GROWING AREA WN – Sheepscot River

Sanitary Survey Report, 2008

Final Report:

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APPROVAL

Division Director:

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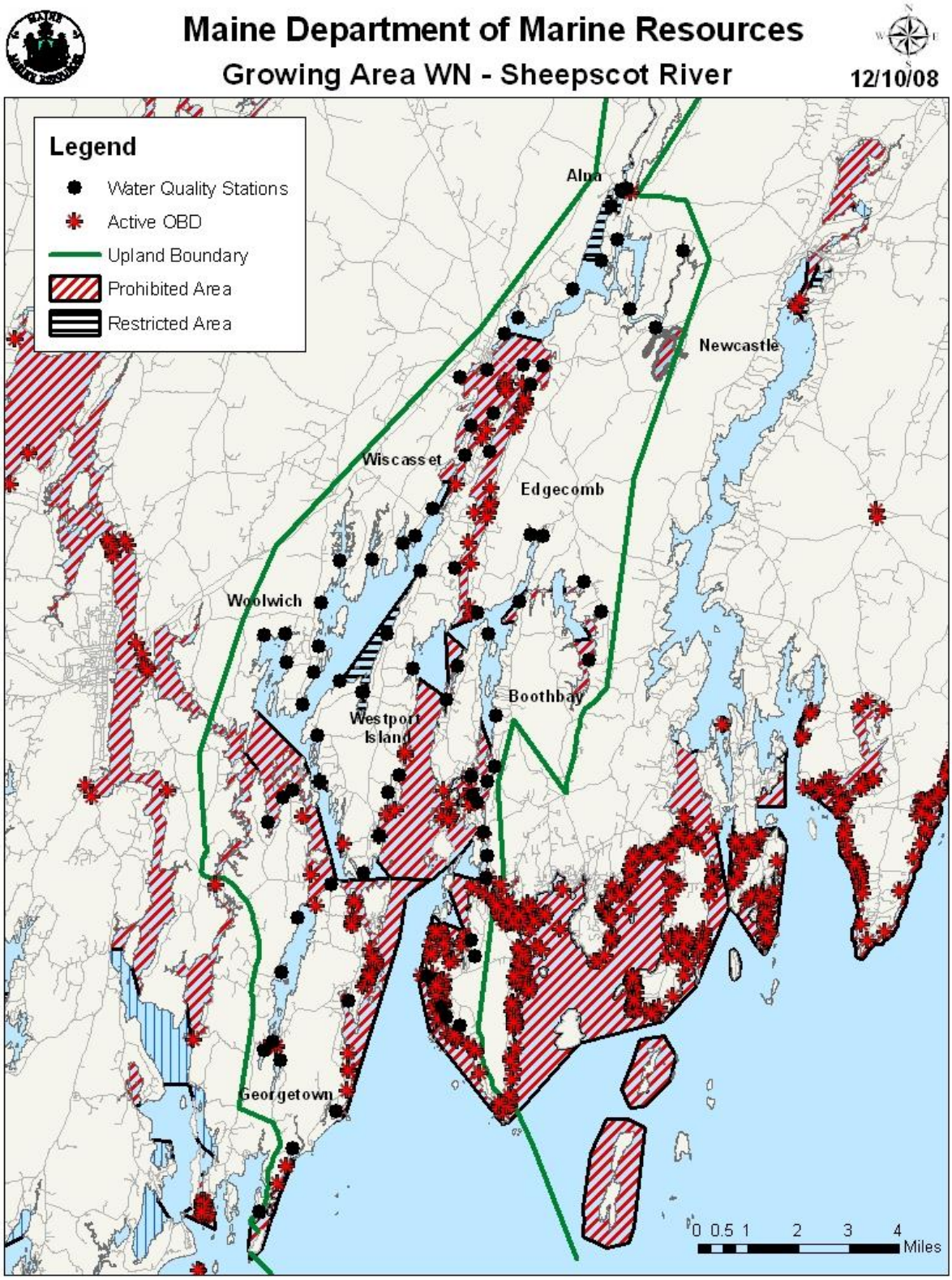


Figure 2. Growing Area Detail- Upper Sheepscot River

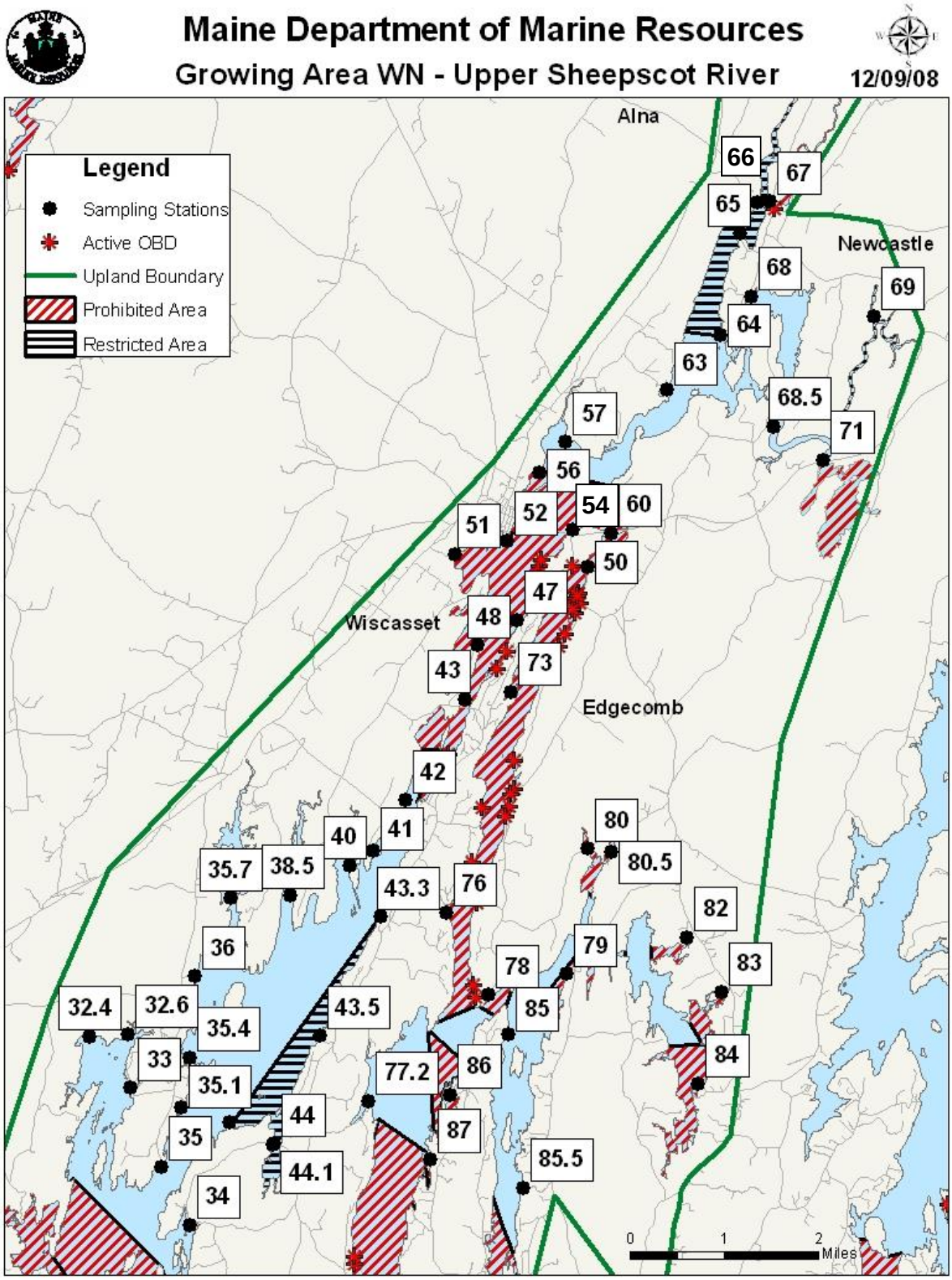
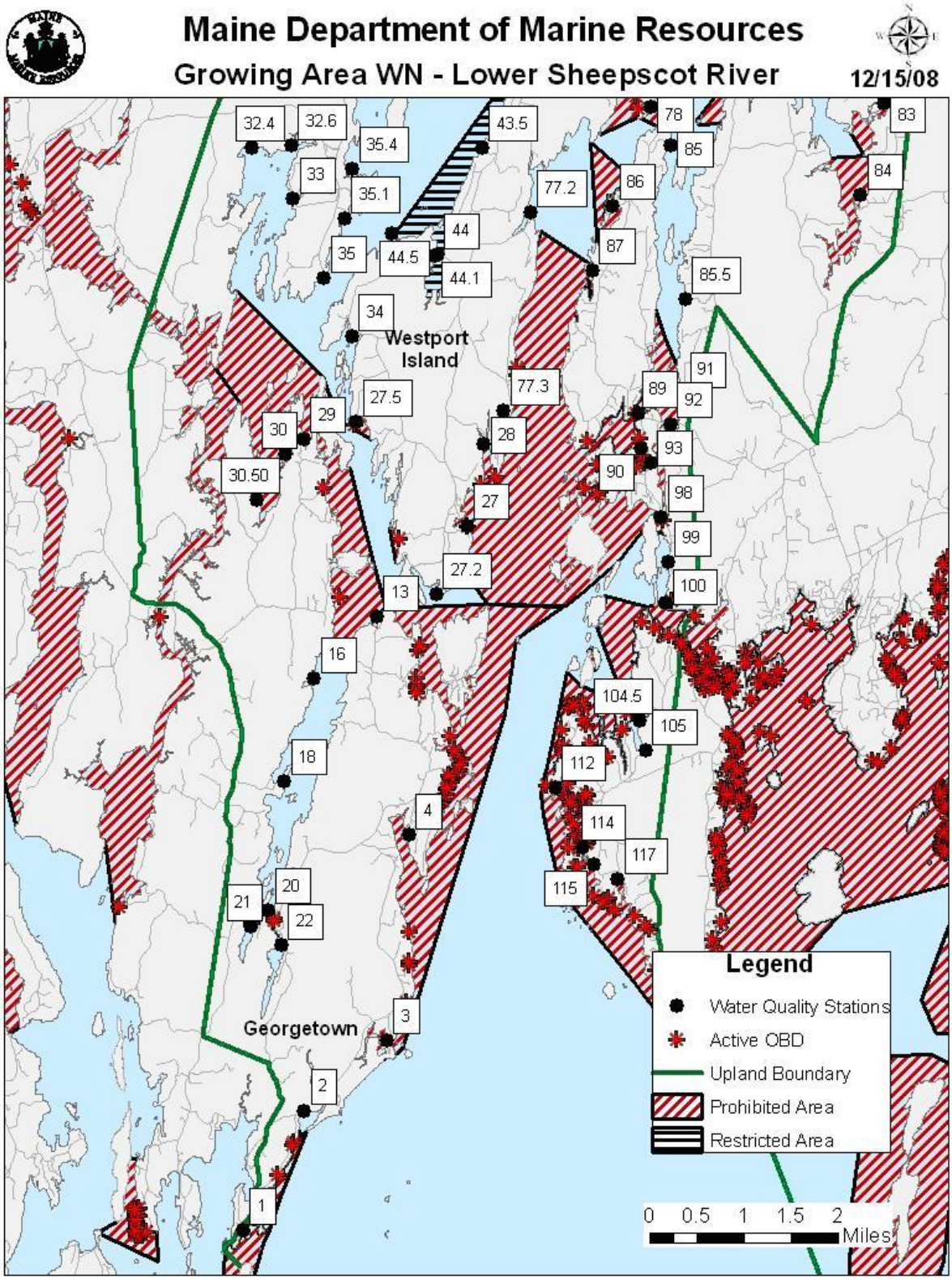


Figure 3. Growing Area Detail- Lower Sheepscot River



Executive Summary

This is a sanitary survey report for growing area WN written in compliance with the requirements of the 2007 Model Ordinance and the National Shellfish Sanitation Program (NSSP). This report includes a water quality review, based on water quality data collected through 2008, as well as an evaluation of all pollution sources identified between 1996 and 2008, and a re-evaluation of major pollution sources located within the boundaries of the area. Pollution sources reviewed in this report include domestic waste, including private in-ground systems and over board discharge (OBDs), marinas, recreational areas, agricultural activities, domestic animal and wildlife areas, stormwater, and non-point pollution transported by streams. Hydrographic and meteorological data are also presented and discussed in this report, including assessments of tides and currents, rainfall, salinity, and river discharge. A discussion of current classifications and recommendations for future work are also presented in this report.

As a result of this report, multiple classification changes were implemented. A closure size surrounding two over board discharges (OBDs) in Georgetown was determined not large enough to protect public health, and its size was increased. Multiple stations located in Montsweag Bay and Brookings Bay (Woolwich and Wiscasset) failed to meet the approved standard and were downgraded to restricted in January 2009. After a review of shoreline survey notes from 2006 where multiple septic malfunctions were noted, but no closures were implemented, the entire area was downgraded from restricted to prohibited. At the present time, the codes enforcement officer for the town of Woolwich is working with the property owners to remediate the problems; any remediation progress that occurs in this area will be presented in the next triennial review of the area. The prohibited area surrounding the western shore of Barters Island, Boothbay, was increased in size, due to station WN 87 (boundary station) not meeting the approved standard in 2008. In Edgecomb, 3 OBDs were recently removed, and the closure surrounding Oven's Mouth was repealed. The closure surrounding a septic system malfunction located on Parsons Creek, Edgecomb was reduced in size based on a dilution calculation; the eastern lobe of Parsons Creek remains prohibited.

The next triennial report for growing area WN will review growing area activities from 2009 through 2011, and will be written in 2012.

Growing Area Description

Growing Area WN includes the Sheepscot River estuary, located in Lincoln County, in midcoast Maine (Figure 1). It encompasses the shellfish growing beds located east of a line from the southwest tip of Salter Island, off Indian Point Georgetown; and east of the Rt # 127 bridge connecting Georgetown and Arrowsic over Back River; and east of a line across Upper Hells Gate on the Sasanoa River from Arrowsic to Barley Neck in Woolwich; and south of a line at Head of Tide in Alna; then west of a line drawn from there to the intersection of Lewis Hill Road and US Rt#1, then to the eastern end of Old County Road, Edgecomb: then following Rt #27S to Lakeside Drive, Boothbay: then west of a line drawn across Townsend Gut from Oak Point to Southport Island; then south along Hendricks Hill Road to the southwestern tip of Southport Island. Detailed maps of the growing area are provided in Figures 2 and 3.

The towns in growing area WN are all located in Lincoln County, approximately 50 miles northeast of the nearest major city of Portland, Maine. Coastal portions of the towns in area WN

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are situated on the Back River, Sasanoa River, Cross River, Robinhood Cove, Little Sasanoa River, Harmon's Harbor, Hockomock Bay, Brookings Bay, Chewonki Creek, Montsweag Bay, Cushman Cove, Polly Clark Cove, Pottle Cove, Hilton Cove, Cod Cove, Squam Creek, McCarty Cove, Greenleaf Cove, Long Cove, Jewell Cove and Fowle Cove. All of these towns and water bodies lie within the Sheepscot River watershed. The river flows through the following towns: Alna, Newcastle, Wiscasset, Edgecomb, Westport, Boothbay, Boothbay Harbor, Southport, Georgetown, Woolwich, and Arrowsic. The growing area's head of tide is located at the Head Tide Dam in Alna; from the head of tide down to Wiscasset is a 5 mile long upper estuary with extensive mud flats and salt marshes. Major streams enter the river here, the Dyer River in Sheepscot Village and the Marsh River and Deer Meadow Brook just above Wiscasset. The Marsh River/Deer Meadow Marsh complex is a highly productive brackish marsh system (rare in Maine) that harbors many threatened and endangered species, including Atlantic Salmon (Maine Rivers 2009). The Sheepscot River estuary is connected with the Kennebec River estuary to the west by the Sasanoa River. Montsweag Bay opens into Hockomock Bay, which receives low salinity water from the Kennebec River estuary through Knubble Bay. Montsweag Bay communicates with the main body of the estuary at the north through Cowseagan Narrows (McAlice and Jaeger 1983). The Sheepscot River continues south from Wiscasset for about 17.5 miles before it empties into the Atlantic Ocean.

The 2007 census indicated the town of Alna had a year-round population of 680. Primary sources of employment in Alna are construction, health care and educational services. Alna does not have a municipal shellfish program and does not issue licenses to harvesters. The town of Arrowsic has a year-round population of 509 as reported by the 2007 census. The most common sources of employment are transportation equipment, construction, health care and education. Arrowsic had 3 licensed commercial shellfish harvesters in 2007.

The town of Boothbay has a year-round population of 3,223 as reported by the 2007 census. The most common sources of employment are construction, agriculture/forestry/fishing, health care and education. Boothbay did not issue any commercial shellfish harvester's licenses in 2007. The town of Boothbay Harbor has a year-round population of 1,277 as reported by the 2007 census. The most common sources of employment are construction, agriculture/ forestry/fishing, health care, accommodation and education. Boothbay Harbor did not issue any commercial shellfish harvester's licenses in 2007.

The town of Edgecomb has a year-round population of 1,247 as reported by the 2007 census. The most common sources of employment are construction, agriculture/forestry/fishing, health care and education. Edgecomb did not issue any commercial shellfish harvester's licenses in 2007. The town of Georgetown has a year-round population of 1,124 as reported by the 2007 census. The most common sources of employment are construction, transportation equipment, agriculture/forestry/fishing, health care and education. Georgetown issued 19 commercial shellfish harvester's licenses in 2007. The town of Newcastle has a year-round population of 1,960 as reported by the 2007 census. The most common sources of employment are transportation equipment, agriculture/forestry/fishing, health care and education. Newcastle issued 13 commercial shellfish harvester's licenses in 2007. The town of Southport has a year-round population of 686 as reported by the 2007 census. The most common sources of employment are construction, public administration, agriculture/forestry/fishing, finance/insurance and education. Southport did not issue any commercial shellfish harvester's licenses in 2007.

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The town of Westport has a year-round population of 822 as reported by the 2007 census. The most common sources of employment are construction, transportation equipment, professional/technical and education. Westport issued 2 commercial shellfish harvester's licenses in 2007. The town of Wiscasset has a year-round population of 1,242 as reported by the 2007 census. The most common sources of employment are construction, health care, professional/technical and education. Wiscasset issued 14 commercial shellfish harvester's licenses in 2007. The town of Woolwich has a year-round population of 2,911 as reported by the 2007 census. The most common sources of employment are construction, health care, transportation equipment and education. Woolwich issued 14 commercial shellfish harvester's licenses in 2007.

Land use in the study area is dominated by year-round residential properties. Sections of dense shoreline development are punctuated by large tracts of undeveloped land. Some seasonal properties remain but many of the seasonal properties are being converted to year-round use throughout the area. The heaviest development is found in Wiscasset along the shores of the Sheepscot River. New development since 2006-2007 has occurred on Davis Island, Edgecomb which is across the river from Wiscasset's downtown area. The rest of the area is pastoral farmland with few residential homes, farms and conservation lands. Approximately 60% of the watershed is forested, another 17% is pasture and hay fields, 7% is wetland, 3.7% is clear cut or partially cut forest, 3.6% is shrub scrubland, 2.2% cropland, 2.1% open water, and 1.8% rural residential (Whiting 2006). Residential development is rapidly increasing in the watershed, especially along waterways. In the eight towns assessed in the *Land Use Regulations Assessment for Towns in the Sheepscot River Watershed*, population growth over the decade between 1990 and 2000 averaged 3.5 times the growth rate for the state (McLean et al. 2007).

The shoreline in growing area WN is typical of mid-coast Maine, with rockbound points and shoreline separating shallow coves and harbors (example: Pottle's Cove, Harmon's Harbor, Robinhood Cove, Five Islands). The muddy and gravel bottoms in these coves frequently provide excellent habitat for soft shell clams and mussels. Fresh water influence comes from upland rivers and streams; Deer Meadow Brook, Ward Brook, Montsweag Brook, Parsons Creek/Lily Pond, Little River and other small seasonal brooks and streams.

History of Growing Area Reports and Classifications

Reports (1995-2006)

The last sanitary survey report for growing area WN in its entirety was written in 1990. After 1990, multiple sanitary survey reports were written for small segments and coves within the WN growing area boundary.

Sanitary Surveys on file:

- Sanitary Survey for Brookings Bay, Woolwich – 1996
- Sanitary Survey for Murphy's Corner, Woolwich – 1996
- Sanitary Survey for Woolwich – 1999 [data from 1993-1998]
- Sanitary Survey for Back River, Wiscasset – 1996 [data from 1989-1996]

- Sanitary Survey for Upper Sheepscot River, Wiscasset – 1997 [data from 1992-1997]
- Sanitary Survey for White's Island, Wiscasset – 1997 [data from 1991-1997]
- Sanitary Survey for McCarty and Fowle Coves, Westport Island – 1995 [data from 1992-1995 and >30 samples]
- Sanitary Survey for Cod Cove, Edgecomb – 1996 [data from 1990-1995]
- Sanitary Survey for Rocky Point, Barter's Island, Boothbay – 1996 [data from 1989-1996]
- Sanitary Survey for Chewonki Creek, Wiscasset - 1995 [data from 1992-1995]
- Sanitary Survey for Bailey Cove and Young's Point Cove, Wiscasset – 1994
- Sanitary Survey for Robinhood Cove, Georgetown – 1996
- Sanitary Survey for Cushman Cove, Wiscasset – 1994
- Sanitary Survey for Polly Clark Cove, Wiscasset – 1995 [data from 1994-1995]
- Sanitary Survey for Montsweag Bay, Woolwich 1995 [data from 1992-1995]
- Sanitary Survey for Boothbay Harbor to Southport 2005
- Sanitary Survey for Westport Island 2006

The last triennial review for area WN was written in 2006.

History of Area Classifications (1997-2008)

The historical records of legal notices for area WN readily available to the author at the time of this report are presented below. Additional records can be obtained from the Maine State Archives in Augusta, ME.

2008:

September 19, 2008 (Area No. 21-A); amendment classifies Sherman Lake (Newcastle) as prohibited. This is an administrative closure. There has been no shoreline survey or water quality assessment in the area.

July 25, 2008 (Area No. 21-D); amendment reclassifies several areas in the Sheepscot River, Back River and Cross River area from "prohibited" to "approved" as a result of recent shoreline survey.

April 16, 2008 (Area No. 21-C); amendment reclassifies the area around Young's Point, Chewonki Creek and Bailey Point from "Prohibited" to "Approved" due to the completion of a recent shoreline survey.

March 27, 2008 (Area No. 23-A); amendment changes the title of this rule to Area No. 23-A, Upper Damariscotta River (Newcastle, Nobleboro, Damariscotta). There are no classification changes in this rule.

March 24, 2008 (Area No. 21-C); amendment reclassifies the area around Oak Island from "Prohibited" to "Approved," due to verification that there are no identified pollution sources in that area; and adjusts the "Prohibited" closure line near Chewonki Neck to better defined points of sight for enforcement purposes; this area remains classified as "Prohibited" due to a lack of recent sanitary survey (no survey in at least 12 years).

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March 18, 2008 (Area No. 21-C); amendment changes the title of the rule from Area No. 22, Sheepscot River (Wiscasset, Westport Island, Edgecomb) to Area No. 21-C, Back River and Montsweag Bay (Woolwich, Wiscasset, Westport Island); moves the areas described in A.1., A.3., and B. to Area No. 21-B; and reclassifies two areas in Montsweag Bay from “Approved” to “Prohibited,” due to a lack of recent shoreline survey (no survey in at least 12 years).

March 18, 2008 (Area No. 21-A); amendment changes the title of the rule from Closed Area No. 22-E, Western Barters Island, Boothbay, to Area No. 21-B, Sheepscot River (Wiscasset, Westport Island, Edgecomb); moves the areas previously described in 22-E to Area No. 21-D; includes areas previously described in Area No. 22; and reclassifies several “Approved” and “Conditionally Approved” areas in Wiscasset and Edgecomb to “Prohibited,” due to declining water quality in Pottle Cove, and a lack of recent shoreline survey in other areas (no survey in at least 12 years).

March 18, 2008 (Area No. 21-D); amendment changes the title of the rule from Closed Area No. 22-F, Ovens Mouth and Cross River, Edgecomb and Boothbay to Area No. 21-D, Sheepscot River (Westport Island, Edgecomb, Boothbay, Boothbay Harbor); AND includes areas previously described in Area No. 22-E, and part of Area 21; AND reclassifies part of the Sheepscot River and its tributaries from “Approved” to “Prohibited,” due to a lack of recent shoreline survey (no survey in at least 12 years).

March 18, 2008 (Area No. 21-E); amendment changes the title of the rule from Closed Area No. 21, Lower Sheepscot River and Tributaries (West), to Area No. 21-E, Hockomock Bay to Robinhood Cove (Woolwich to Georgetown); includes small portions of Area No. 20; moves several of the areas previously found in Area No. 21 to Area No. 21-F. There were no classification changes in this rule.

March 18, 2008 (Area No. 21-F); amendment repeals the emergency DMR Chapter 95.06(P) Closed Area No. 22-C, Cameron Point, Southport, and Vicinity, amended on January 20, 2006, and places the areas previously described there into this rule; repeals DMR Chapter 95.06(N) Closed Area 23-B, Southwestern Southport Island, amended on May 5, 1999, and places the areas previously described there into this rule; amends DMR Chapter 95.06(D) Closed Area No. 23-A, Ebenecook Harbor and Vicinity, Southport, amended on January 25, 2006, and changes the title of the rule to Area No. 21-F, Lower Sheepscot River and Sheepscot Bay (Georgetown, Southport); and reclassifies areas in Ebenecook Cove and Salter Island from “Approved” to “Prohibited,” due to a lack of recent shoreline survey (no survey in at least 12 years).

March 18, 2008 (Area No. 22-B); DMR Chapter 95.06(Q) Closed Area No. 22-B, Hodgdon Island Area, Boothbay, is repealed.

March 18, 2008 (Area No. 22-C); DMR Chapter 95.06(P) Closed Area No. 22-C, Cameron Point, Southport, and Vicinity, is repealed.

March 18, 2008 (Area No. 23-B); DMR Chapter 95.06(N) Closed Area 23-B, Southwestern Southport Island, is repealed.

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2007:

December 21, 2007 (Area No. 22); amendment reclassifies the shore, north of Squam Creek, Westport, as restricted due to non-point pollution.

October 3, 2007 (Area No. 22); amendment reclassifies Squam Creek, Westport as “Restricted”, and requires a special MDMR permit.

September 17, 2007 (Area No. 22); amendment allows the season Conditionally Approved area to open on schedule as there is no longer a threat to public health.

April 19, 2007 (Area No. 22); amendment closes the Conditionally Approved area due to a failure at the Wiscasset WWTP, and administratively combines the areas previously described in Closed Areas No. 20-B and 22, and places them in this notice.

2006:

August 17, 2006 (Area No. 21); amendment opens waters to the south and west of Westport Island, expands the closure on the Woolwich side of Hockomock Bay, administratively changes current closure lines in Hockomock Bay, and incorporates the areas defined in closure 20-E.

June 5, 2006 (Area No. 22-F); amendment closes the southern end of Cross River, Boothbay. Department personnel have determined that the newly closed area is subject to intermittent microbiological pollution and can no longer be opened for shellfish harvest without threat to public health.

January 25, 2006 (Area No. 23-A); amendment is an administrative change to clarify the area description.

January 20, 2006 (Area No 23-A); amendment reduces the size of the closure by opening Loves Cove.

January 20, 2006 (Area No. 22-C); promulgation opens Indiantown Island and several other islands.

January 20, 2006 (Area No. 22-B); amendment is an administrative change to include the Isle of Springs area in this legal notice.

2004:

September 2, 2004 (Area No. 21); amendment re-describes the two closures in the area from Indian Point, Georgetown to McCarty Cove, Westport. This is an administrative change.

June 17, 2004 (Area No. 22-B); amendment closes the small cove south of Tri Cove Road on the east side of Barters Island due to a failing septic system.

1997-2000

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September 21, 2000 (Area No. 22-B); amendment opens more of the shore north of Knickercane Cove, Boothbay.

May 5, 1999 (Area No. 23-B); amendment re-describes the southern boundary of the closure to eliminate an overlapping description with DMR Regulation 95.06 C, Closed Area No. 23, Boothbay Harbor - Damariscove Island Area.

January 2, 1997 (Area No. 22-E): amendment opens Rocky Point Cove on the western shore of Barters Island. The rest of the western shore of Barters will remain closed to the harvest of shellfish.

Current Growing Area Classifications

At the end of 2008, shellfish growing area WN had the following classifications:

Approved (28 stations)

Restricted

Area 21-A: Upper Sheepscot River (Wiscasset, Alna, Newcastle) (3 stations: WN 64, 65, and 66); due to water quality not meeting the approved standard.
Area 21-A: Deer Meadow Brook (Newcastle): (1 station: WN 69); due to water quality not meeting the approved standard.
Area 21-C: Squam Creek area, Westport Island (2 stations: WN 43.5 and 44); due to water quality not meeting the approved standard.

Prohibited

Area 21-A: Dyer River (Newcastle): no stations, due to the presence of OBD.
Area 21-A: Sherman Lake (Newcastle): no stations, due to lack of survey and no water monitoring stations.
Area 21-B: Sheepscot River (Wiscasset, Edgecomb, Westport Island) (9 stations: WN 43, 47, 48, 51, 52, 54, 56, 60, and 76); due to the presence of OBDs, WWTP outfall and/or outdated shoreline survey.
Area 21-C: Back River (Wiscasset, Westport Island), no stations, due to the presence of OBDs.
Area 21-D: northwest shore of Barters Island (1 station WN 86, due to identified pollution sources)
Area 21-D: Cross River (Edgecomb, Boothbay): (1 station, WN 78); due to identified pollution sources.
Area 21-D: Parsons Creek (Edgecomb): (2 stations: WN 80, and 80.5); due to non-point source pollution.
Area 21-D: Ovens Mouth (Edgecomb and Boothbay): (1 station, WN 79); due to presence of OBDs
Area 21-D: Sherman Creek (Edgecomb, Boothbay): (1 station, WN 82); due to non-point source pollution.
Area 21-D: Wildcat Creek (Boothbay): (1 station, WN 83); due to non-point source pollution.
Area 21-D: Cross River (Boothbay): (1 station, WN 84); due to non-point source pollution.

Area 21-D: Sheepscot River (Westport Island and Boothbay): (10 stations: WN 27, 28, 77.3, 87, 89, 90, 91, 92, 93, and 98); due to water quality not meeting the approved. standard, the presence of OBDs, identified pollution sources, and/or expired sanitary survey.
Area 21-E: Hockomock and Knobble Bays (Woolwich, Arrowsic and Georgetown): (4 stations, WN 13, 29, 30, and 30.5); due to the presence of OBDs and water quality not meeting the approved standards.
Area 21-E: Tarbox Cove (Westport): (1 station, WN 27.5); due to the presence of an ODB.
Area 21-E: Bailey Cove (Westport): no station, due to the presence of an OBD.
Area 21-E: southwest lobe of Robinhood Cove (Georgetown): no station; due to the presence of an OBD.
Area 21-E: southeast lobe of Robinhood Cove (Georgetown): no station; due to the presence of an OBD.
Area 21-F: Sheepscot River (Georgetown): (2 stations, WN 3 and 4); due to the presence of OBDs and identified pollution sources.
Area 21-F: Lower Sheepscot River (Georgetown): (1 station, WN 2); due to presence of OBDs and identified pollution sources.
Area 21-F: Lower Sheepscot River (Southport and Boothbay Harbor); (1 station, WN 100); due to the presence of numerous OBDs.
Area 21-F: Ebencook Harbor (Southport): no station, due to lack of sanitary survey
Area 21-F: Lower Sheepscot River (Southport): (4 stations, WN 112, 114, 115 and 117); due to the presence of numerous OBDs.

The following 9 stations have less than 30 data points, and are considered “New” stations: WN 27.2, 35.7, 38.5, 44.1, 44.5, 50, 67, 73, and 104.5; these stations do not have a classification assigned to them.

Please visit the DMR website to view Legal Notices:

Area No. 21-A Upper Sheepscot River and Tributaries (Wiscasset, Alna, Newcastle)
Area No. 21-B Sheepscot River (Wiscasset, Westport Island, Edgecomb)
Area No. 21-C Back River and Montsweag Bay (Woolwich, Wiscasset, Westport Island)
Area No. 21-D Sheepscot River (Westport Island, Edgecomb, Boothbay, Boothbay Harbor)
Area No. 21-E Hockomock Bay to Robinhood Cove (Woolwich to Georgetown)
Area No. 21-F Lower Sheepscot River and Sheepscot Bay (Georgetown, Southport)

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

Current Management Plan(s)

Growing area WN has no conditionally managed areas within its boundaries.

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

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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 Growing Area WN shoreline survey was conducted by the DMR and DEP staff from 1996 through 2008 (Figure 4). Parcel-based tax maps from the towns of Alna, Arrowsic, Boothbay, Boothbay Harbor, Edgecomb, Georgetown, Newcastle, Southport, Westport Island, Wiscasset and Woolwich were used to assign a unique identifier to each lot in the survey area. Basic information on each property (land use, ownership, address, seasonality, etc.) was documented from town information. Vacant lots were recorded for entry into the database in case of future development. All properties within 500 feet of the shore or other water conduits were surveyed; each shoreline property underwent an on-site inspection, including an evaluation of shore-side development. Owners, if present, were asked to provide information about their septic system including age, routine maintenance details and description of any problems they had experienced. Information was recorded in the inspector's notes, and will be presented in this report if indicative of an actual or potential problem. Areas with expired sanitary surveys are re-classified to prohibited classification, until the field work can be completed. Areas that were surveyed in 1997 will be resurveyed by the end of 2009, and the information on these properties will be included in the next triennial report.

The current status of survey work in area WN is as follows: Alna and WN portion of Newcastle were last surveyed in 1997, and will be re-surveyed by the end of 2009; the WN portion of Arrowsic was surveyed in 2006. The towns of Boothbay and Boothbay Harbor were surveyed as follows: Hogden Island and the east shore of Sawyer Island were surveyed in 2008; the Indiantown Island area was surveyed in 2001, the shoreline of Boothbay Harbor was surveyed in 2008; the northern and eastern shore of Barters Island were surveyed in 2008; the remaining areas in Boothbay have an expired survey and are classified as prohibited. The southern portion of Edgecomb (Cross River area, including Ovens Mouth) was last surveyed in 2008; the remaining area has an expired survey and is classified as prohibited. The shoreline in Georgetown was surveyed in 2006. Newcastle was surveyed in 1997 and that survey will be updated by the end of 2009. Due to the presence of multiple OBDs, most of the Southport shoreline is classified as prohibited, and therefore, there are no shoreline survey records on file for properties other then those having OBDs. The only parts of Southport that have a current shoreline are Loves Cove, surveyed in 2005, and Boston, Spectacle, Big Green and Little Green Islands that were also surveyed in 2005. Portions of Westport Island were surveyed in 2003 and 2004, and Squam Creek was surveyed in 2008; the remaining portions were surveyed in 1997 and will be resurveyed by the end of 2009. Wiscasset was surveyed from 2006 to 2008; Woolwich was surveyed in 2006. Problems found during shoreline survey work were reported to the Codes Enforcement Officer (CEO) and/or Licensed Plumbing Inspector (LPI) for each individual town. Figure 4 provides years that growing area WN was surveyed; all areas in marked in red are due to expire in 2009. If these areas are not surveyed by the end on 2009, the shellfish flats adjacent to them will be reclassified as prohibited.

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

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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, municipal waste water treatment facilities, industrial pollution sources, marinas and mooring fields, stormwater discharges, non-point source pollution from streams, agricultural and domestic animal activity, wildlife and conservation/recreation areas.

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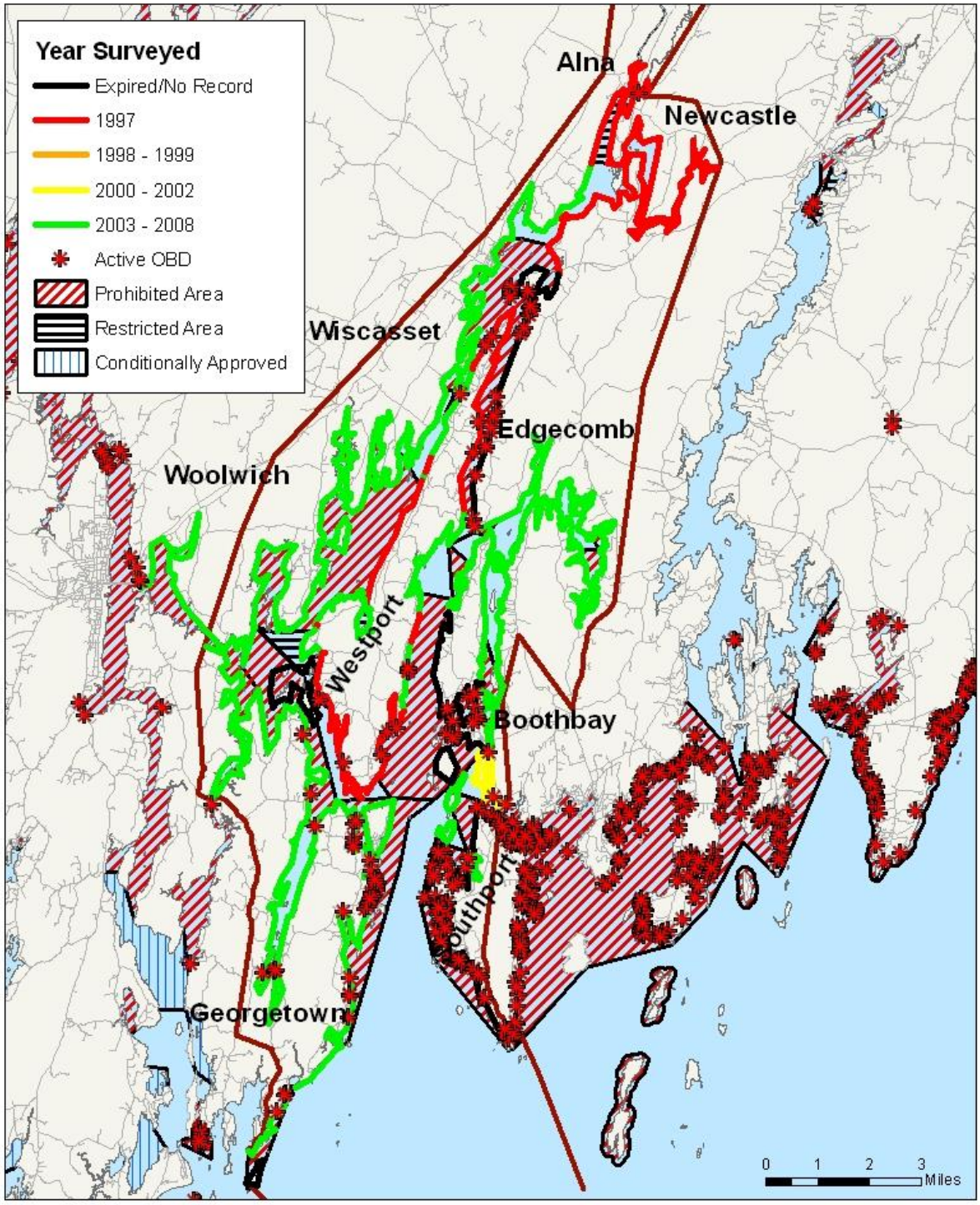
Figure 4. Shoreline Survey Status, Growing Area WN



Identification and Evaluation of Pollution Sources

Domestic Waste

The majority of buildings in this growing area have private waste disposal systems, including inground septic systems, holding tanks, compositing or incinerating toilets, and outhouses. The individual septic systems are the principal form of residential wastewater treatment in all the towns in WN. Many of the systems were installed before the plumbing code was updated in 1974 and may provide little or no treatment. Malfunctioning septic systems may cause sewage to back up in the home, break out at the surface, run off in surface water, or seep undetected into groundwater or cracks in the bedrock. Septic systems may malfunction due to inadequate maintenance, overloading or poor design and construction (e.g. septic systems installed before the plumbing code revision may not meet current public health standards because they are sited in areas with poor soil conditions and shallow depth to bedrock). Private waste disposal systems that were identified as actual or potential sources of pollution during the most recent sanitary survey field inspections are presented in Table 1; actual pollution problems are presented in Figure 5, potential pollution problems are presented in Figures 6 and 7. All identified problems were reported to the respective town CEO or LPI for follow up work; closures were made surrounding actual and potential pollution sources that were determined to have a potential to adversely impact water quality (see Water Quality Discussion and Classification Determination section for more information). Information and updates to pollution source status, based on follow-up surveys conducted by the town's CEO/LPI are reflected in bold font in Table 1; problems which have been remediated or resolved are highlighted in yellow. DMR will continue to work with towns, landowners and DEP to correct these problems, and will re-evaluate the closures as problems are abated.

Table 1. Identified Domestic Waste Actual (A) and Potential (P), (Direct (D) and Indirect (I)) Problems, Growing Area WN

Town	Pollution ID	A or P	D or I	Pollution Description	Survey Date
Boothbay	BOOTH PS 20	A	D	Active straight pipe	07-May-08
	BOOTH PS 23	A	D	Grey water straight pipe	07-May-08
	BOOTH PS 24	A	D	Cesspool malfunction	07-May-08
	BOOTH PS 32	A	D	Grey water pipe	14-Apr-08
	BOOTH PS 22	A	I	IGS malfunction	07-May-08
	BOOTH PS 27	A	I	IGS malfunction; **Scheduled to be fixed in Spring 2009**	24-Apr-08
	BOOTH PS 28	A	I	IGS malfunction; **Scheduled to be fixed in Spring 2009**	24-Apr-08
	BOOTH PS 31	A	I	Gray water discharge	14-Apr-08
	BOOTH PS 33	A	I	Grey water pipe	14-Apr-08
	BOOTH PS 35	A	I	Grey water pipe to stream	15-Apr-08
	BOOTH PS 38	A	I	Cesspool malfunction, **CONFIRMED FIXED**	27-May-08
	BOOTH PS 16	P	D	Inactive straight pipe	09-May-08
	BOOTH PS 17	P	D	Inactive straight pipe	09-May-08
	BOOTH PS 18	P	D	Inactive straight pipe	09-May-08

Town	Pollution ID	A or P	D or I	Pollution Description	Survey Date
	BOOTH PS 14	P	I	Leachfield overgrown with trees	20-May-08
	BOOTH PS 1	P	I	Leachfield lacking or poorly constructed	11-Jun-08
	BOOTH PS 13	P	I	Potential discharge into stream	20-May-08
	BOOTH PS 15	P	I	Lacking sewer system	09-May-08
	BOOTH PS 19	P	I	Holding tank	07-May-08
	BOOTH PS 21	P	I	Overflowing cesspool, sloped away from shore	07-May-08
	BOOTH PS 26	P	I	Sewage odor near system; dye test negative.	24-Apr-08
	BOOTH PS 29	P	I	Potential leachfield malfunction	07-May-08
	BOOTH PS 34	P	I	IGS system inadequate	15-Apr-08
	BOOTH PS 36	P	I	Drain pipe to shore	27-May-08
	BOOTH PS 40	P	I	Unknown system located close to stream	30-May-08
Boothbay Harbor	BBH N PS 4	A	D	Gray water discharge	31-May-01
	BBH N PS 6	P	D	Inactive straight pipe	13-Jun-01
	BBH N PS 5	P	I	Old system	13-Jun-01
Edgecomb	EDGE PS 1	A	I	Septic overflow pipe, design for new system	19-Jun-08
	EDGE PS 3	A	I	Possible IGS malfunction	12-Jun-08
	EDGE PS 2	P	I	Pipes from house to shore	19-Jun-08
Georgetown	GEOR N PS 15	A/**P**	D	Failing cesspool; alarm not functioning; **LPI re-checked, confirmed no problem**	05-Dec-06
	GEOR N PS 16	A	D	Cesspool discharge to stream	05-Dec-06
	GEOR N PS 17	A	D	Licensed ODB to stream	05-Dec-06
	GEOR N PS 27	A/**P**	D/**I**	IGS malfunction; **LPI re-checked, confirmed no problem**	21-Sep-06
	GEOR N PS 28	A/**P**	D/**I**	IGS malfunction; **LPI re-checked, confirmed no problem; new system being constructed**	21-Sep-06
	GEOR N PS 32	A/**P**	D/**I**	IGS malfunction; **LPI re-checked, confirmed no problem**	25-Sep-06
	GEOR N PS 35	A/**P**	D/**I**	IGS malfunction; **LPI re-checked, confirmed no problem**	25-Sep-06
	GEOR N PS 37	A	D	Gray water discharge	25-Sep-06
	GEOR N PS 67	A	D	Gray water discharge, outhouse 80 ft from shore	25-Oct-06
	GEOR N PS 75	A	D	Donkey in pasture near shore	25-Oct-06
	GEOR N PS 76	A	D	Wastepipes from house to shore; sewage odor	25-Oct-06
	GEOR N PS 78	A	D	IGS malfunction	07-Nov-06
	GEOR N PS 83	A	D	Outhouse directly on the shore	19-Sept-06
	GEOR N PS 2	A/**P**	I	IGS malfunction; **LPI confirmed new septic tank, no evidence of**	12-Dec-06

Town	Pollution ID	A or P	D or I	Pollution Description	Survey Date
				problem	
	GEOR N PS 3	A/**P**	I	Holding tank with discharge pipe; odor; **LPI confirmed pipe is land drain, no evidence of problem**	12-Dec-06
	GEOR N PS 4	A/**P**	I	Holding tank with discharge pipe; odor; **LPI confirmed pipe is land drain, no evidence of problem**	12-Dec-06
	GEOR N PS 5	A/**P**	I	IGS malfunction; **LPI re-checked, new system installed, older tank not being used and will be filled in with sand/gravel**	12-Dec-06
	GEOR N PS 19	A	I	IGS malfunction	12-Dec-06
	GEOR N PS 10	P	D	Outhouse close to shore, graywater	05-Dec-06
	GEOR N PS 11	P	D	Pipe with discharge	05-Dec-06
	GEOR N PS 18	P	D	Holding tank 5 ft from shore	12-Dec-06
	GEOR N PS 39	P	D	Unknown system near gully to shore	25-Sep-06
	GEOR N PS 47	P	D	Multiple land drains to shore	27-Oct-06
	GEOR N PS 62	P	D	Holding tank 5 ft from shore	06-Nov-06
	GEOR N PS 64	P	D	Outhouse 80 ft from shore	25-Oct-06
	GEOR N PS 79	P	D	No leachfield installed	07-Nov-06
	GEOR N PS 1	P	I	Tank located 1 ft from shore**; LPI confirmed location of tank and field; no evidence of problem at either**	12-Dec-06
	GEOR N PS 6	P	I	No leachfield installed	12-Dec-06
	GEOR N PS 8	P	I	Holding tank 5 ft from shore	05-Dec-06
	GEOR N PS 26	P	I	Possible problem with septic pipe	21-Sep-06
	GEOR N PS 43	P	I	Holding tank	28-Sep-06
	GEOR N PS 45	P	I	Leach field wet around edges	28-Sep-06
	GEOR N PS 52	P	I	Unknown, old system	27-Oct-06
	GEOR N PS 54	P	I	Drains into dry well	27-Oct-06
	GEOR N PS 56	P	I	Drains into dry well	27-Oct-06
	GEOR N PS 57	P	I	Land drain to shore	27-Oct-06
	GEOR N PS 80	P	I	Cellar Drain, wildlife feces	07-Nov-06
	GEOR N PS 59	P	D	Holding tank	06-Nov-06
	GEOR N PS 81	P	I	Possible problem with septic system	25-Sept-06
	GEOR N PS 82	P	I	Outhouse close to shore	19-Sept-06
Westport	WESTP PS 1	P	I	Old holding tank	01-Sep-04
	WESTP PS 3	P	I	Potential IGS problem, recheck recommended	01-Sep-04
Wiscasset	WISC PS 4	A	D	IGS malfunction	06-May-08
	WISC PS 3	P	D	Very old IGS system	09-Nov-06
Woolwich	WOOL PS 7	A/**P**	I	IGS malfunction **Confirmed FIXED**	17-Oct-06

Town	Pollution ID	A or P	D or I	Pollution Description	Survey Date
	WOOL PS 8	A	I	IGS malfunction	26-Oct-06
	WOOL PS 9	A	I	IGS malfunction	26-Oct-06
	WOOL PS 10	A/**P**	I	IGS malfunction; **Confirmed FIXED**	07-Nov-06
	WOOL PS 11	A/**P**	I	IGS malfunction; **Confirmed FIXED**	17-Oct-06
	WOOL PS 6	A	D	Water running downhill from leachfield	07-Nov-06
	WOOL PS 1	P	I	Potential IGS problem, recheck often; **LPI confirmed to be functioning with no problem**	17-Oct-06
	WOOL PS 4	P	I	Wet spot on leachfield; **LPI confirmed to be functioning with no problem**	26-Oct-06
	WOOL PS 5	P	I	Wet spot on leachfield; **LPI confirmed to be functioning with no problem**	07-Nov-06

Since the sanitary survey field work was completed, several of the identified pollution sources have been abated. In Woolwich, an inground septic system that was reported to be malfunctioning (WOOL PS 8) has been replaced with a new system in August 2007; this was confirmed by the DEP in February 2009. In Boothbay, a malfunctioning cesspool (BOOTH PS 38) was replaced with an inground septic system in July 2008. Additionally, the town of Boothbay secured funding through the Small Communities Grant Program to replace two pollution sources: BOOTH PS 27 and BOOTH PS 28. Construction work for these two systems is scheduled to begin in the spring of 2009. The town of Boothbay is working to obtain additional funding to replace additional systems.

Figure 5. Sheepscot River, Actual Problems (Direct and Indirect)

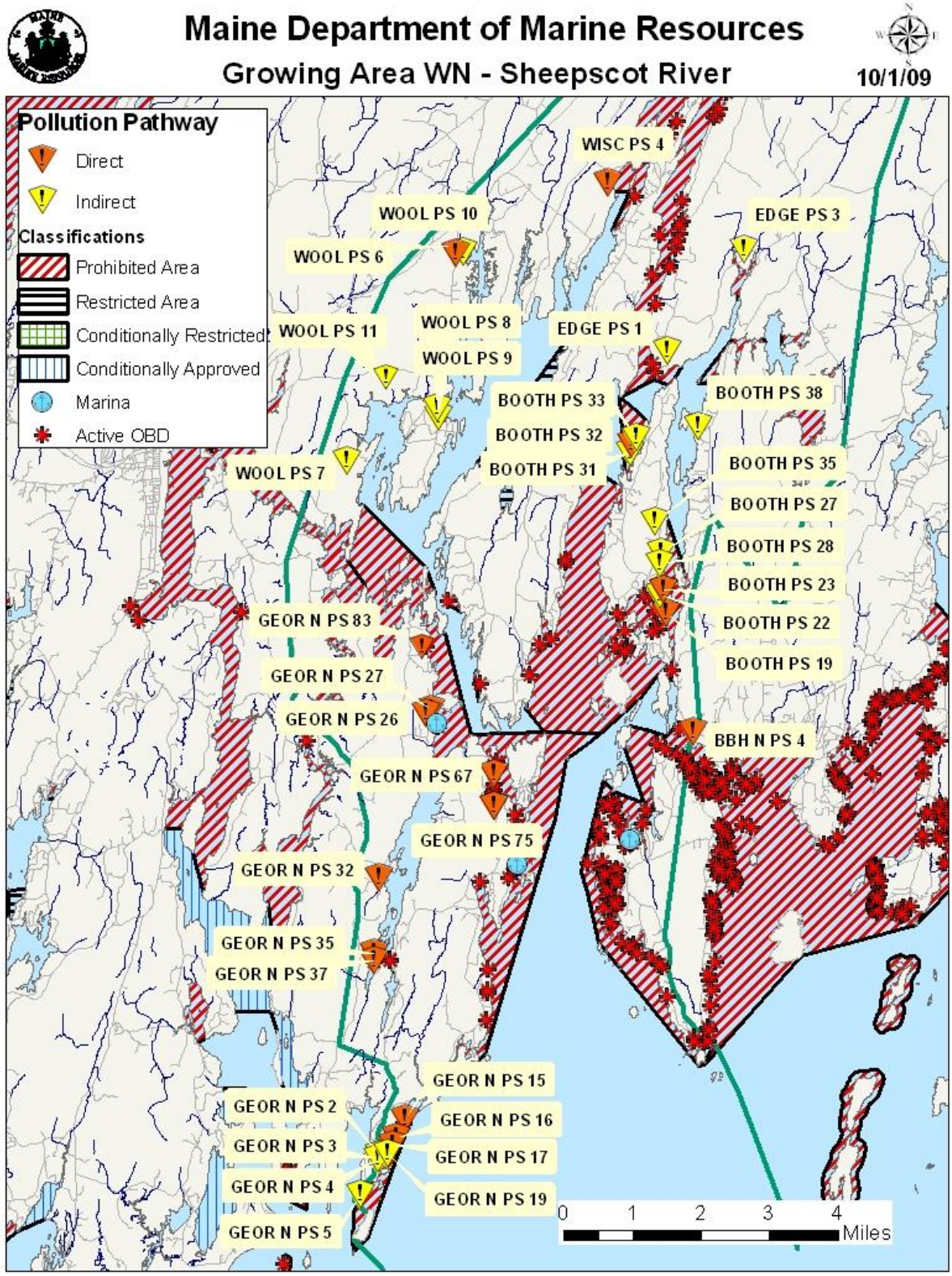


Figure 6. Upper Sheepscot River, Potential Problems (Direct and Indirect)

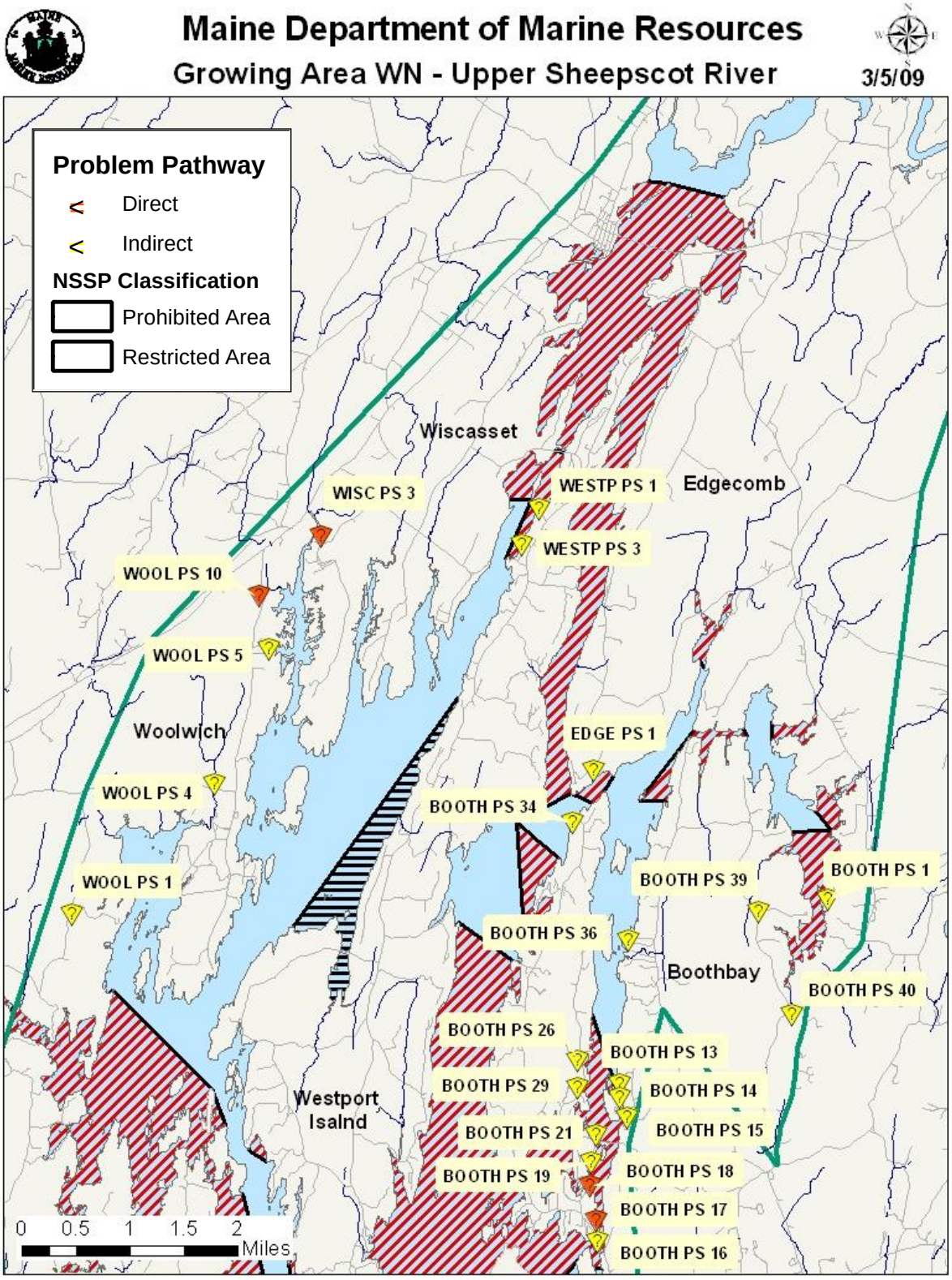
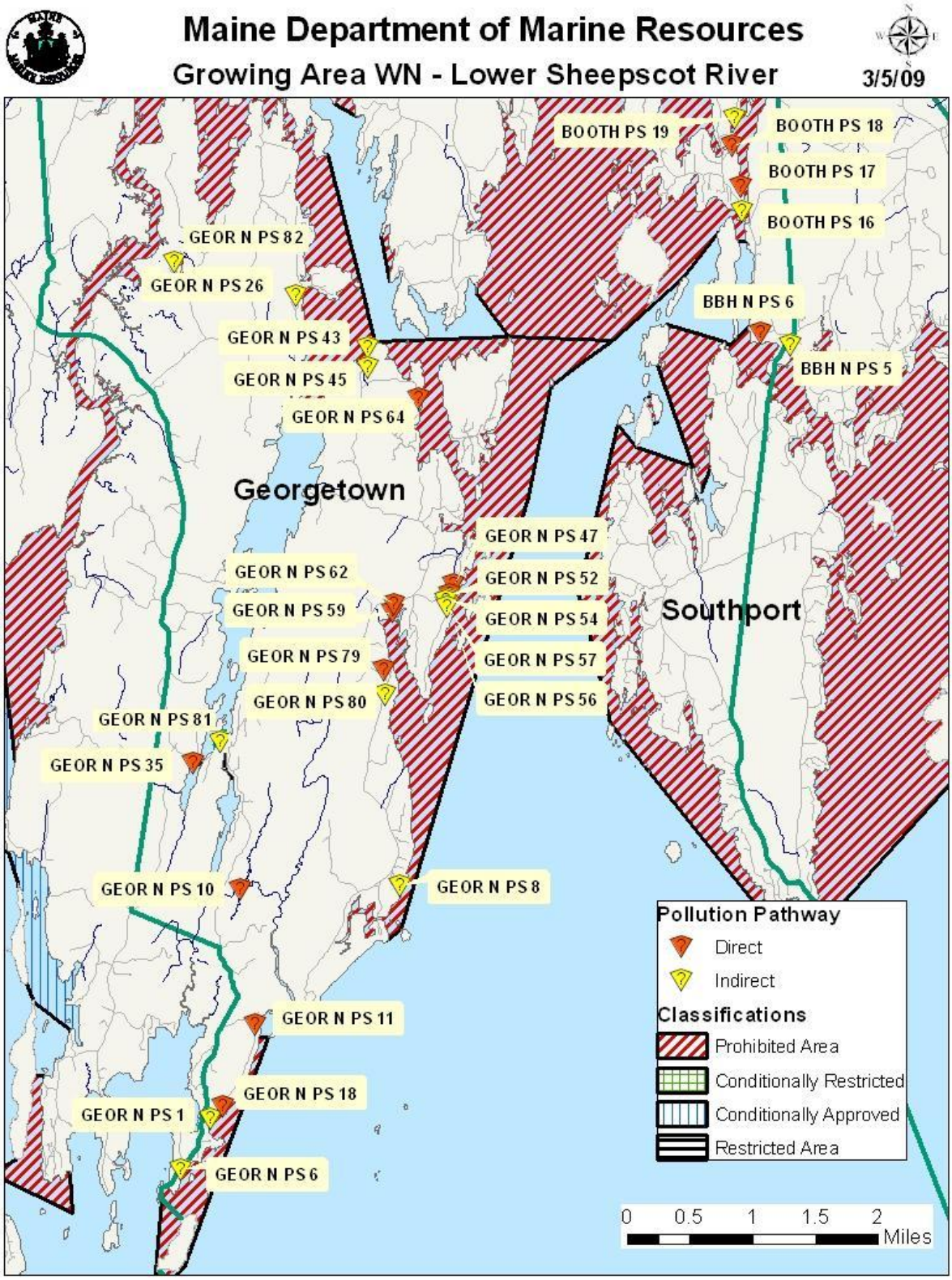


Figure 7. Lower Sheepscot River, Potential Problems (Direct and Indirect)



There are 158 active licensed overboard discharges (OBDs) in growing area WN (Figure 8). An overboard discharge (OBD) is the discharge of wastewater from residential, commercial, and publicly owned facilities to Maine's streams, rivers lakes, and the ocean. Commercial and residential discharges of sanitary waste have been regulated since the mid-1970's when most direct discharges of untreated waste were banned. Between 1974 and 1987 most of the "straight pipes" were connected to publicly-owned treatment works or replaced with standard septic systems. Overboard discharge treatment systems were installed for those facilities that were unable to connect to publicly-owned treatment works or unable to install a septic system because of poor soil conditions or small lot sizes.

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

OBDs are licensed and inspected by the Maine Department of Environmental Protection. 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 located in growing area WN (Table 2). 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 $1.4X10^5$ fc/100 ml. All closures, with the exception of a closure surrounding OBDs 3751 and 2504, located in Georgetown, are of adequate size to protect public health. The closure in Georgetown was increased in size on June 8, 2009. The size of closures surrounding OBDs located in areas where the entire shoreline is classified as prohibited (ex: Southport, east shore Westport Island) were not evaluated.

Figure 8. Growing Area WN OBD Locations (red symbols are active OBDs; green symbols are removed OBDs)

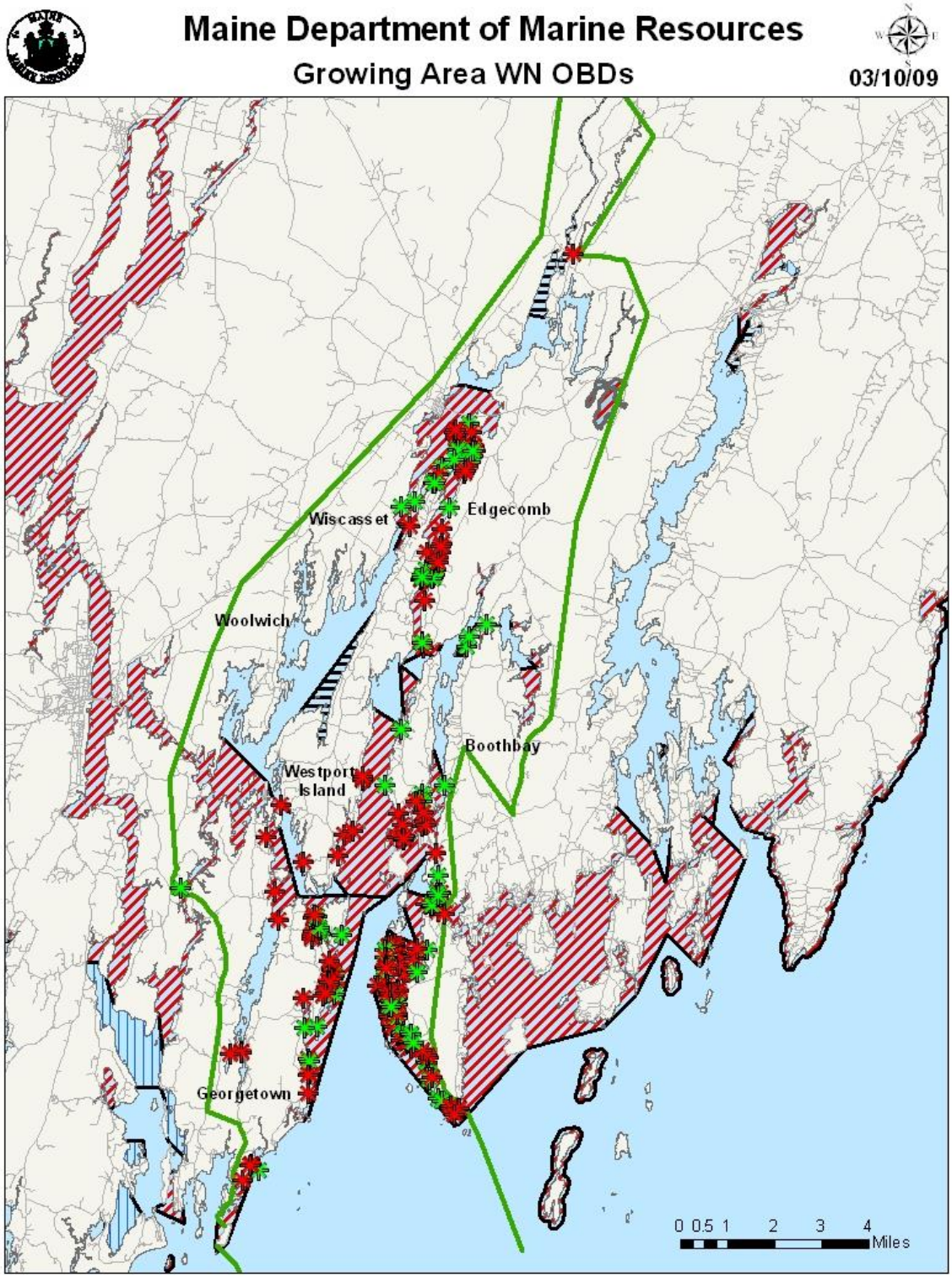


Table 2. Active Licensed Overboard Discharges in Growing Area WN, with required and actual closure sizes (acres)

DEP ID	TOWN	FLOW (GPD)	RECEIVING WATER BODY	PRIORITY REMOVAL	Required Closure (acres)	Actual Closure (acres)
1746	BOOTHBAY	300	SHEEPSCOT RIVER	Y	2.21	Entire Shoreline Prohibited
1813	BOOTHBAY	450	SHEEPSCOT RIVER		2.76	
1961	BOOTHBAY	150	SHEEPSCOT RIVER		0.92	
2167	BOOTHBAY	450	SHEEPSCOT RIVER	Y	2.76	
2301	BOOTHBAY	300	CLAM COVE		1.77	
2917	BOOTHBAY	500	SHEEPSCOT RIVER	Y	3.07	
3017	BOOTHBAY	500	SHEEPSCOT RIVER		3.07	
3524	BOOTHBAY	300	SHEEPSCOT RIVER		1.84	
3978	BOOTHBAY	300	SHEEPSCOT RIVER		1.84	
6133	BOOTHBAY	300	BACK RIVER		1.88	
6841	BOOTHBAY	500	BACK RIVER		3.13	
7771	BOOTHBAY	300	SHEEPSCOT RIVER	Y	1.84	
3385	BOOTHBAY HARBOR	400	TOWNSEND GUT		2.46	>15
3786	BOOTHBAY HARBOR	300	BACK RIVER	Y	1.84	>10
3312	EDGECOMB	250	SHEEPSCOT RIVER		1.53	>30
2130	EDGECOMB	300	SHEEPSCOT RIVER		1.84	
129	EDGECOMB	360	SHEEPSCOT RIVER		2.21	Entire Western Shores Closed
1037	EDGECOMB	300	SHEEPSCOT RIVER		1.84	
1253	EDGECOMB	300	SHEEPSCOT RIVER		3.07	
1616	EDGECOMB	500	SHEEPSCOT RIVER		3.07	
1827	EDGECOMB	300	SHEEPSCOT RIVER		1.84	
1829	EDGECOMB	500	SHEEPSCOT RIVER	Y	3.07	
1830	EDGECOMB	250	SHEEPSCOT RIVER		1.53	
1839	EDGECOMB	400	WISCASSET HARBOR	Y	2.46	
2307	EDGECOMB	300	SHEEPSCOT RIVER		1.84	
2387	EDGECOMB	300	SHEEPSCOT RIVER	Y	1.84	
2388	EDGECOMB	300	SHEEPSCOT RIVER		2.03	
2410	EDGECOMB	300	SHEEPSCOT RIVER		1.84	
2448	EDGECOMB	150	SHEEPSCOT RIVER		0.92	
2703	EDGECOMB	300	SHEEPSCOT RIVER		1.84	
3060	EDGECOMB	300	SHEEPSCOT RIVER		1.84	
3351	EDGECOMB	780	SHEEPSCOT RIVER		4.79	
3606	EDGECOMB	400	SHEEPSCOT RIVER	Y	2.46	
3752	EDGECOMB	400	SHEEPSCOT RIVER	Y	2.46	
3859	EDGECOMB	300	SHEEPSCOT RIVER	Y	1.84	
3985	EDGECOMB	500	SHEEPSCOT RIVER	Y	3.07	

DEP ID	TOWN	FLOW (GPD)	RECEIVING WATER BODY	PRIORITY REMOVAL	Required Closure (acres)	Actual Closure (acres)
4132	EDGECOMB	420	SHEEPSCOT RIVER		2.58	
4590	EDGECOMB	400	SHEEPSCOT RIVER	Y	2.46	
5201	EDGECOMB	315	SHEEPSCOT RIVER		1.93	
742	GEORGETOWN	300	SHEEPSCOT RIVER		1.84	Entire Shore Prohibited (Closure >700 Acres)
1448	GEORGETOWN	1200			7.37	
2011	GEORGETOWN	450			4.60	
2477	GEORGETOWN	300			1.84	
2702	GEORGETOWN	300			1.84	
2737	GEORGETOWN	450			2.76	
2849	GEORGETOWN	300			1.84	
3232	GEORGETOWN	300			1.84	
3340	GEORGETOWN	450	FIVE ISLANDS HARBOR		2.76	
3774	GEORGETOWN	300			2.21	
3392	GEORGETOWN	300	SHEEPSCOT BAY		1.84	
3562	GEORGETOWN	300			1.84	
4085	GEORGETOWN	300			1.84	
4095	GEORGETOWN	1500			9.21	
5063	GEORGETOWN	400	SHEEPSCOT RIVER		2.46	
6244	GEORGETOWN	540			4.60	
6579	GEORGETOWN	475			2.92	
6817	GEORGETOWN	500			3.07	
6855	GEORGETOWN	300			1.84	
6932	GEORGETOWN	300			1.53	
7228	GEORGETOWN	300			1.84	
7636	GEORGETOWN	600			3.68	
7828	GEORGETOWN	300	HARMONS HARBOR	Y	1.84	>90
3611	GEORGETOWN	300	WHITES COVE		1.84	9.0
3347	GEORGETOWN	300	WHITES COVE		1.84	
2433	GEORGETOWN	300	WHITES COVE		2.30	
3188	GEORGETOWN	300	LITTLE SHEEPSCOT RIVER		0.26	>70
6602	GEORGETOWN	300			0.26	
6911	GEORGETOWN	300			0.26	
3751	GEORGETOWN	300	ROBINHOOD COVE		1.96	3.4; increased to 5 acres on 6/8/09
2504	GEORGETOWN	300	ROBINHOOD COVE		1.96	
4389	GEORGETOWN	300	UPPER ROBINHOOD COVE		1.96	>200
4947	GEORGETOWN	2400			15.67	
5159	GEORGETOWN	10	ROBINHOOD COVE		0.07	0.36
3212	GEORGETOWN	300	KNUBBLE BAY		1.84	>70
3391	GEORGETOWN	300	LOWER SHEEPSCOT BAY		1.84	>45
1660	GEORGETOWN	300			1.84	

DEP ID	TOWN	FLOW (GPD)	RECEIVING WATER BODY	PRIORITY REMOVAL	Required Closure (acres)	Actual Closure (acres)
2108	GEORGETOWN	300			1.53	
7796	NEWCASTLE	300	DYER RIVER		1.84	>6.7
966	SOUTHPORT	300	ATLANTIC OCEAN AT COZY HARBOR		1.77	Entire Southport Shore Classified Prohibited
1013	SOUTHPORT	5000	TOWNSEND GUT		30.69	
1024	SOUTHPORT	300	SHEEPSCOT BAY		1.84	
1039	SOUTHPORT	300	COZY HARBOR		1.77	
1244	SOUTHPORT	300	SHEEPSCOT BAY	Y	1.84	
1289	SOUTHPORT	600	SHEEPSCOT RIVER		3.68	
1467	SOUTHPORT	700	SHEEPSCOT RIVER		4.30	
1564	SOUTHPORT	240	SHEEPSCOT BAY		1.47	
1589	SOUTHPORT	300	CAPE HARBOR		1.77	
1667	SOUTHPORT	300	COZY HARBOR		1.77	
1679	SOUTHPORT	330	COZY HARBOR		1.95	
1680	SOUTHPORT	720	MADDOCK COVE		4.25	
1689	SOUTHPORT	8000	CAPE NEWAGEN HARBOR		73.78	
1714	SOUTHPORT	300	ATLANTIC OCEAN MARRS COVE		1.77	
1715	SOUTHPORT	300	ATLANTIC OCEAN MARRS COVE		1.77	
1717	SOUTHPORT	360	ATLANTIC OCEAN		2.25	
1721	SOUTHPORT	630	COZY HARBOR/SHEEPSCOT RIVER		3.72	
1725	SOUTHPORT	450	COZY HARBOR		2.66	
1780	SOUTHPORT	300	COOLENS GUT	Y	1.77	
1788	SOUTHPORT	500	HENDRICKS HARBOR		2.56	
1789	SOUTHPORT	900	MADDOCK COVE		5.31	
1794	SOUTHPORT	300	SHEEPSCOT BAY		1.84	
1796	SOUTHPORT	300	SHEEPSCOT BAY		1.84	
1799	SOUTHPORT	300	MADDOCKS COVE		2.83	
1844	SOUTHPORT	500	SHEEPSCOT BAY		3.07	
1845	SOUTHPORT	600	COZY HARBOR		3.54	
1885	SOUTHPORT	300	EBENECOOK HARBOR		1.84	
1887	SOUTHPORT	360	SHEEPSCOT RIVER		2.21	
1888	SOUTHPORT	540	SHEEPSCOT		3.31	
1909	SOUTHPORT	300	ATLANTIC OCEAN PIERCE COVE		1.77	
2084	SOUTHPORT	450	SHEEPSCOT BAY		2.76	
2089	SOUTHPORT	450	SHEEPSCOT BAY		2.76	

DEP ID	TOWN	FLOW (GPD)	RECEIVING WATER BODY	PRIORITY REMOVAL	Required Closure (acres)	Actual Closure (acres)
2132	SOUTHPORT	300	SHEEPSCOT RIVER		1.84	
2183	SOUTHPORT	360	SHEEPSCOT RIVER		2.21	
2259	SOUTHPORT	540	SHEEPSCOT RIVER		3.68	
2260	SOUTHPORT	750	COZY HARBOR	Y	4.43	
2261	SOUTHPORT	300	SHEEPSCOT BAY		1.84	
2338	SOUTHPORT	360	SHEEPSCOT BAY		2.21	
2817	SOUTHPORT	300	MADDOCK COVE		1.77	
2829	SOUTHPORT	600	SHEEPSCOT BAY		3.68	
2838	SOUTHPORT	720	CAPE HARBOR		4.25	
2954	SOUTHPORT	360	SHEEPSCOT RIVER		2.21	
2977	SOUTHPORT	300	SHEEPSCOT BAY		1.84	
3043	SOUTHPORT	300	SHEEPSCOT RIVER		2.46	
3054	SOUTHPORT	300	CAPE HARBOR		1.77	
3357	SOUTHPORT	300	MADDOCKS COVE/EBENECOOK HARBOR		1.77	
3465	SOUTHPORT	300	SHEEPSCOT BAY		1.84	
3588	SOUTHPORT	315	SHEEPSCOT RIVER		1.93	
3638	SOUTHPORT	300	TOWNSEND GUT		1.84	
3659	SOUTHPORT	300	COZY HARBOR	Y	1.77	
3683	SOUTHPORT	300	SHEEPSCOT BAY		1.84	
3699	SOUTHPORT	300	SHEEPSCOT BAY		1.84	
3726	SOUTHPORT	480	SHEEPSCOT BAY		2.95	
3729	SOUTHPORT	300	SHEEPSCOT BAY		1.84	
3733	SOUTHPORT	500	MADDOCKS COVE		2.95	
4040	SOUTHPORT	720	FISHERMAN ISLAND PASSAGE		5.52	
4042	SOUTHPORT	300	MADDOCK COVE		1.77	
4083	SOUTHPORT	600	TOWNSEND GUT		3.68	
6235	SOUTHPORT	150	CAPE HARBOR		0.89	
6444	SOUTHPORT	300	COZY HARBOR		1.77	
7109	SOUTHPORT	300	SHEEPSCOT RIVER	Y	1.84	
7265	SOUTHPORT	600	SHEEPSCOT RIVER		3.68	
7886	SOUTHPORT	450	SHEEPSCOT BAY		2.76	
7904	SOUTHPORT	300	COZY HARBOR	Y	2.95	
7966	SOUTHPORT	450	COZY HARBOR	Y	2.66	
1781	SOUTHPORT	400	LOVES COVE		1.36	>10
2090	SOUTHPORT	300	PIERCE COVE	Y	1.4	1.71
1903	WESTPORT	900	SHEEPSCOT RIVER	Y	5.52	Entire Eastern Shore Closed
2091	WESTPORT	500	SHEEPSCOT RIVER		3.07	
2853	WESTPORT	300	SHEEPSCOT RIVER	Y	1.84	
5101	WESTPORT	315	SHEEPSCOT RIVER	Y	1.93	

DEP ID	TOWN	FLOW (GPD)	RECEIVING WATER BODY	PRIORITY REMOVAL	Required Closure (acres)	Actual Closure (acres)
6722	WESTPORT	300	SHEEPSCOT RIVER	Y	1.84	
7048	WESTPORT	300	SHEEPSCOT RIVER		1.84	
7092	WESTPORT	300	SHEEPSCOT RIVER	Y	1.84	
7264	WESTPORT	300	SHEEPSCOT RIVER	Y	1.84	
5281	WESTPORT	300	SASANOA RIVER		1.96	13.3
5139	WESTPORT	600	SASANOA RIVER		3.92	12.14
2997	WESTPORT	465	COWSEAGAN NARROWS		2.74	>200
2784	WESTPORT	320			2.00	
3972	WESTPORT	450	BACK RIVER	Y	2.82	>75

Since 1991, 118 OBDs have been removed within growing area WN (Table 3). Closures surrounding areas of these confirmed-removed OBDs may be repealed, as long as the current sanitary survey in the area is current and did not identify any additional pollution sources, and water quality at surrounding monitoring stations meets the approved or restricted criteria. Currently, of the 158 active OBD in area WN, 29 are identified for priority removal by DEP.

Table 3. OBD Removals in Growing Area WN 1991-2008

TOWN	RECEIVING WATER BODY	DEP ID	YEAR REMOVED
ALNA	SHEEPSCOT RIVER	2351	1997
		2845	2001
ARROWSIC	BACK RIVER	6717	2000
		7333	1999
BOOTHBAY	BACK RIVER	1059	2001
		1745	
		2263	2001
		2814	2007
		3882	2001
		4835	
	CROSS RIVER	2323	2007
	SHEEPSCOT RIVER	2268	2008
		2716	
BOOTHBAY HARBOR	SHEEPSCOT RIVER	1778	2000
	TOWNESND GUT	1952	
		3776	2000
		8115	
EDGECOMB	CROSS RIVER	2323	
	SHEEPSCOT RIVER	1676	2005
		1695	2004
		1696	2004
		1831	1992
		1833	

TOWN	RECEIVING WATER BODY	DEP ID	YEAR REMOVED
		1854	
		2283	2000
		4125	1996
		4211	
		7076	1992
		1697	1992
GEORGETOWN	HARMONS HARBOR	2872	unknown
	HEAL EDDY	1907	unknown
	LITTLE SHEEPSCOT RIVER	3310	unknown
		6603	2000
		6997	2000
	MACMAHAN ISLAND	1340	1999
		2199	1999
		2199	1999
		4111	1999
		4112	1998
		4112	1999
		4113	1999
		4113	1999
		4114	1998
		4115	1999
		4115	1999
		4115	1999
		4119	1999
		4120	1999
		4135	1999
		4136	1999
		4154	1999
		4160	1999
		4161	1999
		4162	1999
		4163	1999
		4163	1999
		4164	1999
		4288	1999
		4289	1999
		4290	1999
		4316	1999
		4317	1999
		4318	1999
		4855	1998

TOWN	RECEIVING WATER BODY	DEP ID	YEAR REMOVED
		4856	1999
		4890	1999
		5060	1999
		5060	1999
		5061	1999
		6050	1999
		6061	1999
		6091	1999
		6139	1999
		6161	1999
		UNK	1998
		UNK	1999
		UNK	1999
		UNK	1999
	MALDEN ISLAND	2244	2000
	SHEEPSCOT BAY	2099	2007
		4265	unknown
		7255	unknown
	SHEEPSCOTT RIVER	6300	unknown
SOUTHPORT	CHRISTMANS COVE	6002	unknown
	COZY HARBOR	2016	unknown
		1972	unknown
		2778	unknown
		3785	unknown
		4013	unknown
	JOES'S GUT	2290	2008
	LAVIE'S COVE	5062	2001
	LOVES COVE	1720	1998
	PIERCE COVE	5198	unknown
	SHEEPSCOT BAY	1245	unknown
		1669	unknown
		2830	unknown
		3361	unknown
		3684	2001
		4287	2001
		4887	unknown
		6058	unknown
		6259	unknown
	SHEEPSCOT RIVER	1726	2001
		2821	2004
		3637	unknown

TOWN	RECEIVING WATER BODY	DEP ID	YEAR REMOVED
		3682	unknown
WESTPORT	COWSEAGAN NARROWS	4156	2000
	SHEEPSCOT BAY	6404	unknown
	SHEEPSCOT RIVER	2363	2004
		2848	2004
		6441	2004
		6852	unknown
		6942	unknown
		7164	unknown
		7212	unknown
		6611	unknown
WISCASSET	COWSEAGAN NARROWS	6225	unknown
	SHEEPSCOT RIVER	5130	unknown

Municipal WWTP

There is one municipal wastewater treatment plant in this growing area. This plant was last reviewed on September 30, 2008; a site visit was conducted on the same date. The Wiscasset Wastewater Treatment Plant is a secondary, treatment plant located on the Sheepscot River, 4000 feet north of Whites Island, and serves approximately 850 households located in the town of Wiscasset and on Davis Island, Edgecomb. The plant maintains 17 pump stations, capable of pumping a range of 70 to 400 gallons per minute; there are no combined sewer overflows (CSOs). The pump stations are alarmed, and have no bypass or overflow capability. There have been no violations at the Wiscasset WWTP during this review period (DEP 2009).

The facility has a permitted design of 620,000 gpd (gallons per day). The actual average daily flow is 200,000 gpd, and an average wet weather flow of 300,000 gpd. Wet weather flows may reach 2 mgd for short periods of time; a spare clarifier is available to hold excess influent until it can be treated. The plant's treatment design is activated sludge, and the plant's outfall is a 500' straight pipe that empties directly into the Sheepscot River. Depth at the outfall is 4' at mean low water, and 15' at high water. There is seasonal chlorination, between the periods of May 10th and September 30th; the chlorine residual in effluent is less than 0.1 ppm.

According to a hydrographic survey conducted by Ron Aho in 1995, the flow of the river is such that effluent from the outfall moves north to the railroad trestle, then south down the middle of the river. Using the information provided by the treatment plant staff during the most recent review, the closure area around the plant was verified; based on the a daily flow of 0.3 million gallons per day (average wet weather flow), a fecal concentration of $1.4*10^5$ FC col/100 ml, and estimating the average depth of receiving waters at 30 ft, the required closure must be equal of greater to 307 acres. The current size of the prohibited area surrounding the Wiscasset Treatment Plant is over 1,800 acres; the size of the closed area north of the Rt. 1 bridge and south of the northernmost closure line (area outlined in green) is 356 acres (Figure 9). The current closure size surrounding the WWTP meets the requirements of the NSSP.

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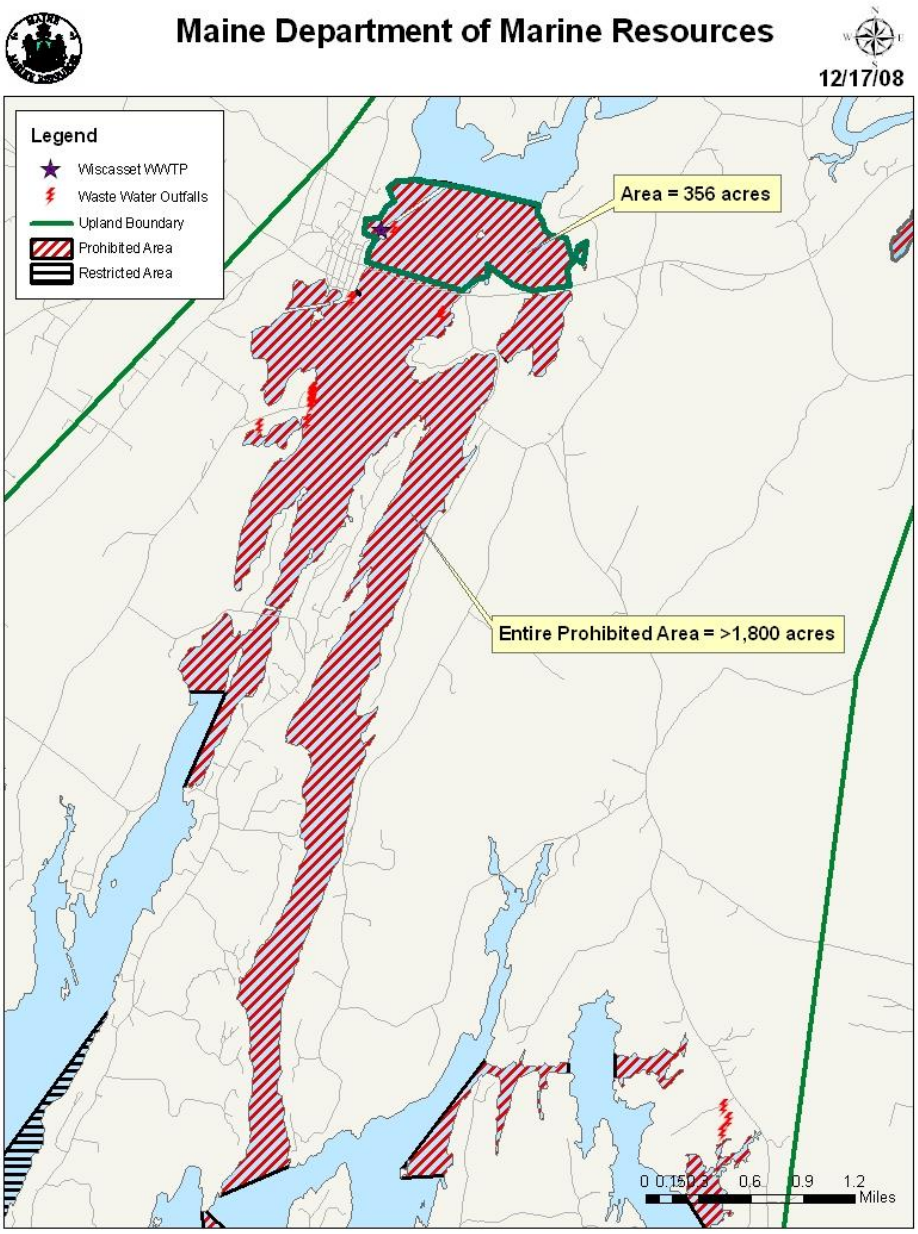
Figure 9. Wiscasset WWTP and Associated Prohibited Area



Industrial Pollution

The Maine Yankee Nuclear Power plant was built on Bailey Point, Wiscasset in the early 1970's and discharged reactor cooling water into Back River on the west side of Westport Island. The plant was decommissioned in 1996. During the decommissioning, spent fuel pool water was discharged on several occasions. The DMR, DEP and several other agencies collaborated on a testing regime that sampled and tested sediments, shellfish, lobsters, macro-algae, etc. prior to the release of the spent fuel pool water, during and after the final release. The report, entitled,

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Maine Yankee Marine Sampling Study Final Report, is available in the DMR files, and results of the sampling study indicate that the dose rate of radioactive materials was higher from normal background levels than any air particles, cooling water or spent fuel pool water from the Maine Yankee facility.

Marinas and Mooring Fields

There are seven marinas and boatyards in area WN area (Table 4 and Figure 10). Four are located within a large prohibited area, surrounding the outfall of the Wiscasset Waste Water Treatment plant. The remaining three marinas are located within three large prohibited areas, which are closed to shellfish harvesting due to the presence of multiple over board discharges.

The Boothbay Regional Boatyard is located on Southport Island. This marina is seasonally open, with peak season in July and August, and provides 40 slips and 40 moorings. Approximately 80 percent of the moored boats have toilets; a pump-out facility, as well as toilet and shower facilities are available on-site. The marina has double-walled fuel (gasoline and diesel) located 100 ft from shore. Based on the information provided by the marina personnel, this marina requires a 99 acre closure; it is currently located in a closure that is 128 acres.

The Sheepscot Bay Boat Company is located on lower Sheepscot River, in Georgetown. The marina is in operation year-round, with peak season from May through September. This marina provides 22 moorings and 5 slips; approximately 2 percent of the moored moats have toilets. There is no pump-out facility, toilets or showers on-site. This marina has 2 fuel tanks, located 10 ft from shore (3500 gallon gasoline, 1500 gallon diesel fuel); both are enclosed with cement containment, to prevent leakage to the ground. Based on the information provided by the marina personnel, this marina does not require a closure area. However, it is located within a closure area greater than 100 acres.

Robinhood Marina is located in Robinhood Cove, Georgetown. This marina is in operation year-round, with a peak season from May through September. It provides 135 slips and 72 moorings; and approximately 80 percent of the moored boats have toilets. There is a pump-out facility, as well as toilet and shower facilities available on-site. There are two 3,000 gallon fuel tanks, located 60 feet from shore; both tanks are in secondary containment. Based on the information provided by the marina owner, a closure size of 154 acres is required surrounding this marina; it is currently located in a closure of 219 acres.

Eddy Marina is located in the upper Sheepscot River, in Wiscasset. It is in operation from May through October, with peak season from July through August. It provides 8 slips and 15 moorings; no boats have toilets. There are no pump-out facilities; toilets and showers are available, as well as gasoline and diesel. Based on this information no closure is required for this marina, since there are no boats present have the potential to release fecal matter into the Sheepscot River.

The Wiscasset Town Landing and the Wiscasset Yacht Club are located on the Sheepscot River, in Wiscasset. There are approximately 110 moorings (all privately owned), which are utilized by both commercial and recreational boats; pump-out facilities and toilets are available on-site. The landing toilet facility is connected to the Wiscasset Wastewater Treatment Facility. The number of boats with toilets which may be moored at this facility is unknown. The town

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landing is managed by the Wiscasset Harbor Master. This marina is located within the boundary of the large closure surrounding the Wiscasset Waste Water Treatment plant outfall.

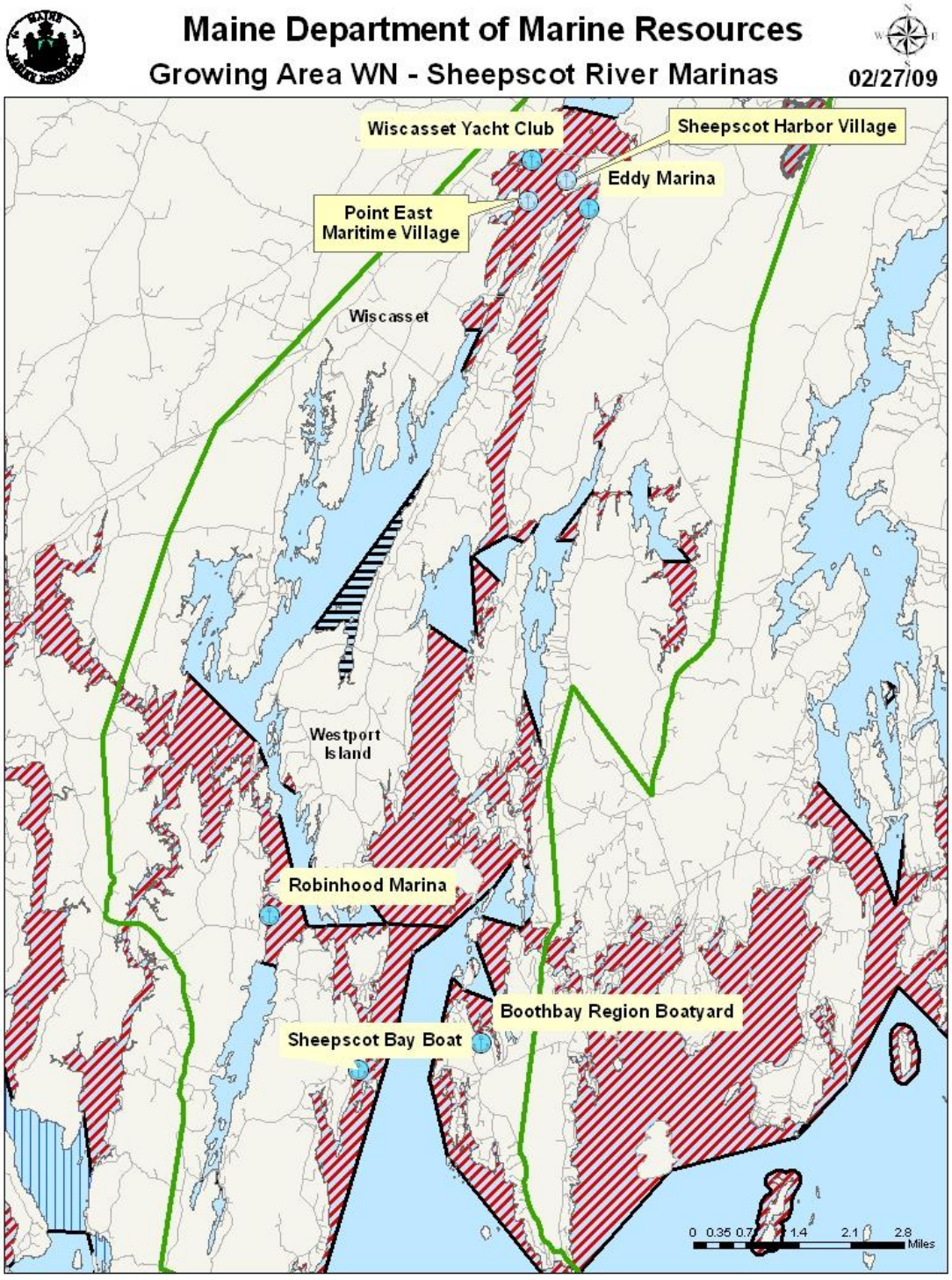
Recently, a new development was approved for the old Mason Station power generating facility in Wiscasset on the shores of the Sheepscot River. Point East Maritime Village will include 160 waterfront condominiums, 67 waterfront cottages, a 239 slip Hinckley Marina and a Maritime Village Square, which will feature retail spaces and restaurants. The Hinckley Marina will include a repair/retrofit yard, heated boat storage facilities, shower/laundry facilities and a ships chandlery. No boats with heads were observed at this marina in 2008.

The Sheepscot Harbor Village and Resort, located on Davis Island is another new development in the upper Sheepscot River. Information on mooring/slip space and sanitary facilities will be provided in the next triennial evaluation for area WN. To date, no boats capable of having on-board toilets have been observed at this facility.

Table 4. WN Marinas, with required Closure Sizes (in acres)

Marina Name	Town	Number Boats with Heads	Required Closure Size	Actual Closure Size	Date of Last Interview or Site Evaluation
Boothbay Region Boatyard	Southport	64	99	128	12/22/08
Sheepscot Bay Boat Company	Georgetown	1	none	>100	12/23/08
Robinhood Marina	Georgetown	166	154	219	12/23/08
Eddy Marina	N. Edgecomb	none	none	>1800	7/31/07
Wiscasset Town Dock/Yacht Club	Wiscasset	unknown	N/A	>1800	7/31/07
Sheepscot Harbor Village and Resort	Edgecomb	None (new marina, not in operation)	none	>1800	New Marina, to be evaluated for next triennial
Point East Maritime Village	Wiscasset	None (new marina, not in operation)	none	>1800	New Marina, to be evaluated for next triennial

Figure 10. Growing Area WN Marina Locations



Stormwater Run-Off

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 an NPDES permit. In 1990, under authority of the Clean Water Act, the U.S. EPA promulgated Phase I of its stormwater management program, requiring permitting through the National Pollution Discharge Elimination System (NPDES). The Phase I program covered three categories of discharges: (1) “medium” and “large” Municipal Separate Storm Sewer Systems (MS4s) generally serving populations over 100,000, (2) construction activity disturbing 5 acres of land or greater, and (3) ten categories of industrial activity. In 1999, US EPA issued Phase II of the stormwater management program, expanding the Phase I program to include all urbanized areas and smaller construction sites.

Although it is a federal program, in the state of Maine, the Phase II Stormwater permit is issued and regulated by the Maine DEP (Chapter 500 and 502). Under the MS4 regulations, each municipality must implement the following six Minimum Control Measures: (1) Public education and outreach, (2) Public participation, (3) Illicit discharge detection and elimination, (4) Construction site storm water runoff control, (5) Post-construction stormwater management, and (6) Pollution prevention/good housekeeping. The permit required each city or town to develop a draft Stormwater Management Plan by September 3, 2003 that will establish measurable goals for each of the Minimum Control Measures. The Town must document the implementation of the Plan, and provide annual reports to the Maine DEP. Currently the discharge of stormwater from 28 Maine municipalities is regulated under the Phase II permit requirements, however, no municipalities located within the boundaries of growing area WN fall under these regulations. Additionally, the Maine Stormwater Management Law provides stormwater standards for projects located in organized areas that include one acre of more of disturbed area (Maine DEP 2009).

The Wiscasset village has a stormwater management system that is separate from the municipal sewage system. In the past (prior to 1996), the town had identified some places where stormwater was infiltrating through sewer pipe, and overwhelming the sewage treatment plant (Wiscasset Comprehensive Plan, 2006). Since 1996, the town has worked to correct the major problems, and is working to correct any remaining problems as they are discovered. The Wiscasset village stormwater system discharges untreated stormwater directly into the Sheepscot River, as well into several streams which ultimately drain into the Sheepscot. According to the information provided by the Wiscasset WWTP operator, there are between 300-400 manholes for stormwater collection throughout the town, the majority of which are in the village center. The majority of the stormwater discharge points are also located along the shore in the village center; the entire area surrounding the Wiscasset downtown is classified as prohibited, due to the presence of the WWTP outfall. The number of stormwater discharge

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points in Wiscasset was not reported at the time of the interview. The remaining municipalities in growing area WN do not have municipal stormwater systems, and stormwater drains via overland flow to streams and river, or percolates into the ground.

There is also a permitted snow dump site in the town of Wiscasset, located in a large prohibited area surrounding the Waste Water Treatment Plant.

Non-Point Source Pollution from Streams

Streams are a source of fresh water to the Sheepscot River watershed, and carry stormwater, snowmelt and groundwater into this estuary system. Waste, including that containing fecal matter, which is deposited on land, may be washed into streams and transported to shellfish growing areas, contributing to elevated fecal counts in waters that are filtered by shellfish.

Prior to 2008, stream samples were collected at multiple streams throughout the growing area; however, the precise location of the stream samples was not noted on the data sheets. Additionally, at most streams, only one sample was collected. Therefore, the results obtained from streams samples prior to 2008 are not presented in this report. For the next triennial review, areas that may be impacted by fresh water sources will be identified, and streams located in such areas will be undergo sampling; samples will be taken multiple times, and under a variety of meteorological conditions, in order to determine the range of possible impacts on the growing area. Stream flow rates will also be measured at the time of sample collection, and if appropriate, closures surrounding the outlets of the streams will be implemented.

In 2008, the town of Westport requested that DMR assess the possibility of an upward classification for Squam Creek and Squam Creek Pond (Stations WN 44 and 44.1). As part of this assessment, the marshy area at the head of the pond was sampled. The area was sampled on two separate dates; on both dates the run-off conditions were low, and no significant precipitation had occurred with the three days preceding marsh sample collection. Samples were collected in multiple locations in the pond, starting to the area several hundred feet south of station WL 44.1, and approximately every 500 ft going away from the station. The results of these samples showed that water quality tends to deteriorate away (south) from sample station WN 44.1, with samples taken at the head of the pond (approximately 1/3 mile), showing scores of 200. While there are very few homes along the shore of Squam Creek, the marshy area provides a habitat well suited for water fowl. There is also a beaver dam located at the head of the Creek, and while it appears to be inactive, the scores from samples collected within its vicinity showed elevated fecal scores. Based on this information, the restricted classification of Squam Creek should not be changed at this time, as the upstream pollution is likely to be transported to the mouth of Squam Creek on days when flow rates in the Creek are increased (after rainfall, snowmelt, etc) (station WN 44.1), and adversely impact water quality.

Agriculture, Domestic Animals and Wildlife Activity

The Chewonki Foundation campus is located on a 400-acre peninsula in Wiscasset, Maine, with three and a half miles of rocky coastline on the southern half of Chewonki Neck. The property sits on Montsweag Bay, a protected tidal inlet located several miles upriver from the mouths of the Kennebec and Sheepscot rivers. The Foundation runs a small organic farm, consisting of approximately 25 acres of open land and 150 acres of woodlot. The Salt Marsh farm is a diversified organic farm that produces produce, dairy and eggs, wood products, and fiber. One

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acre is cultivated for vegetable production and the remainder is comprised of pasture, hay fields, buildings, trees and stone walls.

In 2007, the Salt Marsh Farm kept two horses, four cows (two milkers, and two calves), 30 sheep (13 ewes, one ram, and lambs), 50 laying hens, 150 broilers and seven pigs. The lambs, pigs, calves, and broilers are only present on the property for part of the year. When grass is growing, all animals, except the pigs, are pastured. Manure is stored in a covered manure shed with walls. Approximately 6-7 tons of manure is captured by the farm, composted (with bedding) and spread in the fall, with a horse-drawn manure spreader. The Salt Marsh Farm pasture is located 100-200 feet from Montsweag Creek. A woodlot buffer strip between the edge of the pasture and the marsh of the creek is left in place to protect water quality from agricultural run-off. The pasture gently slopes towards the water and runoff may become a pollution issue only during rare periods of excessive rainfall when the area would be placed under an emergency flood closure according to the DMR Growing Area Standard Operating Procedure.

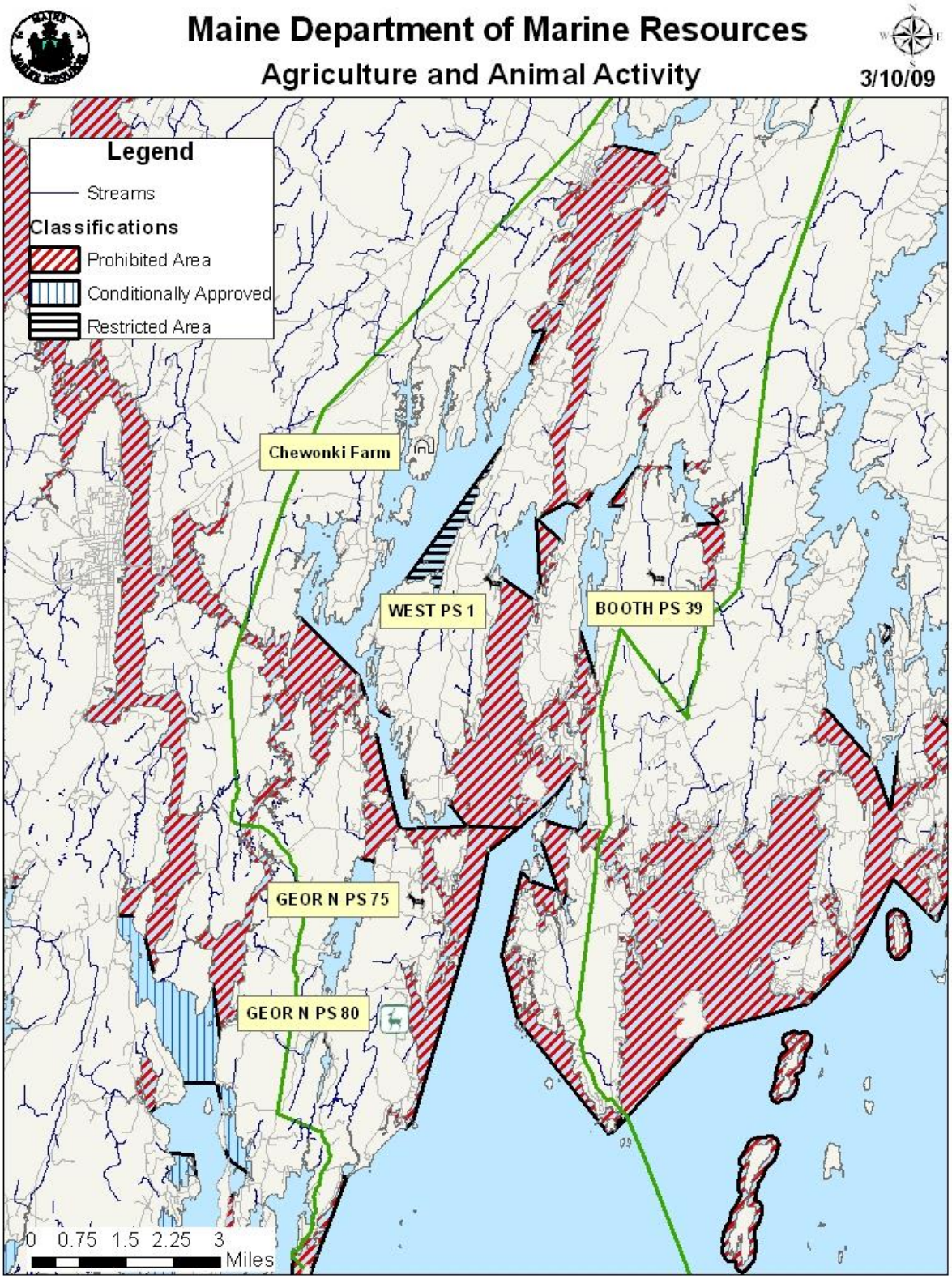
The Kennebec Morgan Horse farm is located in Woolwich (not shown on map). The farm houses multiple horses, and provides riding trails. The area is currently monitored by stations WN 35 and WN 35.1, and is currently classified as prohibited. Prior to any upward classification work that can be done in this area, and for the next triennial report, this farm needs to be assessed in more detail.

Several properties in growing area WN were identified as having large domestic animals present of the property, or had noted wildlife activity (Table 5 and Figure 11). All of these properties are located, or drain to, areas that are classified as prohibited.

Table 5. Domestic Animals and Wildlife, Area WN

Town	Pollution ID	A or P	D or I	Pollution Description	Survey Date
Boothbay	BOOTH PS 39	P	I	Horse farm	30-May-08
Georgetown	GEOR N PS 75	A	D	Donkey in pasture near shore	25-Oct-06
	GEOR N PS 80	P	I	Wildlife feces on property	07-Nov-06
Westport	WEST PS 1	P	I	Sheep pastured in field	Drive through 2008

Figure 11. Farms and Animal Activity



Conservation/Recreation Areas

There are sixteen distinct preserved areas within Growing Area WN, totaling more than 1,500 acres of conservation and park land, and nature preserves (Table 6 and Figure 12). All of the areas allow dog walking and other human activities; some have sanitary pollution facilities available to the public. Many of the areas have specifications on camping; however, these policies are not closely enforced. While there is no indication that water quality has been impacted by human or animal activities at these conservation areas, they remain a potential pollution source due to dog walking and camping that may occur along the shore.

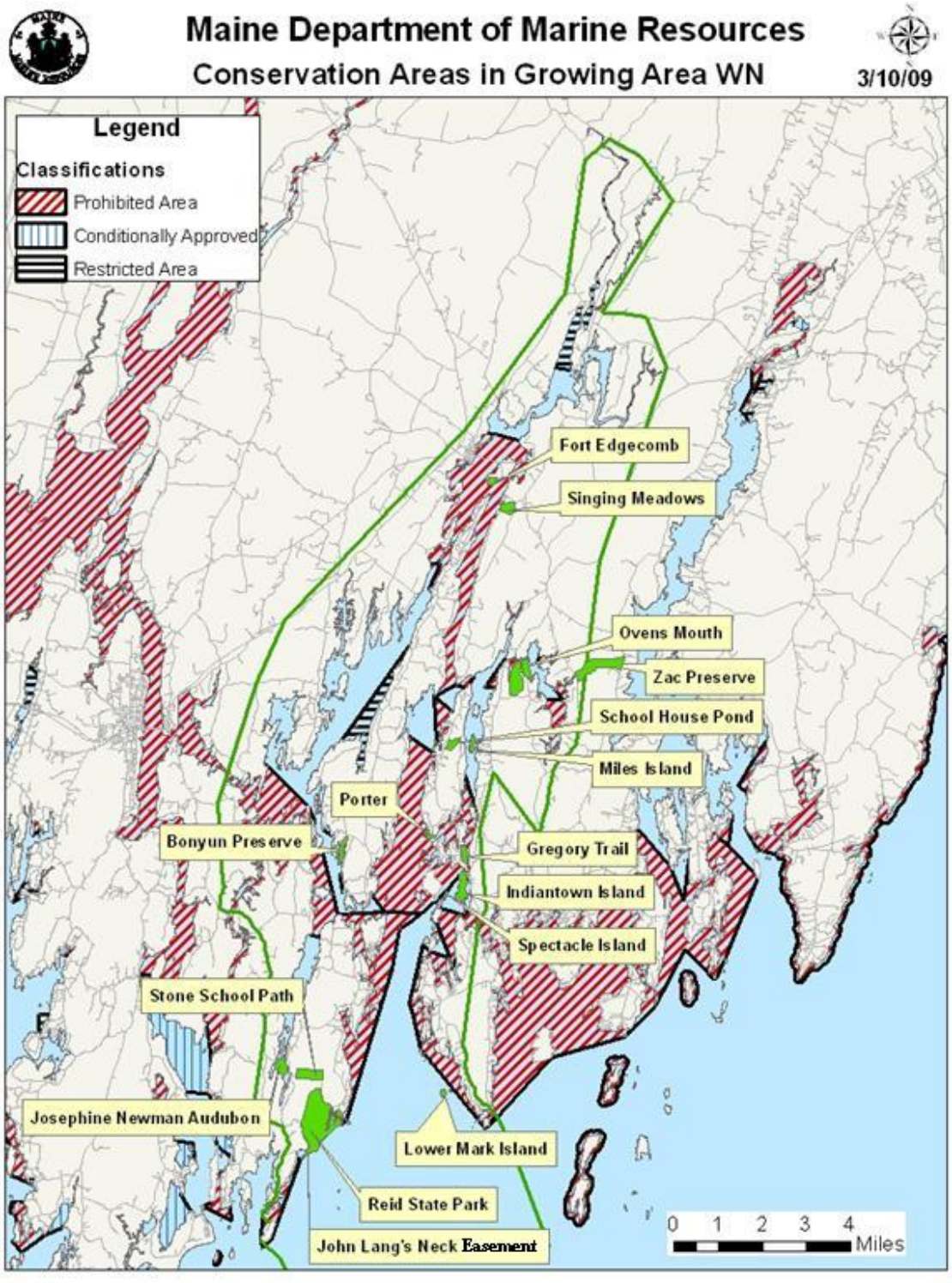
In addition to conservation/park areas, growing area WN also has a large, privately owned campground located on Cross River, in Boothbay. The Shore Hills Campground and RV park has 149 tent and RV sites, and 2 wash houses, with toilet, shower and laundry facilities in each. Most sites do not have a sewer hook-up; sites that provide a full hookup have a small inground system serving each of the camp sites. No evidence of an actual pollution source was noted during the most recent (2008) sanitary survey inspection of this site; however, this site is located within the Cross River prohibited area.

Table 6. Conservation and Recreation Areas in Growing Area WN

Area Name	Location	Size (Acre)	Description
Gregory Hiking Trail	Sawyers Island, Boothbay	20	Nature preserve with a 0.8 mile loop trail along the Back River. Walking trails on private property; no overnight camping, fires or motorized vehicles are allowed; dogs are allowed.
Ovens Mouth Preserve	Boothbay	146	1.6 miles of hiking trails on the east peninsula and 3.1 miles of hiking trails on the west peninsula.
Porter Preserve	Barters Island, Boothbay	19	Wooded shore property including a small offshore island and a beach; 0.86 mile loop trail on the Sheepscot River.
Miles Island	Barters Island, Boothbay	17	Uninhabited Island; day use allowed.
School House Pond	Barters Island, Boothbay	42	1.7 miles of loop trails though the woods; wider trails through the property may be used for hiking, horseback riding, mountain biking, skiing, snowmobile riding and ATV use. No camping or fires are allowed; controlled dogs allowed.
Zak Preserve	Boothbay	206	1.8 miles of trail paralleling Wildcat Creek; no overnight camping, fires or motorized vehicles are allowed; controlled dogs are allowed; canoe launch present.
Singing Meadows	Edgecomb	16	Old Farm property; no established trails. Wildlife and bird watching opportunities.
Indiantown Island	Boothbay Harbor	60	Mile-long island with approximately 9,000 feet of shoreline, wetlands and mud flats and 2 miles of trail. The Boothbay Region Land Trust (BRLT) owns the northern half of the island and holds a conservation easement on the southern half that allows for one single-family residence; Pleasant

Area Name	Location	Size (Acre)	Description
			Cove Island, Boothbay Harbor is a 2 acre conservation land.
Spectacle Island	Boothbay Harbor	<10	Small island; popular for picnickers.
Bonyun Preserve	Sasanoa River, Westport Island	68	1.5 miles of shore frontage; parking lot and trail system for low impact recreational use.This preserve is located in the heart of the highest concentration of nesting ospreys in New England.
Stone School Path	Georgetown	-	Preserve is under development. There are no trails or parking lots.
John Lang's Neck	Georgetown	190	Adjacent to Reid State Park; conservation easement with more than 60 acres of protected marshland and two islands. The preserve is designated for wildlife protection and is used for traditional non-motorized recreational use
Reid State Park	Georgetown	770	2 beaches; extensive salt marsh habitat. Flush toilet and shower facilities. No camping allowed.
Fort Edgecomb	Davis Island	-	State Historic Site, with picnic spots and restrooms.
Josephine Newman Audubon Sanctuary	Georgetown	119	Audubon sanctuary which is bounded by the west and east branches of Robinhood Cove; hiking trails.
Lower Mark Island	Newagen, Southport	9	State-owned coastal island designated for nesting by colonial water birds. Trespass is prohibited during specific nesting periods.

Figure 12. Conservation and Recreational Areas



Hydrographic and Meteorological Assessment

The NSSP program requires, as part of the sanitary survey, the evaluation of hydrographic and meteorological factors in order to determine the factors that may affect distribution and persistence of pollutants throughout the study area (WN). Climate and weather can affect the distribution of pollutants or can be the cause of pollutant delivery to a growing area. Prevailing winds can determine the distribution of pollutants in a growing area. Rainfall patterns and intensity can affect water quality through pollutant delivery in runoff or cause flooding which can affect the volume and duration of pollutant delivery. Examples of hydrographic factors that are evaluated in this report are tidal transport, tidal cycles, and river discharge.

Tides and Currents

The Sheepscot River is an estuary system, and receives both salt water inputs from the south and fresh water inputs from the north and west. The Sheepscot River estuary system is connected with the Kennebec River estuary to the west by the Sasanoa River, which drains into the Hockomock Bay. Montsweag Bay is a significant part of the Sheepscot River estuary, and it communicates with the main body of the estuary at the north through Cowseagan Narrows (McAlice and Jaeger 1983). Montsweag Bay is a shallow body of water, and at mean low water, approximately 50 percent of its area has less than 6 feet water (McAlice and Jaeger 1983). The main channel of the Sheepscot River lies east of Westport Island.

Water circulation in the Sheepscot River is dominated by tides. The average tidal range at spring tides is about 10.47 ft, and the annual average tidal range is 9.1 ft. (NOAA 2009). Tides are semi-diurnal, with a slight diurnal inequality (McAlice and Jaeger 1983). The tidal cycle is 12 hours and 25 minutes long. Tide levels may fluctuate throughout the month. These fluctuations and the speed and direction of the tidal currents constantly change during a tidal cycle. Tidal currents have the greatest energy when water is pushed in and out of bays and channels during the highest and lowest tide levels. In Montsweag Bay and in the main channel of the Sheepscot River estuary, slack water occurs about 30-45 minutes before the times of low and high tide.

The water column in Cowseagan Narrows is almost always well-mixed, consistent with the increased tidal flows, while the southern half of Montsweag Bay has strong vertical stratification (McAlice and Jaeger 1983). The strongest ebbing tide occurs in Lower Hell Gate and Goose Rock Passage, with maximum ebb currents of about 4 knots. A prominent clockwise eddy forms off Robinhood Cove during the strongest part of the ebb tide, and a prominent convergence front occurs east of Clous and Middle Ledges where the outflow from the passage pushes into the Sheepscot River (Brooks 2006). The flooding tide is strongest along the west side of the Sheepscot River, until it turns into Goose Rock Passage (Brooks 2006). The flood impinges directly on Robinhood Point, where it splits, most going north toward Hells Gate, Hockomock Bay, and Montsweag Bay (Back River) (Brooks 2006). The tide floods simultaneously north and south in Back River, meeting near Cowseagan Narrows.

As part of the Maine Yankee Nuclear Power Plant decommissioning in 1996 (permanent shut-down in August 1997), Maine Yankee funded a study on the dynamics of the Sheepscot River estuary, including a tidal transport analysis of the estuarine system. This analysis showed that

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the greatest tidal transport (>5000 m^3 s^{-1}) occurs in the main channel of the river (east of Westport Island), and a moderate amount of transport (1000 to 5000 m^3 s^{-1}) occurs along the south east shore of Westport Island and Cowseagan Narrows and the least amount of tidal transport (<1000 m^3 s^{-1}) occurring in Montsweag Bay and Davis Island, Edgecomb (Figure 13). The study also identified an area of almost no tidal movement, in an area between Young Point, Wiscasset and Westport Island; this area was determined to be the product of merging tidal waves that circuit the estuary's largest island (Westport Island) (Hess et al. 2005).

In order to investigate the frequency of elevated scores (those that surpass the variability standard) at various tidal stages, a tidal assessment for all stations located in growing area WN was completed (Table 7). In considering all SRS data collected between 2003 and 2008 (total of 2903 samples), 40.6 percent of all stages were collected on an ebbing tide, and 59.4 percent were collected on a flooding tide. A further break up among the 8 tidal stages (low, low ebb, ebb, high ebb, flood, low flood, high flood, and high) showed that the most frequent tidal stages for sample collection were flood and ebb tides (869 and 734 samples, respectively); the tidal stage at which the least amount of samples were collected was low tide (73 samples). Many stations flat out entirely at low tidal stage, making sample collection impossible. The frequency at which the samples violated the variability standard per tidal stage was also computed. On average, the tidal stages at which WN samples had the highest frequency of violating the P90 standard were high ebb tide (9.16 percent of samples) and high tide (8.43 percent of samples); the lowest frequency of violating the P90 standard occurred at low tide (0.83 percent) and low flood tide (1.63 percent). Based on the data reviewed in this report, the tidal stages at which samples are least likely to receive elevated fecal scores (low, low ebb and low flood tides) are also the tidal stages at which the least number of samples has been collected.

Figure 13. Maine Yankee Sheepscot River Estuary Tidal Transport Study

Maine Yankee Marine Sampling Study

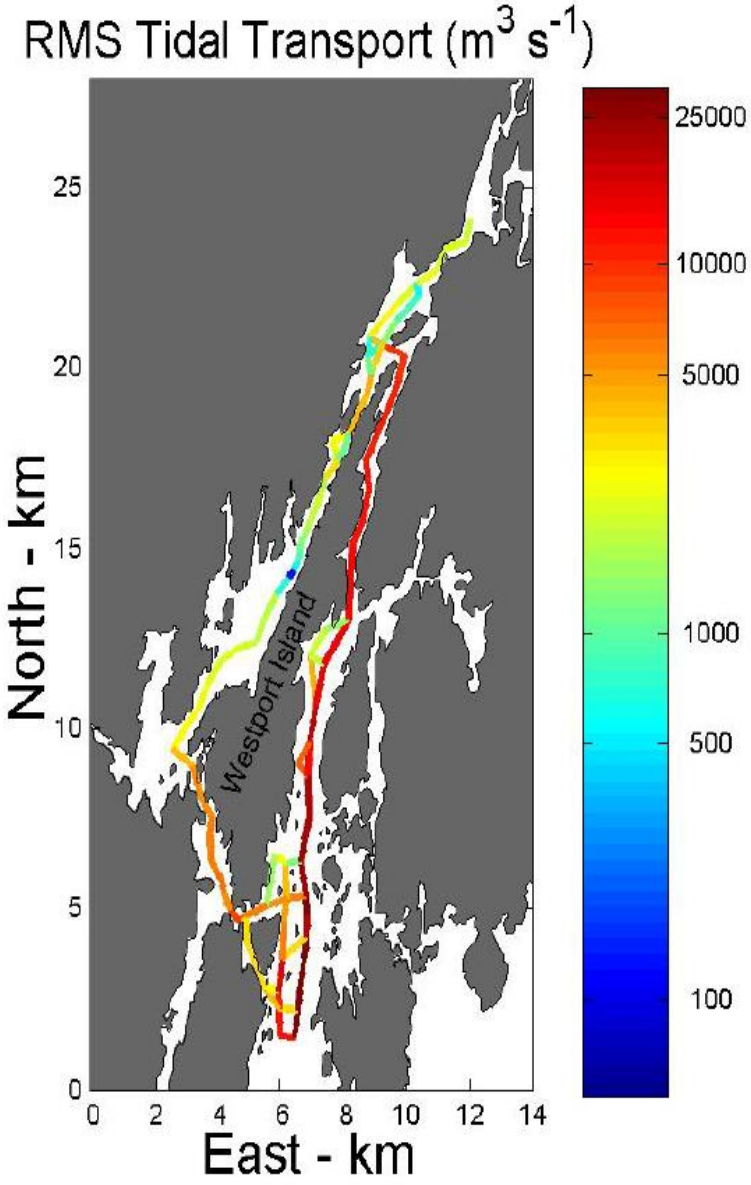


Figure 4-4a. The RMS value of volume transport within channels encircling Westport Island. These RMS transports show a minimum of tidal energy at the tidal node off the western shore of Westport Island.

Table 7. Tidal Assessment (number of samples collected at each tidal stage and percent of samples violating variability standard),WN 2003-2008

Station	Class	Ebb Tide								Flood Tide							
		Ebb N	% Ebb Exceed	Low N	% Low Exceed	High Ebb N	% HE Exceed	Low Ebb N	% LE Exceed	Flood N	% Fld Exceed	High N	% High Exceed	High Flood N	% HF Exceed	Low Flood N	% LF Exceed
WN001.00	A	7	14	0		3	0	1	0	14	7	8	13	5	20	1	0
WN002.00	P	8	13	0		2	0	0		14	7	5	20	10	10	0	
WN003.00	P	5	0	1	0	2	0	1	0	16	0	4	0	10	20	1	0
WN004.00	P	5	20	1	0	2	0	0		15	0	5	20	9	0	2	0
WN013.00	P	5	0	1	0	4	0	0		12	0	7	14	5	40	2	0
WN016.00	A	6	0	1	0	6	33	0		14	7	1	0	10	0	1	0
WN018.00	A	4	0	2	0	3	0	0		13	0	5	20	7	14	1	0
WN020.00	A	5	0	1	0	4	0	0		16	0	3	0	6	17	3	0
WN021.00	A	6	0	1	0	3	0	0		17	6	4	25	8	13	0	
WN022.00	A	6	0	0		3	0	0		15	0	7	14	7	0	1	0
WN027.00	P	9	11	3	0	4	25	3	0	10	0	1	0	4	25	3	0
WN027.20	NEW	5	20	1	0	4	0	2	0	7	14	1	0	1	0	4	0
WN027.50	P	9	11	1	0	6	0	3	0	9	0	3	0	3	0	3	0
WN028.00	P	12	8	3	0	1	0	1	0	12	8	1	0	5	20	2	0
WN029.00	P	7	14	1	0	6	17	0		11	0	3	33	9	11	0	0
WN030.00	P	9	11	2	0	3	33	0		12	25	4	25	8	25	1	0
WN030.50	P	9	22	0		2	50	0		8	13	5	20	9	33	1	0
WN032.40	A	6	0	0		2	50	0		16	6	4	0	6	17	0	
WN032.60	A→P	7	0	0		3	0	0		16	6	3	0	5	20	0	
WN033.00	A	8	0	0		2	0	0		15	0	5	20	4	0	0	
WN034.00	A→P	8	13	1	0	6	0	3	0	10	10	3	0	3	33	3	0
WN035.00	A→P	8	13	0		4	25	0		12	0	3	33	5	0	2	0
WN035.10	A	7	0	0		4	25	0		12	0	3	33	8	13	0	
WN035.40	A→P	4	0	0		5	0	0		11	0	5	40	9	0	0	

Station	Class	Ebb Tide								Flood Tide							
		Ebb N	% Ebb Exceed	Low N	% Low Exceed	High Ebb N	% HE Exceed	Low Ebb N	% LE Exceed	Flood N	% Fld Exceed	High N	% High Exceed	High Flood N	% HF Exceed	Low Flood N	% LF Exceed
WN035.70	NEW	5	0	0		0		1	0	5	0	4	50	2	0	1	0
WN036.00	A→P	9	0	0		4	75	0		13	8	4	0	4	0	0	
WN038.50	NEW	6	0	0		1	100	1	0	7	0	3	0	0		1	0
WN040.00	A	9	0	0		4	25	0		12	0	6	0	3	0	2	50
WN041.00	A	10	10	0		3	0	0		14	0	4	0	4	0	1	0
WN042.00	A	11	9	0		3	0	1	0	13	0	4	0	4	0	0	
WN043.00	P	10	10	0		4	0	1	0	14	0	3	0	4	0	0	
WN043.30	A	8	0	3	33	4	25	1	0	10	10	1	0	1	0	3	0
WN043.50	R	7	0	2	0	2	0	3	33	8	13	3	33	3	0	3	33
WN044.00	R	6	0	0		7	14	3	0	13	31	5	20	3	0	1	0
WN044.10	NEW	2	0	0		2	50	0		3	33	1	0	0		0	
WN044.50	NEW	4	25	1	0	2	50	3	0	8	0	4	0	2	0	1	0
WN047.00	P	10	0	4	0	2	0	2	0	9	0	5	20	2	0	3	0
WN048.00	P	12	8	0		3	0	0		12	0	4	0	5	0	0	
WN050.00	NEW	5	0	0		5	0	0		6	0	6	0	4	0	0	
WN051.00	P	20	15	0		8	13	0		16	0	10	10	9	0	0	
WN052.00	P	18	28	3	0	7	14	4	0	19	0	6	0	4	0	3	0
WN054.00	P	8	0	0		4	0	3	0	10	10	5	0	5	0	2	0
WN056.00	P	12	25	0		3	0	0		10	0	2	0	9	0	0	
WN057.00	A	14	7	0		2	0	0		9	0	4	0	7	0	0	
WN060.00	P	6	17	0		4	0	4	0	13	0	6	0	4	0	0	
WN063.00	A	14	14	0		1	0	0		12	0	5	0	4	0	0	
WN064.00	R	15	7	0		3	0	0		13	8	5	20	4	0	0	
WN065.00	R	12	8	1	0	5	0	0		0	0	4	0	4	0	1	0
WN066.00	R	12	25	1	0	0		4	0	4	25	9	0	1	0	1	0
WN067.00	NEW	5	20	1	0	0		3	33	2	0	4	0	0		0	
WN068.00	A	12	0	4	0	4	0	0		7	0	5	0	4	0	1	0

Station	Class	Ebb Tide								Flood Tide							
		Ebb N	% Ebb Exceed	Low N	% Low Exceed	High Ebb N	% HE Exceed	Low Ebb N	% LE Exceed	Flood N	% Fld Exceed	High N	% High Exceed	High Flood N	% HF Exceed	Low Flood N	% LF Exceed
WN068.50	A	9	0	0		6	0	0		9	0	4	20	7	14	2	0
WN069.00	R	9	44	0		6	50	2	50	8	0	6	17	6	0	0	
WN071.00	A	8	0	0		6	0	2	0	10	10	5	40	4	0	2	0
WN073.00	NEW	6	33	1	0	1	0	0		6	0	7	0	2	50	1	0
WN076.00	P	11	27	2	0	3	0	1	0	9	0	3	0	4	25	4	0
WN077.20	A	13	23	3	0	1	0	1	0	12	0	3	33	4	0	1	0
WN077.30	P	12	8	3	0	1	0	2	0	13	15	1	0	4	50	1	0
WN078.00	P	5	0	0		5	0	0		8	0	8	0	7	0	3	0
WN079.00	P	9	0	1	0	4	0	1	0	14	0	1	0	3	0	3	0
WN080.00	P	6	0	0		6	0	0		10	0	7	0	6	17	3	0
WN080.50	P	5	20	0		7	0	0		14	0	6	0	5	40	0	
WN082.00	P	6	17	0		4	25	0		8	0	8	13	9	11	1	0
WN083.00	P	8	0	0		3	0	0		10	10	8	0	7	29	0	
WN084.00	P	7	0	0		3	0	0		13	15	8	0	5	0	0	
WN085.00	A	10	10	3	0	4	25	0		9	0	4	0	4	0	0	
WN085.50	A	9	0	2	0	3	0	2	0	12	0	4	0	4	0	2	0
WN086.00	P	10	10	0		3	0	0		10	0	11	9	2	0	0	
WN087.00	P	11	18	0		2	0	1	0	11	9	10	10	2	50	0	
WN089.00	P	7	0	3	0	4	0	3	0	9	0	2	0	6	0	3	0
WN090.00	P	9	0	2	0	1	0	0		9	0	9	11	4	0	2	0
WN091.00	P	10	0	1	0	3	0	0		10	0	7	0	7	0	0	
WN092.00	P	16	0	2	0	3	0	5	0	8	13	3	0	6	17	5	0
WN093.00	P	9	0	2	0	3	0	1	0	9	0	7	0	3	0	3	0
WN097.00	P	0		0		0		0		0		0		0		0	
WN098.00	P	13	0	0		1	0	2	0	8	0	9	0	1	0	3	0
WN099.00	A	13	0	0		2	0	3	0	10	0	7	14	1	0	1	0
WN100.00	P	12	8	1	0	4	0	3	0	10	0	5	0	2	0	0	

Station	Class	Ebb Tide								Flood Tide							
		Ebb N	% Ebb Exceed	Low N	% Low Exceed	High Ebb N	% HE Exceed	Low Ebb N	% LE Exceed	Flood N	% Fld Exceed	High N	% High Exceed	High Flood N	% HF Exceed	Low Flood N	% LF Exceed
WN104.50	NEW	8	0	0		5	0	2	0	5	0	2	0	2	0	0	
WN105.00	A	11	0	1	0	7	0	2	0	9	11	3	33	4	0	0	
WN114.00	P	15	0	3	0	4	0	2	0	8	0	0		1	0	4	0
WN115.00	P	15	7	1	0	4	0	3	0	9	11	2	0	1	0	2	0
WN117.00	P	15	0	2	0	3	0	2	0	10	10	2	0	1	0	2	0
Total Samples Collected		734		73		283		88		869		377		376		103	
Average % of samples that Exceeded the P90 standard			7.6		0.83		9.16		2.9		4.28		8.43		8.03		1.63

Rainfall

Rainfall can affect water quality by contributing to increased over-land run-off as well as to higher flow rates in steams. 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. In growing area WN, there are two rainfall monitoring stations, located in Boothbay Harbor and Newcastle, which report to DMR. Both stations report daily rainfall amounts Monday through Friday and a cumulative rainfall amount over the weekend. Daily precipitation amounts recorded at these two stations over the past six years are presented in Figure 14. Yearly precipitation amounts for these two stations, as well as the Wiscasset Airport weather reporting station, are presented in Table 8.

Figure 14. Daily Rainfall Amounts, (A) Newcastle, (B) Boothbay Harbor, Maine, 2003-2008

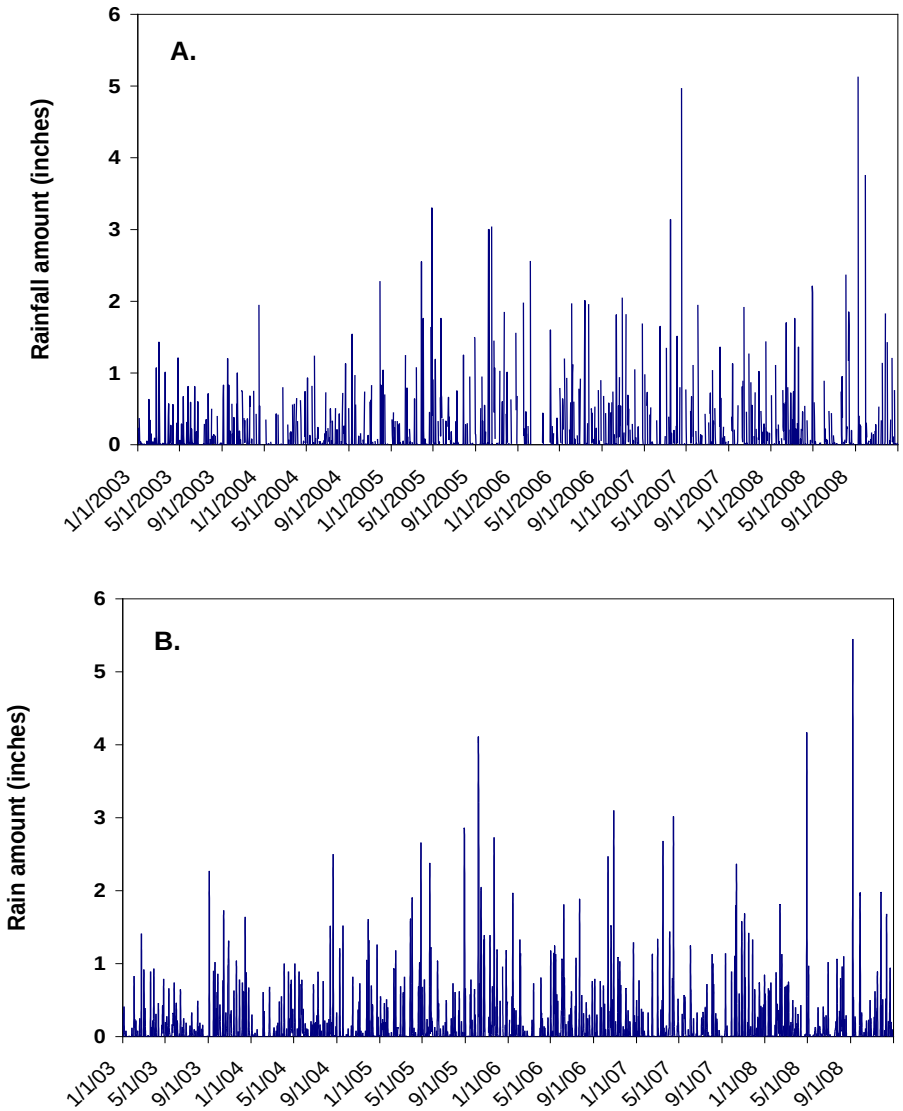


Table 8. Annual Precipitation at Wiscasset, Newcastle and Boothbay Harbor Rain Stations, 2003-2008

Year	Wiscasset Rainfall	Newcastle Rainfall	Boothbay Harbor Rainfall
2003	39.34	42.87	37.44
2004	39.11	39.47	33.63
2005	69.02	73.73	62.55
2006	54.96	55.19	52.88
2007	NA	54.03	49.71
2008	NA	55.49	55.78

During extreme precipitation events, the DMR can enact an emergency closure of the shellfish areas, known as a “flood closure”. Such closures are intended to protect public health by implementing a temporary closure of shellfish areas which are impacted by heavy run-off of potentially polluted storm water. Flood closures are implemented during heavy rainfall events, which result in at least 2 inches of rainfall deposited over a particular geographic area in a 24 hour period. While it is not known whether the run-off generated during such events is contaminated with fecal matter, the flood closures are intended to serve as precautionary closures to protect public health. Before these emergency closures can be repealed, water samples collected at pre-determined stations must confirm that water quality has returned to approved standards; these predetermined stations are selected from stations that are classified as approved, but in the past have been impacted by intermittent pollution associated with rainfall.

Generally, DMR enacts several (2-3) flood closures in a calendar year. During dry years this number typically decreases, while during wetter years, the number can significantly increase. Flood closures most frequently occur in spring and fall. Since 1999, DMR has promulgated 23 flood closures which affected growing area WN. According to the USGS, the period from 1999 to 2003, Maine was affected by the most severe drought in more than 50 years. As a result, only 5 flood closures were promulgated over this five year period; specifically, 2 closures in 1999 (both occurring in September), and one flood closure per year in 2000, 2001 and 2002, in April, March and September, respectively by year. There were no flood closures promulgated in 2003. In 2004, one flood closure was implemented; this flood closure only encompassed the shoreline surrounding Westport Island. In contrast to the preceding six years, 2005 was one of the wettest on recent record, and seven flood closures were implemented (in March, April, May, August and three in October). In 2006, two flood closures were promulgated, one in June and the other in October; in 2007, three closures were promulgated, occurring in March, April and October. In 2008, five flood closures were implemented, occurring in February, April, September (2 closures) and November.

While emergency closures limit shellfish harvesting during extremely heavy rainfall events, water quality in some shellfish areas may be adversely impacted by polluted run-off that is generated during lesser precipitation events (<2 inches in 24 hours). In order to investigate how water quality is impacted by rainfall events which do not necessitate an emergency flood closure, a rainfall assessment for all stations in growing area WN was completed. For this assessment, the geometric mean and P90 scores were recalculated using only data points which were collected after 0.25 or more inches of cumulative rainfall were recorded 72 hours prior to sample collection (sum of rainfall recorded in the AM on day of sample, day before

sample and two days before sample was taken) (Table 9). In this calculation, all data (excluding those samples collected during flood closures) collected between 2000 and 2008 were included, and calculations were limited to those stations that had at least five sample collected under the defined rainfall condition. In completing this assessment, the data collected under dry (<0.25 inches of rainfall in 72 hours) conditions, and thus not affected by run-off, was omitted from the calculation. While the results of this calculation show that all stations that are classified as approved retain geometric mean scores of less than 14 when using data collected after rainfall, the P90 scores for multiple stations increase when looking at this dataset, indicating that multiple approved stations are impacted by intermittent pollution that occurs after rain events. Stations that showed the greatest increase in P90 scores include WN 21, 40, 71 and 105. Additional sampling after rainfall events is recommended for these stations, and any surrounding streams that may influence the water quality at these stations; the results of these samples should be presented in the next triennial report. Any downward changes in classification for these stations should be supported by additional water quality data following rainfall events.

Table 9. Rainfall Analysis, Cumulative rainfall of >0.25 inches (72 hours), 2000-2008

Station	Class	Sample Count	GM	Stnd Dev	P90
WN001.00	A	25	5.40	0.52	25.09
WN002.00	P	26	5.95	0.61	36.56
WN003.00	P	26	5.21	0.45	19.81
WN004.00	P	25	5.87	0.56	31.10
WN013.00	P	22	7.22	0.67	52.96
WN016.00	A	23	6.32	0.54	31.13
WN018.00	A	24	6.74	0.56	35.77
WN020.00	A	24	6.87	0.60	40.33
WN021.00	A	23	7.85	0.76	75.31
WN022.00	A	24	5.97	0.54	29.53
WN027.00	P	19	8.09	0.68	60.92
WN027.20	NEW	12	3.94	0.39	12.77
WN027.50	P	19	8.40	0.59	49.08
WN028.00	P	21	10.79	0.81	118.50
WN028.50	P	13	30.09	0.49	129.18
WN029.00	P	22	16.64	0.71	137.89
WN030.00	P	21	19.24	0.80	206.73
WN030.50	P	15	18.98	0.69	150.46
WN032.40	A→P	20	9.09	0.60	53.99
WN032.60	A→P	19	13.10	0.70	105.27
WN033.00	A→P	20	11.53	0.64	77.78
WN034.00	A→P	21	6.84	0.45	26.13
WN035.00	A→P	21	12.70	0.74	113.93
WN035.10	A→P	21	13.39	0.52	62.61
WN035.40	A→P	20	8.43	0.67	62.01
WN035.70	NEW	5	11.08	0.54	57.20
WN036.00	A→P	20	8.98	0.59	52.08
WN038.50	NEW	6	15.02	1.04	348.89

Station	Class	Sample Count	GM	Stnd Dev	P90
WN040.00	A	19	7.55	0.69	58.95
WN041.00	A	19	4.83	0.39	15.42
WN042.00	A	19	5.34	0.44	20.00
WN043.00	P	19	5.19	0.45	19.96
WN043.30	A	15	7.91	0.56	42.66
WN043.50	R	15	12.82	0.65	88.67
WN044.00	R	27	13.58	0.63	87.74
WN044.50	NEW	12	9.89	0.42	34.88
WN047.00	P	16	4.63	0.36	13.47
WN048.00	P	19	5.36	0.45	20.34
WN050.00	NEW	14	3.22	0.21	5.98
WN051.00	P	29	8.40	0.61	50.67
WN052.00	P	36	11.40	0.57	60.92
WN054.00	P	23	5.27	0.49	22.71
WN056.00	P	19	5.87	0.49	25.44
WN057.00	A	18	7.86	0.61	47.53
WN060.00	P	23	6.52	0.55	33.34
WN063.00	A	19	7.03	0.63	45.35
WN064.00	R	23	9.56	0.50	42.31
WN065.00	R	24	12.87	0.51	59.19
WN066.00	R	20	8.35	0.57	45.23
WN068.00	A	23	4.05	0.32	10.59
WN068.50	A	23	6.14	0.49	26.24
WN069.00	R	18	24.26	0.62	153.84
WN071.00	A	23	8.85	0.60	52.37
WN073.00	NEW	11	11.84	0.93	188.92
WN076.00	P	27	7.70	0.75	69.85
WN077.20	A	27	5.16	0.54	25.53
WN077.30	P	25	7.93	0.72	66.53
WN078.00	P	22	4.64	0.34	12.62
WN079.00	P	20	3.39	0.27	7.56
WN080.00	P	24	9.79	0.61	60.15
WN080.50	P	14	8.69	0.50	39.16
WN082.00	P	19	23.87	0.82	275.37
WN083.00	P	20	15.67	0.83	186.57
WN084.00	P	21	9.99	0.64	66.93
WN085.00	A	20	4.60	0.72	39.25
WN085.50	A	18	4.68	0.41	15.78
WN086.00	P	21	4.78	0.52	22.71
WN087.00	P	21	5.42	0.67	39.64
WN089.00	P	19	4.19	0.32	10.95
WN090.00	P	19	3.96	0.29	9.29
WN091.00	P	20	5.06	0.35	14.43

Station	Class	Sample Count	GM	Stnd Dev	P90
WN092.00	P	22	6.11	0.53	29.21
WN093.00	P	21	4.40	0.31	11.16
WN098.00	P	19	3.42	0.23	6.74
WN099.00	A	19	3.67	0.34	10.08
WN100.00	P	19	4.40	0.45	16.92
WN104.50	NEW	7	2.66	0.26	5.75
WN105.00	A	22	6.86	0.68	52.27
WN114.00	P	22	4.51	0.37	13.65
WN115.00	P	23	3.36	0.30	8.16
WN117.00	P	22	6.39	0.55	32.98

Salinity

Salinity refers to the dissolved salt content in a body of water. Typically, the salinity values of the open ocean range from 33-37 psu (practical salinity units). Salinity values of coastal waters are typically more variable, as they are affected by factors such as snow and ice melt, precipitation (rain and snow), inflow of freshwater from stream and rivers, and groundwater feeding. Additionally, tides, wave motion and ocean currents can contribute to the variability of salinities along the coast by impacting both the horizontal and vertical mixing of seawater. Since salt water has a higher density than fresh water, areas where vertical mixing of the water is limited may experience layering in the water column, with salinity values varying by depth.

The sampling stations located in the Sheepscot River, have variable salinity values. The lowest salinity value recorded from an SRS (systematic random schedule) sample, collected between 2003 ands 2008 was 0; the maximum salinity values observed for the same set of samples was 34 (Table 8). Average salinities of individual sample stations, collected from 2003 through 2008 (SRS data only) ranged from 8.97 to 30.29; standard deviation showed variability among the stations, ranging from 1.35 to greater than 11. Stations with the greatest variability within their datasets (highest stnd. dev values) are most impacted by freshwater sources.

Table 10. Salinity Values (number of samples (n), minimum, maximum and average values, with stnd.dev) for WN Stations, Random Data only, Collected between 2003-2008

Station	Class	n	Min Salinity	Max Salinity	Ave Salinity	Stnd. Dev
WN001.00	P	40	5	32	26.83	5.56
WN002.00	A	40	8	32	27.20	5.10
WN003.00	P	41	16	32	27.98	3.28
WN004.00	P	40	16	32	28.05	3.12
WN013.00	P	38	14	30	25.66	4.27
WN016.00	A	40	14	31	25.10	4.16
WN018.00	A	37	14	30	24.68	3.99
WN020.00	A	40	14	31	24.90	3.96
WN021.00	A	41	4	30	24.39	4.93
WN022.00	A	41	14	32	24.88	4.64
WN027.00	P	38	14	31	27.26	3.68
WN027.20	New	26	18	31	26.38	3.20

Station	Class	n	Min Salinity	Max Salinity	Ave Salinity	Stnd. Dev
WN027.50	P	39	10	30	23.15	5.13
WN028.00	P	37	2	32	26.05	7.13
WN029.00	P	38	2	31	17.87	8.43
WN030.00	P	39	2	30	14.77	8.63
WN030.50	P	35	1	28	14.14	8.10
WN032.40	A	35	5	28	17.00	5.53
WN032.60	A	35	5	30	16.17	5.96
WN033.00	A	35	5	28	16.11	5.93
WN034.00	A	38	8	30	20.32	6.00
WN035.00	A	35	2	27	15.14	6.39
WN035.10	A	35	4	25	15.14	5.07
WN035.40	A	35	2	30	16.51	7.00
WN035.70	New	18	6	24	16.06	5.47
WN036.00	A	35	6	30	18.00	5.77
WN038.50	New	19	6	25	17.42	5.27
WN040.00	A	36	8	30	19.89	5.46
WN041.00	A	36	8	30	21.94	5.72
WN042.00	A	36	8	31	23.03	5.08
WN043.00	P	36	12	30	24.92	4.49
WN043.30	A	32	7	30	20.16	6.21
WN043.50	R	32	6	30	16.31	6.50
WN044.00	R	38	4	27	16.16	5.37
WN044.10	New	9	5	20	10.22	4.41
WN044.50	New	26	5	22	14.00	5.18
WN047.00	P	38	17	31	25.32	4.28
WN048.00	P	36	10	30	23.89	4.60
WN050.00	New	26	15	30	25.12	3.69
WN051.00	P	63	5	31	23.41	5.83
WN052.00	P	64	15.	32	24.92	4.25
WN054.00	P	38	10	30	24.26	4.98
WN056.00	P	36	10	30	23.03	5.07
WN057.00	A	36	10	30	23.00	5.47
WN060.00	P	38	6	30	22.50	5.82
WN063.00	A	36	5	30	20.97	6.70
WN064.00	R	41	3	30	21.76	6.38
WN065.00	R	38	0	30	14.18	7.30
WN066.00	R	32	0	26	11.88	7.92
WN067.00	New	15	0	22	11.20	6.71
WN068.00	A	38	0	30	21.37	6.43
WN068.50	A	38	0	31	17.76	7.48
WN069.00	R	38	0	30	8.97	8.42
WN071.00	A	38	0	27	11.87	8.29
WN073.00	New	23	17	30	25.17	3.51
WN076.00	P	38	10	32	26.84	5.33
WN077.20	A	37	18	32	28.35	3.10

Station	Class	n	Min Salinity	Max Salinity	Ave Salinity	Stnd. Dev
WN077.30	P	38	6	31	28.13	4.13
WN078.00	P	37	10	31	27.24	4.11
WN079.00	P	38	18	32	28.76	3.13
WN080.00	P	38	18	31	26.97	3.49
WN080.50	P	37	0	31	24.00	8.34
WN082.00	P	37	0	32	12.46	11.11
WN083.00	P	37	0	30	18.14	10.21
WN084.00	P	37	6	32	26.81	5.57
WN085.00	A	39	22	32	29.28	1.99
WN085.50	A	39	15	32	27.82	3.84
WN086.00	P	36	18	31	28.19	3.05
WN087.00	P	37	20	32	28.24	2.92
WN089.00	P	39	24	32	29.08	1.91
WN090.00	P	37	25	32	28.70	1.85
WN091.00	P	37	20	32	28.76	2.49
WN092.00	P	39	22	32	29.23	2.05
WN093.00	P	38	25	32	29.21	1.68
WN098.00	P	38	25	32	29.16	1.90
WN099.00	A	38	24	32	28.97	1.92
WN100.00	P	38	24	32	29.26	1.94
WN104.50	New	25	22	32	27.96	2.39
WN105.00	A	38	0	32	22.29	10.31
WN114.00	P	38	28	33	30.26	1.37
WN115.00	P	38	28	34	30.29	1.35
WN117.00	P	38	3	33	25.50	8.24

For the purpose of this report, high salinity variability was defined as having a standard deviation value of 5 or greater. A further salinity assessment was completed on all stations classified as approved that showed high variability in salinity. For these 19 stations (highlighted in yellow in Table 8), individual fecal scores (SRS samples only) collected between 2003 and 2008 were plotted against each sample's salinity values in order to investigate whether a relationship between salinity and fecal scores can be established (Figure 14). While no strong relationship between salinity values and fecal scores was evident at any of the stations, station WN 35 showed weaker relationships between salinity values and fecal scores. This station is located at the tip of Phipps Point, Woolwich, and is influenced by fresh water draining into the Sheepscot River estuary from the Kennebec River, via the Sasanoa River. This station failed to meet the approved standards at the end of 2008, and was reclassified to restricted.

Figure 15. Relationship between Salinity Values and Fecal Scores, WN Stations, Random Data

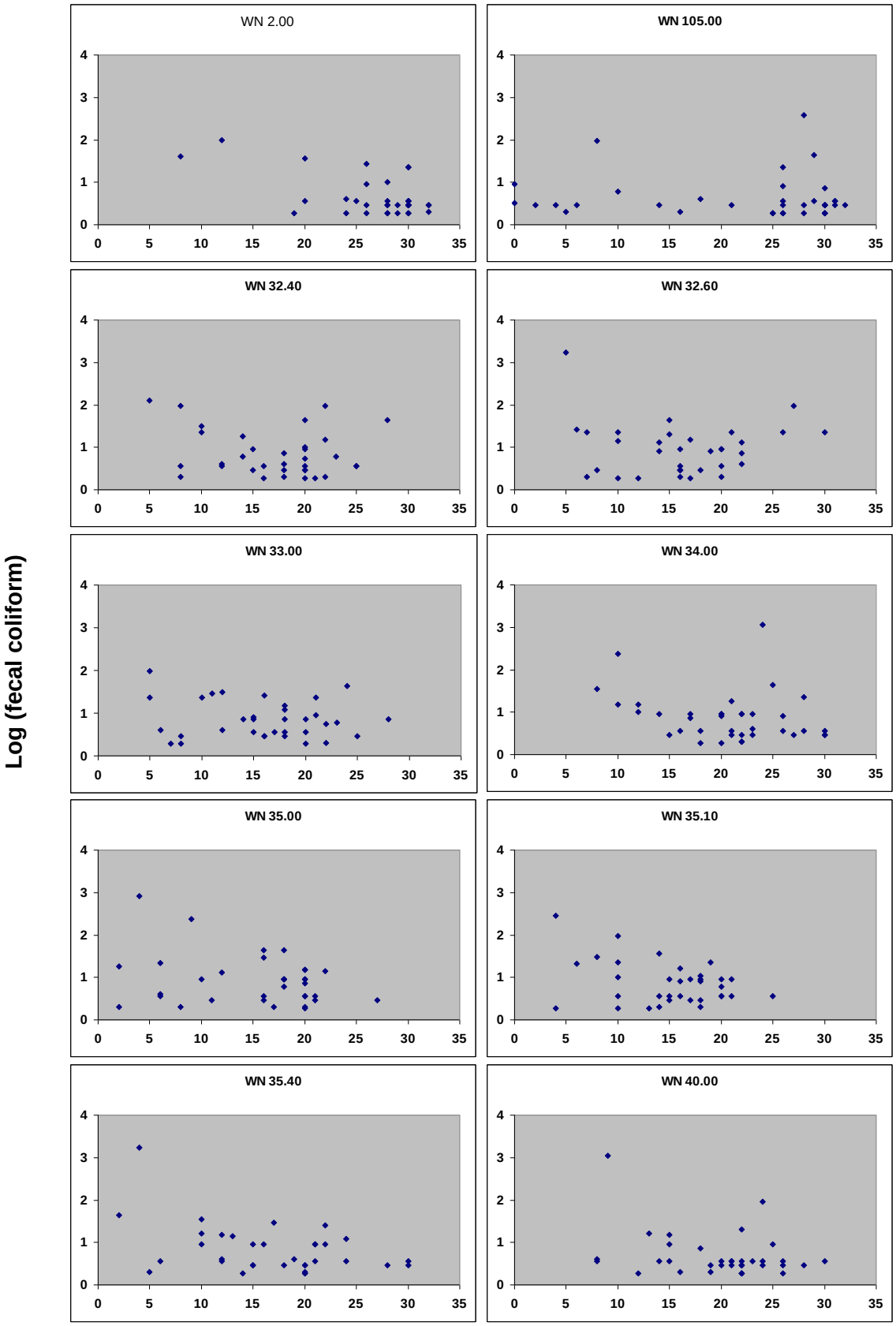
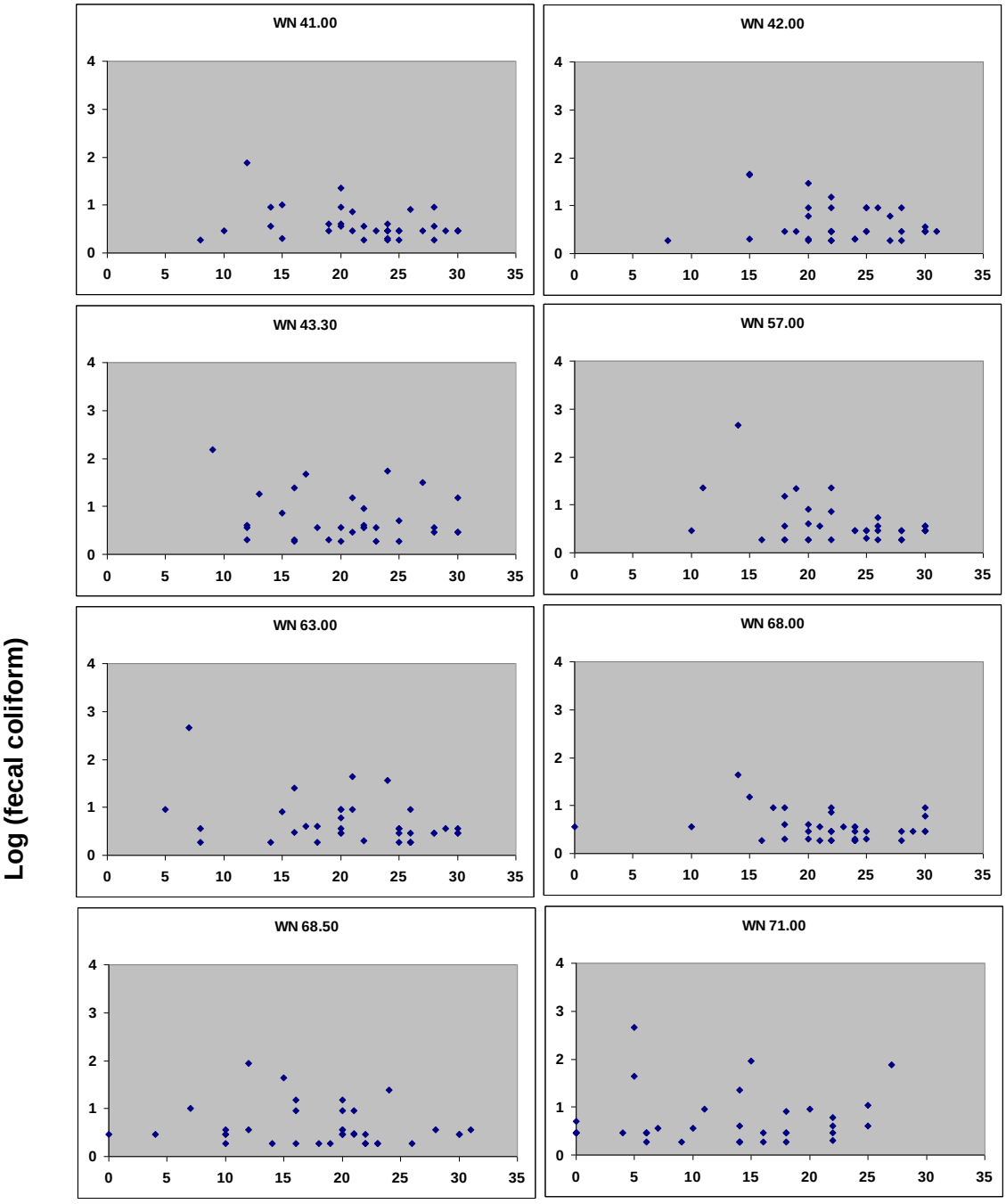


Figure 15 cont.



Winds

Prevailing winds for the period 2004 through 2008 were from the west southwest and south southwest as reported at the Gulf of Maine Ocean Observing System (GOMOOS) buoy in Casco Bay (E01) (Figure 16 and 17). Periods of wind from the west and east southeast were recorded in May of 2005 and 2006. Weekly average wind speed recorded in the same time period show 6-8 mph from June through August and 10-18mph the rest of the year. Wind data specific to each sampling site has been collected since the spring of 2005. While the database now has over three years of data, it is not yet adequate to determine whether wind has an impact on sample scores.

Figure 16. Monthly Average Wind Direction 2004-2008 GOMOOS Buoy E01 site

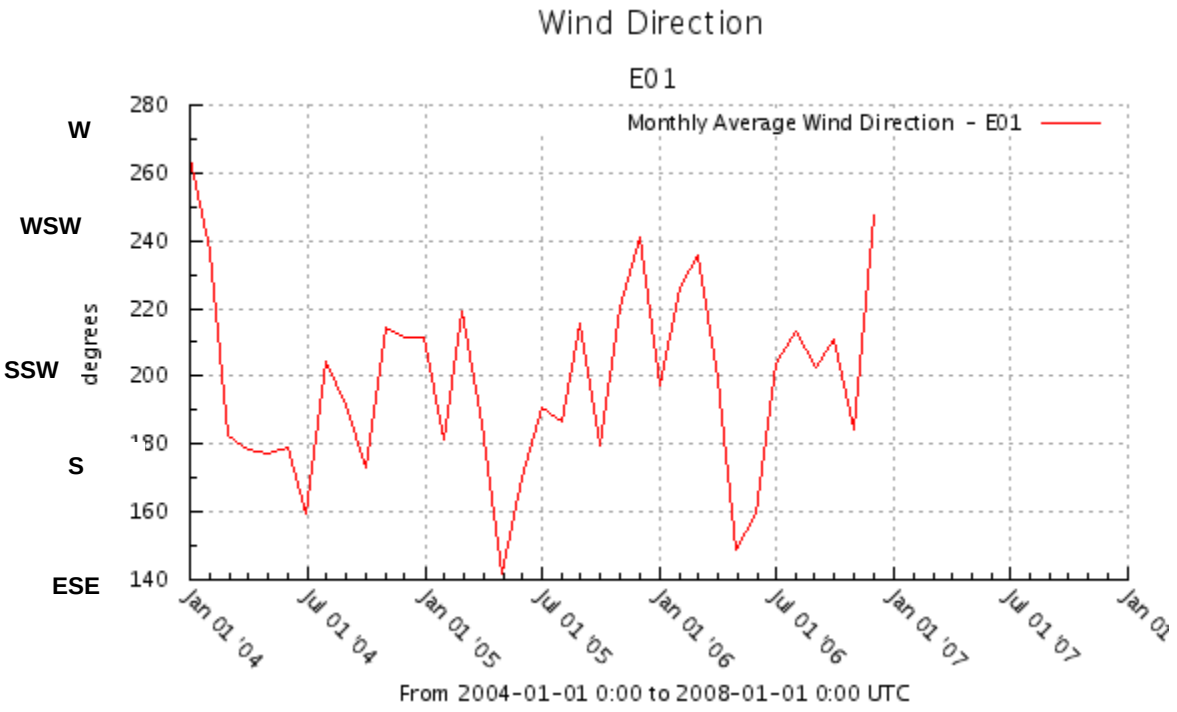
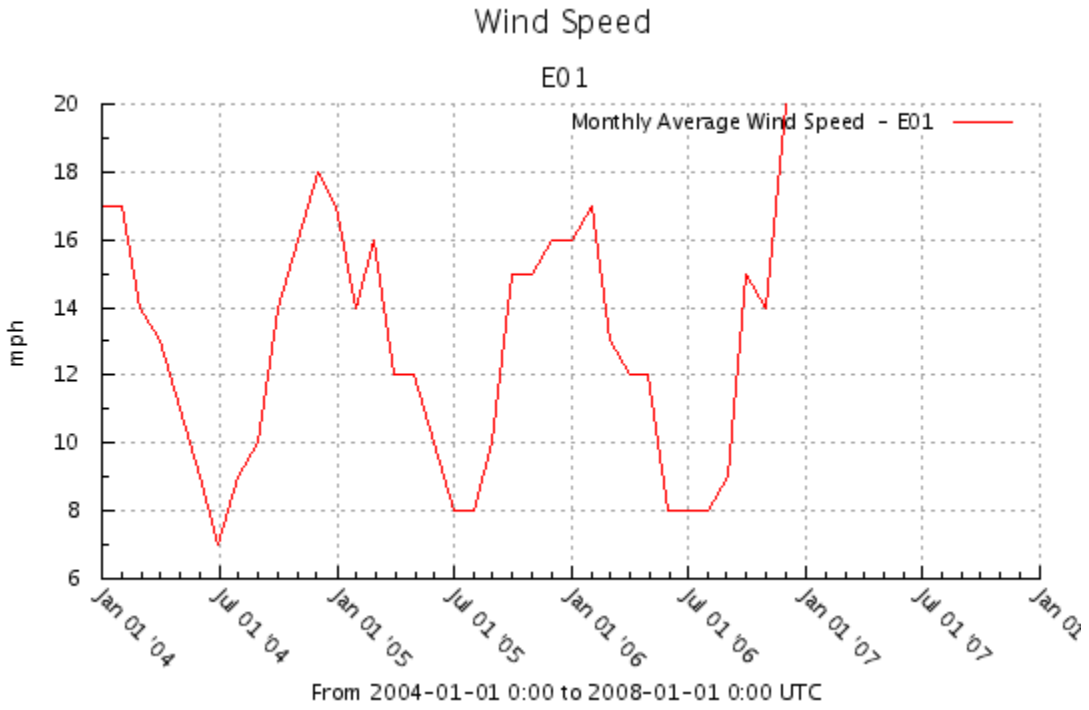


Figure 17. Monthly Average Wind Speed at GOMOOS Buoy E01 2004-2008



River Discharge

The Sheepscot River is the most significant source of fresh water to the Sheepscot River estuary system (McAlice and Jaeger 1983). The river drains an area of 590 km^2. The discharge rate and river height are monitored by the USGS, which maintains a flow gauge at Whitefield, Maine. Discharge rates vary by year (depending on precipitation/snow melt on each given year), as well as by month. Since 1996, the average annual precipitation has ranged from 143 to 484 cfs (Table 9), with 2005, 2006 and 2008 having the highest flow rates; and 2001 having the lowest rates. Years with high average flow rates correspond to years that received the most precipitation. Monthly means over the past 13 years (1996-2008) showed the greatest discharge rates occurring in April, and the lowest rates July, August and September; all months, with the exception of July, August and September showed great variability in the mean monthly discharge rates when compared by year (Table 11). Discharge rates can also vary daily, depending on the daily changes in precipitation amounts (Figure 18).

Water quality can be greatly impacted by discharge rates of the upper Sheepscot River if this fresh water source is polluted with fecal matter. Greater inputs of polluted fresh water will require greater amount of estuarine water to achieve dilution to approved fecal coliform concentrations. The pollution loading to the upper Sheepscot River may be impacted by numerous factors, including the intensity and duration of rain events, the saturation of surrounding soils, water temperature, and activities taking place within the watershed (examples: fertilization of fields with manure, pastured animal presence, septic system malfunction, etc). Thus, while fresh water inputs to the Sheepscot River estuarine system will increase as discharge rates of the river increase, these inputs may not always result in an increase of pollution loading to the estuary system. The stations within growing area WN which

would be most affected by the fresh water inputs from the upper river are WN 63 through 68; these stations are located in the upper reaches of the Sheepscot River estuary; stations WN 63 and 68 are classified as approved and the remaining stations are classified prohibited.

In addition to the upper Sheepscot River, fresh water from the Kennebec River can also enter the Sheepscot River estuary system via the Sasanoa River and Back River. The station that are most affected by these fresh water inputs include stations WN 29, 30 and 30.5 (Hockomock and Hall Bays), WN 32.4, 32.6 and 33 (Brookings Bay) and WN 35, 35.1, 35.4 and 36 (Montsweag Bay).

Table 11. Average Discharge by Calendar Year, Sheepscot River, USGS Gauge 01038000

Year	8Average Discharge (cfs)
1996	344.71
1997	188.28
1998	255.62
1999	304.32
2000	245.09
2001	142.52
2002	210.13
2003	266.26
2004	203.22
2005	484.90
2006	395.39
2007	256.23
2008	372.98*

*Note: Data range for 2008 includes data from Jan 1 through September 30

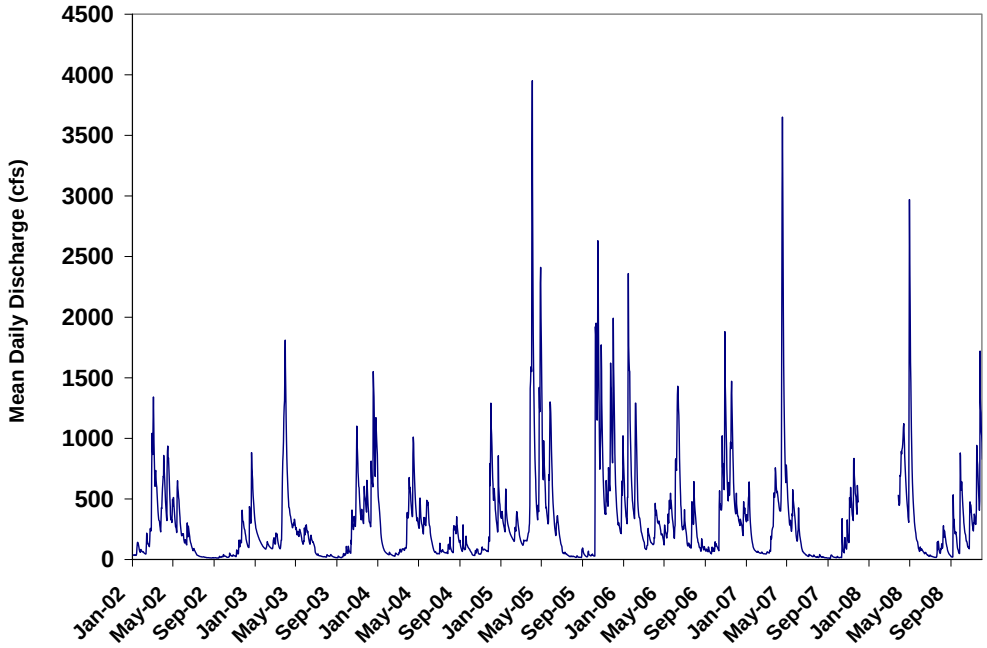
Table 12. Average Discharge by Month, Sheepscot River, 1996-2008

YEAR	Monthly mean Discharge cfs												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Mean
1996	645.1	614	396.8	677.3	397.2	126	214	49.6	90.4	85	91.6	750	344.71
1997	293.1	171.4	231.8	714.5	428.7	155.7	82.8	24.3	25.3	17.4	60.7	53.6	188.28
1998	137.6	365.6	920.3	400.4	371.5	402.2	131	27.1	17.9	79.7	77.2	137.2	255.62
1999	677	413.7	815.9	350.8	101.1	50.5	21.3	15.6	240	261.6	381	323.6	304.32
2000	194.2	161.8	765.8	777.8	430	133.1	69.2	32.3	17.7	28.4	62.1	268.7	245.09
2001	121.5	91.5	194.6	927.8	159.5	97.4	24.2	13	13.9	16.2	18.3	32.3	142.52
2002	67.8	181.9	589.6	574.8	359.2	163.4	39.8	14.8	18.6	27.9	149	334.7	210.13
2003	161.2	114.6	458.5	515	206.8	162.6	29	25.7	30.7	273.1	492	725.5	266.26
2004	186	39.6	120.2	522.6	349.6	116.1	70.2	176.6	113	54	126	564	203.22
2005	310.5	229.8	304	1,345	777.6	313.3	42.9	24.9	40.3	1,101	715	614.3	484.90
2006	783.6	490.9	140.4	266.5	311.4	659.8	241	153.4	75.8	514.1	764	343.5	395.39

YEAR	Monthly mean Discharge cfs												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Mean
2007	242.9	53.1	255.9	1,088	371.7	125.3	27.3	18.7	19.2	95.4	475	302.7	256.23
2008	389.2	529.4	627	821	556	55.1	44.7	117.7	217				372.98 **
Monthly Mean Range	68 - 784	40 - 614	120 - 920	400 - 1345	101 - 778	51 - 659	21 - 214	13 - 177	14 - 240	16 - 1101	18 - 764	32 - 750	
Monthly Mean	324	266	448	691	371	197	80	53	71	213	284	371	

** 2008 Yearly Mean based on average of January through September; the remaining 2008 monthly data not yet available

Figure 18. Mean Daily River Discharge, 2002-2008, USGS Gauge 103800, North Whitefield, Maine



Water Quality Review

Table 13 lists all active approved, restricted and prohibited stations in Growing Area WN, 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 13. The approved and restricted standards for each station are also displayed in Table 13. These standards will fluctuate yearly as a result of the DMR transition from a most probable number (MPN) fecal coliform test method to a membrane filtration (MF) method and are dependent on the number of sample analyzed by MPN verses 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. A more detailed explanation of this transition can be found in Appendix C.

Five approved stations, WM 32.6, 34, 35, 35.4 and 36 exceeded their NSSP classification standard in 2008 and need to be downgraded in classification (highlighted in yellow in Table 13). The remaining approved stations and all restricted stations met their NSSP classification standard. There are 31 stations in growing area WN that meet the approved standard but are classified as prohibited, due to their proximity to OBDs or actual identified pollution sources, or expired shoreline survey (Table 14). Many OBDs in area WN are on the DEP priority removal list; once these OBDs are removed and the survey status is updated, the adjacent stations can be reviewed for an approved classification. Prohibited station WN 112, is located near OBDs which are not on the priority removal list; this station was deactivated at the completion of the 2008 field season. Closures surrounding shoreline with expired survey status will be reevaluated once the survey work is completed; upward classifications for these areas will be considered only after the survey work is completed and any identified problems are remediated. Previously approved areas that remain prohibited due to their proximity to actual pollution sources which were identified during the most recent shoreline survey field work will be reevaluated for upward classification once the documented problems are remediated.

Table 13. Growing Area WN Geomean and P90 Scores, 2003-2008

STATION	CLASS	CNT	MFCNT	GM	SDV	MAX	P90	APPD_STD	RESTR_STD
WN001.00	P	30	15	4.9	0.69	320	28.7	39	221
WN002.00	A	30	15	4.6	0.47	98	18.0	39	221
WN003.00	P	30	15	4.4	0.41	42	14.6	39	221
WN004.00	P	30	15	4.0	0.36	23	11.5	39	221
WN013.00	P	30	15	5.2	0.54	104	25.2	39	221
WN016.00	A	30	15	4.6	0.46	84	17.5	39	221
WN018.00	A	30	14	4.8	0.45	102	17.8	40	226
WN020.00	A	30	15	4.4	0.42	90	15.3	39	221
WN021.00	A	30	15	4.4	0.41	92	14.8	39	221
WN022.00	A	30	15	5.3	0.47	92	21.5	39	221
WN027.00	P	30	14	4.2	0.60	700	24.6	40	226
WN027.20	New	25	14	3.9	0.43	93	13.7	38	213
WN027.50	P	30	15	4.0	0.38	43	12.1	39	221
WN028.00	P	30	14	6.5	0.70	1500	50.8	40	226
WN029.00	P	30	16	10.1	0.68	1100	74.3	38	217
WN030.00	P	30	15	14.3	0.72	440	118.4	39	221
WN030.50	P	30	16	15.3	0.67	380	109.8	38	217
WN032.40	A	30	16	6.9	0.54	128	34.4	38	217
WN032.60	A	30	16	8.4	0.63	1700	53.6	38	217
WN033.00	A	30	16	7.5	0.46	96	29.1	38	217
WN034.00	A	30	14	7.5	0.60	1160	44.8	40	226
WN035.00	A	30	16	8.2	0.61	820	49.2	38	217
WN035.10	A	30	16	7.9	0.53	280	37.0	38	217
WN035.40	A	30	16	7.5	0.60	1700	44.5	38	217
WN035.70	New	18	16	5.3	0.49	80	22.8	33	174
WN036.00	A	30	16	8.0	0.53	140	38.1	38	217
WN038.50	New	19	15	5.4	0.70	1700	42.5	34	185
WN040.00	A	30	14	5.1	0.58	1100	28.4	40	226

STATION	CLASS	CNT	MFCNT	GM	SDV	MAX	P90	APPD_STD	RESTR_STD
WN041.00	A	30	14	3.9	0.33	76	10.3	40	226
WN042.00	A	30	14	4.2	0.41	46	13.9	40	226
WN043.00	P	30	15	3.1	0.33	54	8.1	39	221
WN043.30	A	30	14	5.9	0.51	154	26.5	40	226
WN043.50	R	30	14	10.4	0.60	240	60.2	40	226
WN044.00	R	30	15	9.9	0.58	94	54.0	39	221
WN044.10	New	8	8	9.4	0.75	200	90.0		
WN044.50	New	25	14	7.8	0.53	93	37.5		
WN047.00	P	30	14	4.0	0.36	43	11.3	40	226
WN048.00	P	30	15	3.9	0.41	93	13.0	39	221
WN050.00	New	26	15	3.2	0.24	16	6.4		
WN051.00	P	30	24	6.5	0.63	332	41.6	34	184
WN052.00	P	30	24	10.2	0.66	220	72.3	34	184
WN054.00	P	30	15	3.4	0.35	93	9.5	39	221
WN056.00	P	30	14	4.6	0.45	93	17.7	40	226
WN057.00	A	30	14	4.1	0.49	460	17.7	40	226
WN060.00	P	30	15	3.2	0.37	93	9.7	39	221
WN063.00	A	30	14	5.1	0.53	460	24.2	40	226
WN064.00	R	30	17	5.6	0.57	240	29.6	38	212
WN065.00	R	30	16	6.2	0.45	48	23.8	38	217
WN066.00	R	30	14	7.9	0.58	140	43.4	40	226
WN067.00	New	15	15	8.3	0.61	440	51.7		
WN068.00	A	30	15	3.4	0.32	43	8.7	39	221
WN068.50	A	30	15	4.4	0.45	88	16.6	39	221
WN069.00	R	30	15	16.0	0.68	460	118.2	39	221
WN071.00	A	30	15	4.8	0.55	460	24.7	39	221
WN073.00	New	24	14	6.4	0.74	1200	56.9		
WN076.00	P	30	14	6.0	0.73	1100	51.6	40	226
WN077.20	A	30	14	4.3	0.51	160	19.3	40	226
WN077.30	P	30	14	5.1	0.68	1100	37.8	40	226
WN078.00	P	30	15	3.7	0.35	43	10.3	39	221
WN079.00	P	30	15	2.7	0.18	9.1	4.7	39	221
WN080.00	P	30	16	3.9	0.40	43	12.6	38	217
WN080.50	P	30	16	5.9	0.60	160	34.7	38	217
WN082.00	P	30	15	6.3	0.57	280	33.8	39	221
WN083.00	P	30	15	6.3	0.67	440	45.3	39	221
WN084.00	P	30	16	4.5	0.56	320	23.4	38	217
WN085.00	A	30	15	3.7	0.61	1100	22.6	39	221
WN085.50	A	30	15	3.5	0.35	43	9.6	39	221
WN086.00	P	30	15	3.3	0.29	42	7.9	39	221
WN087.00	P	30	15	6.5	0.70	1700	50.8	39	221
WN089.00	P	30	15	3.7	0.31	28	9.2	39	221
WN090.00	P	30	15	3.8	0.34	32	10.2	39	221
WN091.00	P	30	15	3.5	0.32	31	9.0	39	221

STATION	CLASS	CNT	MFCNT	GM	SDV	MAX	P90	APPD_STD	RESTR_STD
WN092.00	P	30	16	5.6	0.51	240	25.3	38	217
WN093.00	P	30	15	3.7	0.32	23	9.4	39	221
WN098.00	P	30	15	3.1	0.31	43	7.8	39	221
WN099.00	A	30	15	3.4	0.53	1100	16.1	39	221
WN100.00	P	30	15	3.5	0.39	240	10.9	39	221
WN104.50	New	24	15	2.8	0.28	23	6.3		
WN105.00	A	30	15	4.4	0.55	380	22.2	39	221
WN112.00	P	30	15	7.1	0.75	1100	64.7	39	221
WN114.00	P	30	15	3.2	0.28	23	7.3	39	221
WN115.00	P	30	15	2.5	0.11	4	3.4	39	221
WN117.00	P	30	15	4.1	0.42	43	14.1	39	221

Table 14. Justification for Prohibited Classifications for Stations Meeting the Approved Standard

STATION	CLASS	GM	P90	APPD_STD	NOTES
WN002.00	P	5.1	31.3	39	Near identified actual pollution source
WN003.00	P	4.4	14.6	39	Can be evaluated for upward classification
WN004.00	P	4.0	11.5	39	Can be evaluated for upward classification
WN013.00	P	5.2	25.2	39	Near Marina
WN027.00	P	4.2	24.6	40	Near active OBD
WN027.50	P	4.0	12.1	39	Near active OBD
WN043.00	P	3.1	8.1	39	Near Removed OBDs, can open if no problems noted
WN047.00	P	4.0	11.3	40	Near active OBD
WN048.00	P	3.9	13.0	39	Near Removed OBDs, can open if no problems noted
WN054.00	P	3.4	9.5	39	Expired survey
WN056.00	P	4.6	17.7	40	Boundary station between P and A areas
WN060.00	P	3.2	9.7	39	Expired survey
WN077.30	P	5.1	37.8	40	High water quality scores in dataset
WN078.00	P	3.7	10.3	39	Expired Survey
WN079.00	P	2.7	4.7	39	Near Removed OBDs, recommended for upgrade in classification; upgraded in March 2009
WN080.00	P	3.9	12.6	38	Closure can be repealed, survey completed; upgraded in June 2009
WN080.50	P	5.9	34.7	38	Near identified actual pollution source
WN082.00	P	6.3	33.8	39	Can be evaluated for upgrade once non-point pollution sources(streams) are evaluated
WN084.00	P	4.5	23.4	38	Can be evaluated for upgrade once non-point pollution sources(streams) are evaluated
WN086.00	P	3.3	7.9	39	Near identified actual pollution source
WN089.00	P	3.7	9.2	39	Near active OBD
WN090.00	P	3.8	10.2	39	Near active OBD
WN091.00	P	3.5	9.0	39	Near removed OBD; expired survey
WN092.00	P	5.6	25.3	38	Near identified actual pollution source

STATION	CLASS	GM	P90	APPD_STD	NOTES
WN093.00	P	3.7	9.4	39	Near identified actual pollution source
WN098.00	P	3.1	7.8	39	Near active OBD
WN100.00	P	3.5	10.9	39	Near active OBD; boundary station
WN114.00	P	3.2	7.3	39	Near active OBD
WN115.00	P	2.5	3.4	39	Near active OBD
WN117.00	P	4.1	14.1	39	Near active OBD

All stations active at the beginning of 2008 were sampled at least 6 times following the systematic random sampling schedule (Table 15 and Appendix D). Some of the stations were sampled multiple times under adverse conditions; these scores are not used in calculating the P90 scores. Multiple stations changed classifications in the middle of 2008; these changes are reflected in Table 15, and a corresponding number of samples collected during each classification are provided.

Table 15. WN Sampling Effort, 2008

Station	Class	Adverse	Extra		Random		Total	Comments
		Closed	Closed	Open	Closed	Open		
WN001.00	P				6		6	
WN002.00	A					6	6	
WN003.00	P				6		6	
WN004.00	P				6		6	
WN013.00	P				6		6	
WN016.00	A					6	6	
WN018.00	A					6	6	
WN020.00	A					6	6	
WN021.00	A					6	6	
WN022.00	A					6	6	
WN027.00	P		1		6		7	
WN027.20	New				1	6	7	
WN027.50	P	3			6		9	
WN028.00	P		1		6		7	
WN029.00	P				6		6	
WN030.00	P				6		6	
WN030.50	P				6		6	
WN032.40	A	7				6	13	
WN032.60	A					6	6	
WN033.00	A					6	6	
WN034.00	A	13			1	6	20	Flood Station
WN035.00	A					6	6	
WN035.10	A					6	6	
WN035.40	A					6	6	
WN035.70	New					6	6	
WN036.00	A					6	6	
WN038.50	New					6	6	
WN040.00	A					6	6	
WN041.00	A					6	6	

Station	Class	Adverse	Extra		Random		Total	Comments
		Closed	Closed	Open	Closed	Open		
WN042.00	A	18				6	24	Flood Station
WN043.00	P				6		6	
WN043.30	A				1	6	7	
WN043.50	R				1	6	7	
WN044.00	R			1	1	6	8	
WN044.10	New				1	6	7	
WN044.50	New				1	6	7	
WN047.00	P		1		6		7	
WN048.00	A					1	6	Reclassified from A to P
	P				5			
WN050.00	New				6		6	
WN051.00	CA					3	10	Reclassified from CA to P
	P				7			
WN052.00	CA	2				3	16	Reclassified from CA to P
	P	3			8			
WN054.00	A					2	7	Reclassified from A to P
	P				5			
WN056.00	P				6		6	
WN057.00	A					6	6	
WN060.00	A					2	7	Reclassified from A to P
	P				5			
WN063.00	A					6	6	
WN064.00	R				1	6	7	
WN065.00	R				1	6	7	
WN066.00	R					6	6	
WN067.00	New				6		6	
WN068.00	A				1	6	7	
WN068.50	A				1	6	7	
WN069.00	R				1	6	7	
WN071.00	A				1	6	7	
WN073.00	New		1		5		6	
WN076.00	P		1		6		7	
WN077.20	A	13			1	6	20	Flood Station
WN077.30	P		1		6		7	
WN078.00	A					2	7	Reclassified from A to P
	P				5			
WN079.00	P				7		7	
WN080.00	A					2	6	Reclassified from A to P
	P				4			
WN080.50	A					2	6	Reclassified from A to P
	P				4			
WN082.00	P				7		7	
WN083.00	P				7		7	
WN084.00	P				7		7	
WN085.00	A					4	7	Reclassified from A to P due

Station	Class	Adverse	Extra		Random		Total	Comments
		Closed	Closed	Open	Closed	Open		
	P				3			to expired shoreline survey; after survey updated, upgraded back to A
WN085.50	A					4	7	Reclassified from A to P due to expired shoreline survey; after survey updated, upgraded back to A
	P				3			
WN086.00	P				6		6	
WN087.00	P				6		6	
WN089.00	P				7		7	
WN090.00	P				6		6	
WN091.00	P				6		6	
WN092.00	A	3				2	14	Reclassified from A to P
	P	4			5			
WN093.00	A					2	6	Reclassified from A to P
	P				4			
WN098.00	P				6		6	
WN099.00	A					6	6	
WN100.00	P				6		6	
WN104.50	New					6	6	
WN105.00	A					6	6	
WN112.00	P				6		6	
WN114.00	P				6		6	
WN115.00	P				6		6	
WN117.00	P				6		6	

Figures 19, 20 and 21 show the P90 trends over the past three years, for all approved, and restricted and prohibited stations (that are meeting the approved standard) in growing area WN. During the transition from MPN to MF analysis method, the approved standard will decrease every year, until all samples have been analyzed by the MF method. In order to show the trend of the P90 value over the years, the calculated P90 scores are expressed as a percentage of the approved standard; any station showing the 2008 column on or above 100 percent does not meet the standard for approved classification. Generally, most approved stations in WN have shown an increase in scores over the past year. In 2008, several of the sampling dates fell during periods of moderately heavy rain, which contributed to an increase of run-off, and more elevated fecal coliform scores across many station in the growing area. At the end of 2008, stations WN 32.6, 34, 35, 35.4 and 36 did not meet the approved standard and were downgraded in classification; stations 32.4, 33 and 35.1 were also downgraded in classification. All of these stations are located in Brookings or Montsweag Bays, and multiple septic system malfunctions have been noted in this area during the most recent shoreline survey. It is likely that the recent increase in scores among these stations were caused by these malfunctions. Station WN 40 currently meets approved standards, but has shown an increase in scores over the past year. No actual pollution sources were identified in the vicinity of this station, and follow up survey work in the vicinity of this station may be required in the coming review year, to further investigate the sources of the pollution. Stations WN 21 and 77.2 have shown an decrease in scores (improvement in water quality) over the past year, while stations WN 16, 18, 20, 22, 41, 57, 63, 68, 71, 85, 85.5, 91 have shown no or little change (<15 percent) in the

scores. The P90 trends for restricted stations in growing area WN show an increase in scores for stations WN 43.5, 66 and 69; station WN 44 has shown a slight decrease since 2007. Station WN 64 and 65 currently meet the approved standards, and have shown little change in scores over the past three years. These two stations may be evaluated for an upgrade in classification, once the shoreline survey is updated in 2009. The remaining restricted stations are appropriately classified.

Figure 19. P90 Scores expressed as percents of approved standard, Approved Stations, 2006-2008

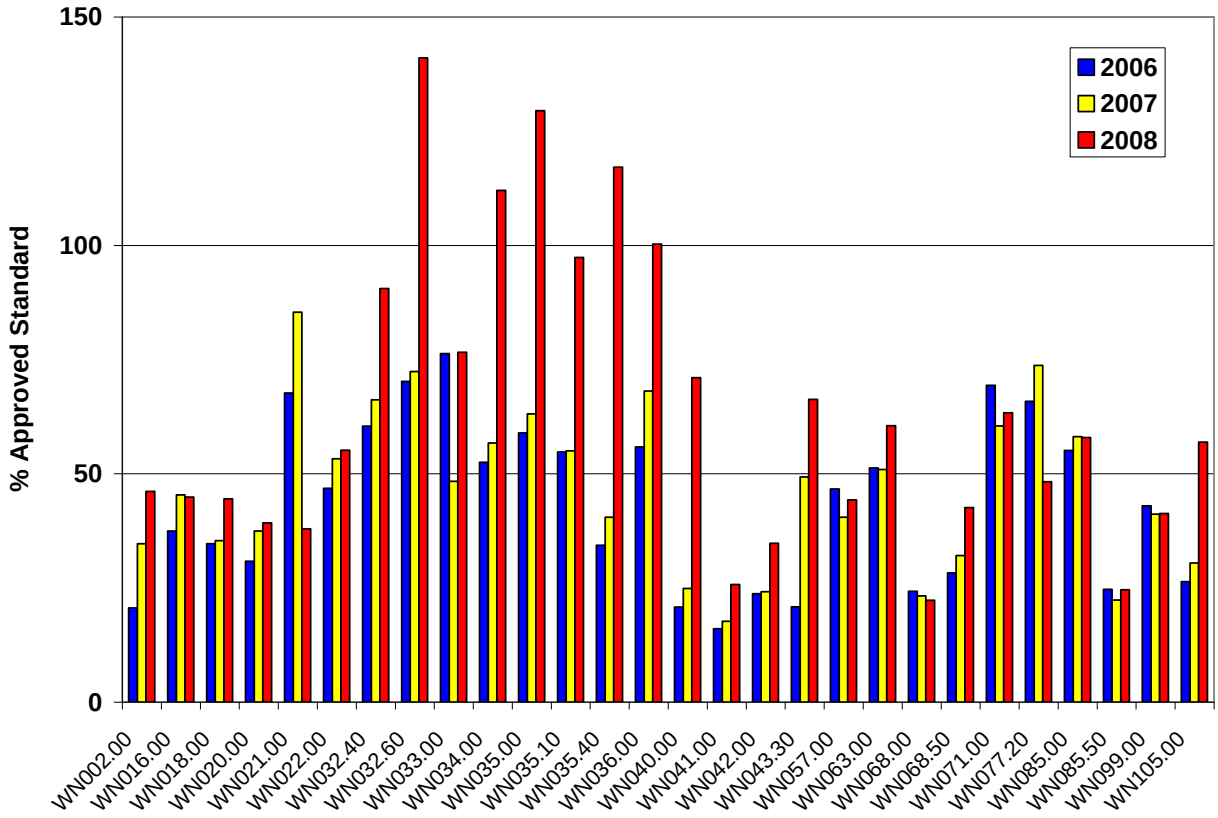


Figure 20. P90 Scores expressed as percents of approved standard, Restricted Stations, 2006-2008

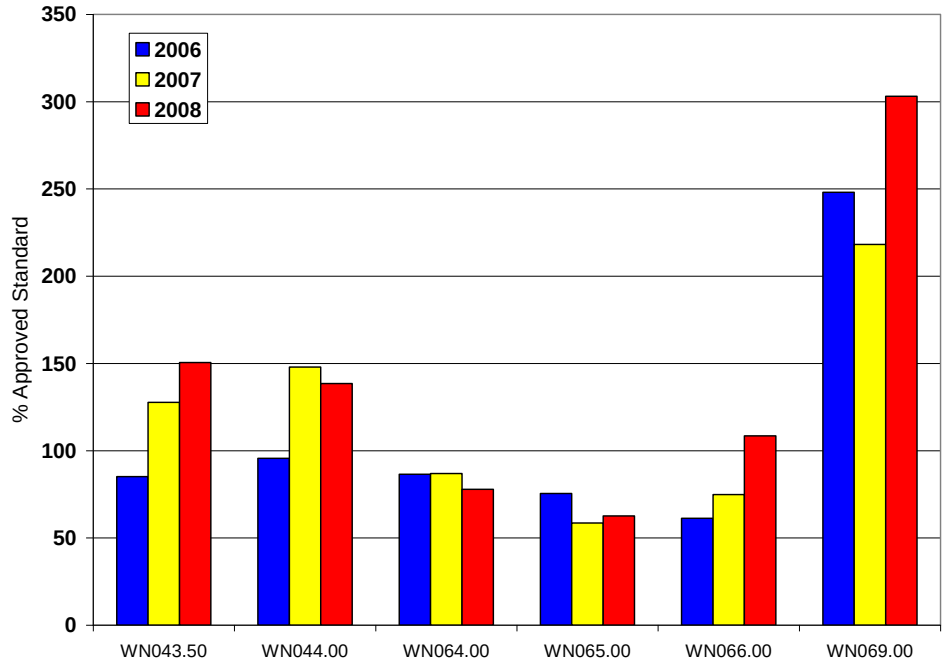
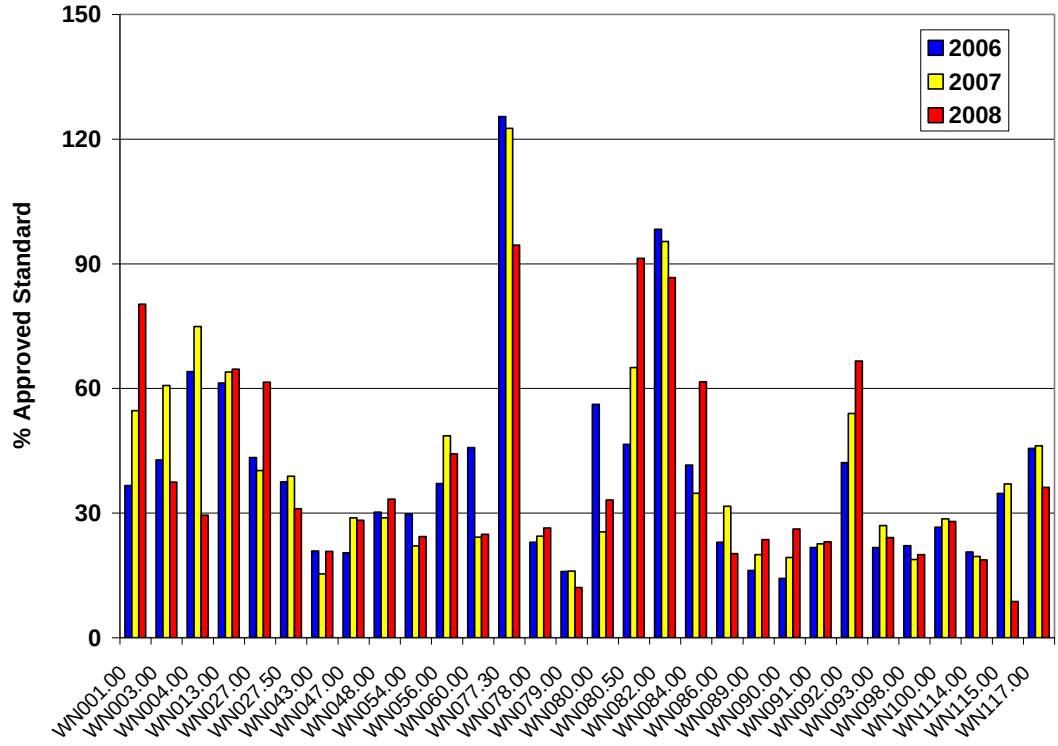


Figure 21. P90 Scores expressed as percents of approved standard, Prohibited Stations meeting approved standard, 2006-2008



Water Quality Discussion and Classification Determination

As a result of the findings of this report, multiple changes in classification were made; figures 22, 23 and 24 illustrate these changes. A more detailed explanations of changes in classification that have occurred to date, as well as possible re-classifications that may be implemented in the future, once the recommended follow up work is completed, are presented below.

Figure 22. Classification Changes in Pollution Area 21-C

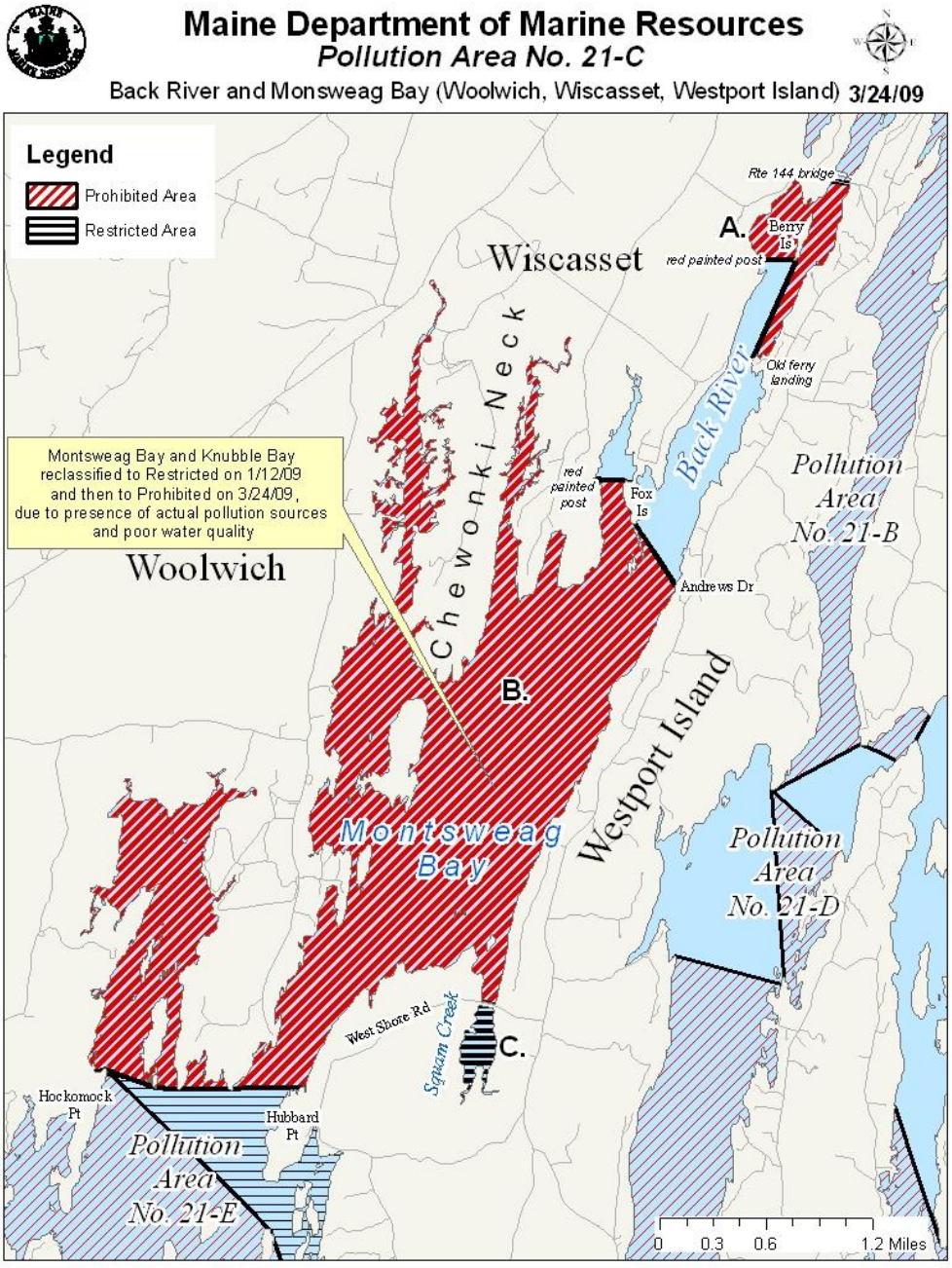


Figure 23. Classification Changes in Pollution Area 21-D

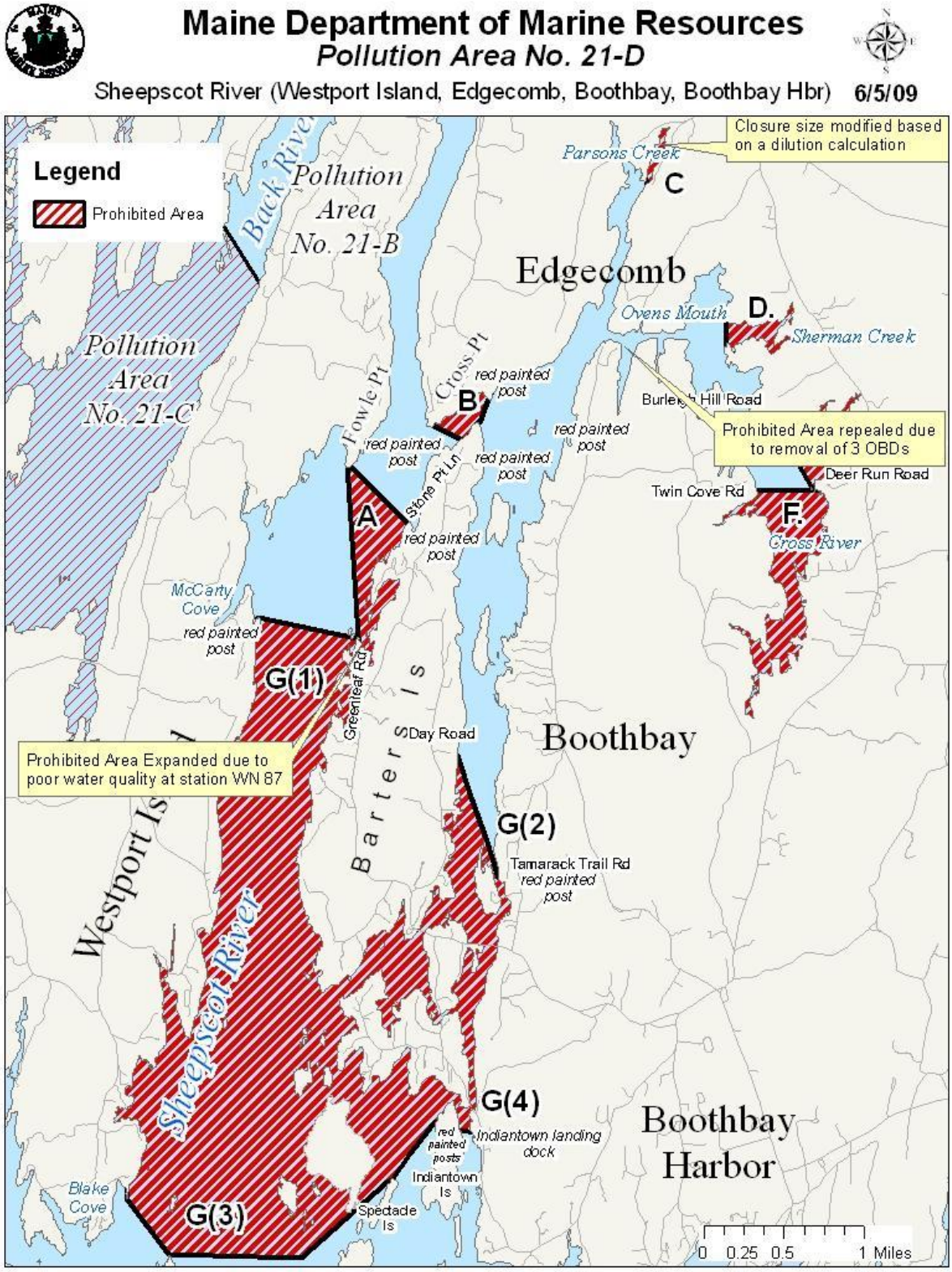
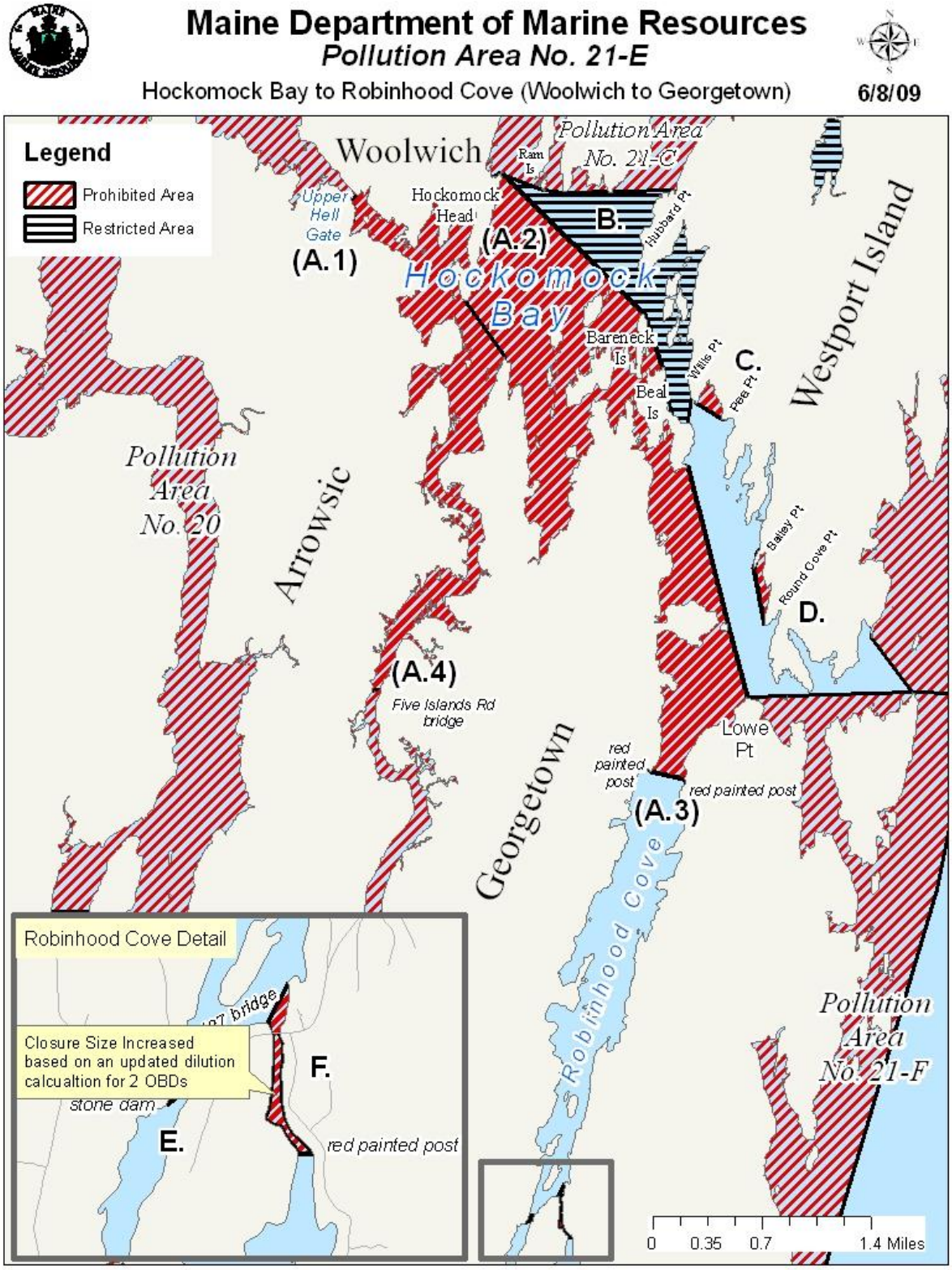


Figure 24. Classification Changes in Pollution Area 21-E



Brookings and Montsweag Bays (Woolwich, Wiscasset)

At the end of 2008, water quality stations WN 32.6, 34, 35, 35.4, and 36, located in Montsweag Bay and Brookings Bay (Woolwich and Wiscasset) failed to meet the approved standard and were downgraded to restricted in January 2009; stations WN 32.4, 33 and 35.1, which were meeting the approved standard, were also downgraded. Stations WN 35.7 and 38.5 are new sations, with less than 30 data points in their datasets, therefore neither of these stations could serve as a boundary station for the closure line; the boundary line of the restricted area and the approved area was extended to station WN 40, which met the approved standard and had 30 data points in its dataset. After a review of shoreline survey notes from 2006, multiple septic malfunctions were noted; no closures were ever implemented surrounding these closures at the time of the survey. Once these pollution problems were reviewed in the winter of 2009, the entire Montsweag Bay and Brookings Bay area was downgraded from restricted to prohibited. At present time, the codes enforcement officer for the town of Woolwich is working with the property owners to remediate the problems; any remediation progress that occurs in this area will be presented in the next triennial review of the area.

Oven's Mouth (Boothbay, Edgecomb)

As part of the current report, Oven's Mouth is recommended for an upgrade in classification from prohibited to approved. The area has been classified as prohibited due to the presence of three OBD's; these OBDs have been removed by DEP since the last sanitary survey report. The area was surveyed by DEP and DMR staff in June 2008, and no actual or potential problems were observed at the time of the survey. Water quality at this station is monitored by station WN 79; water quality at this station has been maintained approved classification standards over the past three years, with P90 scores from 2006-2008 decreasing slightly (Figure 21). At the end of 2008, the P90 score was 4.7. This area was upgraded to approved classification in March 2009.

Parsons Creek (Edgecomb)

A malfunctioning septic system was identified on Parson's Creek (Edgecomb) in June 2008. A closure surrounding this malfunction was implemented. A dilution calculation was completed to verify the size of the required closure; based on a discharge of 500 gallons per day, a concentration of 140,000 fc/100 ml, and the depth of the receiving water body of 3 ft at mean tide, a 5 acre closure is required. Currently, the closure size surrounding this malfunction is 42 acres; the closure was reduced to 9 acres on June 8, 2009.

Sherman Creek, Wildcat Creek and Lower Cross River (Edgecomb, Boothbay)

At the end of 2008, the water quality station (WN 82) monitoring Sherman Creek (Edgecomb) met the approved standard (P90=33.8, with standard of 39). This area is currently classified as prohibited, but has shown an improvement in water quality over the past three years (please refer to Figure 21 for water quality trends). In 2008, the creek was surveyed and no actual or potential pollution sources were identified. In considering the SRS data from 2003 through 2008, this station has had four scores that elevated the variability standard (P90), with all four scores occurring after cumulative rainfall amount of at least 0.38 inches over a four day period prior to sampling (Table 16). Using the same dataset, no seasonal trends were observed over the past six years. The recommendation for this area is to collect additional water quality

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samples under adverse conditions, as well as steam samples (under both dry and wet conditions) and re-evaluate this area for an upward classification for the next triennial report, due in 2010.

Table 16. Fecal Coliform Scores at Sherman Creek, WN 82, Effect of Rainfall and Seasonality, 2003-2008

Rain Range	Date	Tide	Adv	SAL %	Rain Sum	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	7/22/03	E	N	30	0							23					
	2/3/04	HF	-	26	0		<3										
	3/28/06	H	N	27	0			<3									
	5/8/07	HF	-	17	0					<2							
	6/27/07	E	-	29	0						<2						
	8/22/07	E	-	32	0								<2				
	10/7/08	HF	-	22	0										2		
	3/2/04	HE	N	14	0.001			9.1									
	2/8/05	HF	N	5	0.001		9.1										
	12/15/05	F	-	3	0.001												9.1
	7/19/06	LF	-	18	0.01							15					
	11/28/06	F	-	14	0.01											2	
	1/8/08	HE	-	2	0.01	4											
0.01-0.5	4/12/07	E	-	8	0.03				<2								
	6/21/05	F	N	10	0.05						23						
	1/13/04	HF	N	0	0.061	3.6											
	5/28/08	HF	-	24	0.07					<2							
	6/8/04	F	N	2	0.11						<3						
	4/11/05	F	N	10	0.12				<3								
	11/28/05	H	PN	22	0.13											9.1	
	6/24/08	F	-	28	0.35						6						
	4/8/03	HF	N	0	0.36				<3								
	3/14/07	HE	N	0	0.38			58									
	8/22/06	H	P	27	0.4								8				
	10/3/06	H	-	24	0.45										6		
0.51-1.0	6/28/06	E	PN	6	0.59						149						
	10/22/07	H	-	0	0.64										22		
	12/13/04	H	N	15	0.641												<3
	3/4/08	HE	T	2	0.74			<2									
	12/10/03	E	N	0	0.8												9.1
	6/17/03	F	N	2	0.81						43						
	10/14/03	F	N	20	0.89										43		
1.01-1.50	8/13/08	HF	-	20	1.11								280				
	4/6/04	H	-	0	1.19				<3								
	5/4/04	HF	PN	2	1.19					15							
>1.51	12/16/03	H	N	0	1.64												93

Water quality station (WN 83) monitors Wildcat Creek (Edgecomb). This station is currently classified as prohibited, with a year-round P90 of 45.3. In 2008, the creek was surveyed and no actual or potential pollution sources were identified. In considering all SRS data collected between 2003 and 2008, this station has had three scores that have elevated the P90 standard; in all three cases, the scores occurred after at least 0.5 inches of cumulative rainfall within 72 hours prior to sample collection (Table 17). The data set also showed a seasonal trend, with high scores occurring between May and August. Prior to 2008, a seasonal campground was located along the shoreline of this creek, and the area received much heavier shoreline use. In 2008, this campground did not re-open; the property owner has no plans for re-opening it in the future or developing the property for any other use. There is a tidal stream that drains into the head of Wildcat Creek; this steam has been sampled three times over the review period, with all three samples collected under high flow conditions (after rainfall). The results of all three stream samples (collected on March 7, 2002, April 3, 2003 and April 9, 2009) had scores below 14 fc/100 ml (<3, <3, and 12, for the three dates, respectively). Based on this information, the recommendation for this area is to collect additional water quality samples (and stream samples) during the months when this station has shown good water quality scores (September through April) and re-evaluate this area for a classification of conditionally approved based on season, with closed status in May and the summer months, for the next triennial report.

Table 17. Fecal Coliform Scores at Wildcat Creek, WN 83, Effect of Rainfall and Seasonality, 2003-2008

Rain Range	Date	Tide	ADV	SAL%	Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	7/22/03	E	N	30	0							9.1					
	2/3/04	HF	-	25	0		<3										
	3/28/06	H	N	28	0			<3									
	5/8/07	H	-	26	0					<2							
	6/27/07	E	-	29	0						<2						
	8/22/07	E	-	30	0								<2				
	10/7/08	F	-	20	0										<2		
	3/2/04	E	N	18	0.001			9.1									
	2/8/05	HF	N	21	0.001		3.6										
	12/15/05	F	-	6	0.001												<3
0.01-0.5	7/19/06	E	-	27	0.01							43					
	11/28/06	F	-	25	0.01											<2	
	1/8/08	HE	-	5	0.01	8											
	4/12/07	E	-	15	0.03				2								
	6/21/05	F	N	10	0.05						43						
	1/13/04	HF	N	21	0.061	<3											
	6/8/04	F	N	10	0.11						<3						
	4/11/05	F	N	20	0.12				3.6								
	11/28/05	HE	PN	20	0.13											9.1	
	6/4/08	F	-	28	0.18						20						
	6/24/208	F	-	28	0.35						<2						
	4/8/03	HF	N	30	0.36				<3								
	3/14/07	HE	N	0	0.38			9.1									
	8/22/06	H	P	28	0.4								<2				
	10/3/06	H	-	20	0.45										27		

Rain Range	Date	Tide	ADV	SAL%	Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.51-1.0	6/28/06	F	-	15	0.59						240						
	10/22/07	H	-	30	0.64										<2		
	12/13/04	H	N	24	0.641												3.6
	3/4/08	E	T	6	0.74			2									
	12/10/03	E	N	5	0.8												15
	6/17/03	F	N	22	0.81						9.1						
	10/14/03	HF	N	30	0.89										3.6		
1.01-1.50	8/13/08	HF	-	7	1.11								440				
	4/6/04	H	N	10	1.19				<3								
	5/4/04	HF	PN	2	1.19					93							
>1.5	12/16/03	H	N	0	1.64												15

Station WN 84 monitors the lower Cross River (Boothbay). This station is currently classified as prohibited, with a year-round P90 of 23.4. Water quality scores at this station have met the approved standard for the past three review years (please refer to Figure 21 for trends). In 2008, this area was surveyed and no actual pollution sources were identified; three potential sources were identified (2 questionable/unknown systems, and one horse farm). There is also a large privately owned campground located on the Cross River, and the area receives much heavier shoreline use between Memorial Day and Labor Day of each year. The SRS data set over the past six years has shown two elevated scores, occurring in June and August, with the August score occurring after over an inch of rain within 72 hours (Table 18). Based on this information, the recommendation for this area is to collect additional water quality samples (and any stream samples which may impact the shellfish flats) under adverse conditions, during the period when the campground is in operation and when it is not in operation. After this data is collected, the area can be evaluated either for an upgrade to approved status, or for a seasonal conditionally approved classification.

Table 18. Fecal Coliform Scores at Lower Cross River, WN 84, Effect of Rainfall and Seasonality, 2003-2008

Rain Range	Date	Tide	ADV	Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	7/22/03	E	-	0							<3					
	2/3/04	HF	-	0		<3										
	3/28/06	HE	N	0			<3									
	6/27/07	E	-	0						<2						
	8/22/07	E	-	0								<2				
	10/7/08	F	-	0										<2		
	3/2/04	E	-	0.001			<3									
	2/8/05	H	N	0.001		<3										
	12/15/05	F	-	0.001												<3
0.01-0.5	11/28/06	F	-	0.01											<2	
	1/8/08	E	-	0.01	2											
	6/21/05	F	N	0.05						93						
	1/13/04	HF	-	0.061	<3											
	5/28/08	HF	-	0.07					<2							
	6/8/04	F	-	0.11						<3						
	4/11/05	F	-	0.12				<3								

Rain Range	Date	Tide	ADV	Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	11/28/05	HE	P	0.13											9.1	
	1/22/07	F	-	0.34	<2											
	6/24/08	F	-	0.35						12						
	4/8/03	F	-	0.36				<3								
	12/11/06	H	-	0.36												<2
	3/14/07	HE	-	0.38			<2									
	8/22/06	HF	P	0.4								4				
	10/3/06	H	-	0.45										2		
0.51-1.00	6/28/06	F	-	0.59						9.1						
	10/22/07	H	-	0.64										<2		
	12/13/04	H	-	0.641												21
	3/4/08	E	T	0.74				<2								
	12/10/03	E	N	0.8												<3
	6/17/03	F	-	0.81						3.6						
	9/6/06**	E	P	0.871									15			
	10/14/03	HF	-	0.89										15		
1.01-1.5	8/13/08	F	-	1.11								320				
	4/6/04	H	N	1.19				<3								
	5/4/04	H	P	1.19					43							
>1.5	12/16/03	H	-	1.64												3
	6/5/07	F	-	2.52						11						

Aquaculture/Wet Storage Activity

There are eight aquaculture sites in area WN. In the upper Sheepscot River between Cunningham and Lehman Islands there is an experimental shellfish lease (SHE LE) which is a 2.96 acre bottom lease for American and European oysters, the lease was issued in 2004 and will expire in 2014. A second experimental shellfish lease (SHE LE2) is 1.57 acres bottom lease on the east side of Lehman Island and is for American and European oysters. SHE LE23 was issued in 2007 and will expire in 2017.

There is one Limited-Purpose Aquaculture (LPA) site off the Wiscasset Town Dock for 0.01 acres (JAM 07). The LPA is for overwintering cages and tray racks for soft-shelled clam seed. A second LPA (JAM2 07) has been issued between Mason Station and White's Island for upweller/FLUPSY units for soft shell clam seed. Both of the LPAs expired on December 31, 2008.

There is an experimental shellfish lease (SHE SP) issued in the Mason Station salt pond for 1.94 acres of bottom or suspended culture of American/European oysters, soft shelled clams, quahogs, surf/hen clams, razor clams and bay scallops. The lease will expire in 2015.

There are two experimental shellfish leases (SHE SQW and SHE SQ2) and a LPA (HOP 04) issued for the Squam Creek salt pond on Westport Island. SHE SQ2 is for 0.569 acres of bottom/suspended culture of American/European oysters, soft shelled clams, quahogs, surf/hen clams, razor clams and bay scallops and will expire in 2013. SHE SQW is for 1.492 acres of bottom/suspended culture of American/European oysters, soft shelled clams, quahogs and surf/hen clams and will expire in 2013.

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Additional information on these lease sites/LPAs can be found at the DMR website: http://www.maine.gov/dmr/aquaculture/leaseinventory/sheepscotriver.htm

There are no shellfish wet storage permits issued for area WN.

Conclusion

Over the past review year, water quality has declined in many areas of growing area WN. As a result of this water quality decline, a large area of growing area WN was downgraded in classification. In addition to poor water quality scores, portions of the coastline in growing area WN (Boothbay, Edgecomb, and Boothbay Harbor) are currently classified as prohibited due to the presence of identified pollution sources which may impact water quality, especially under adverse weather conditions when run-off from the shore land increases. These areas will remain prohibited until the pollution sources are abated.

Based on the review completed in this report, closure sizes were reduced in two areas of WN. In Edgecomb, 3 OBDs were recently removed, and the closure surrounding Oven's Mouth was repealed. The closure surrounding a septic system malfunction located on Parsons Creek, Edgecomb was reduced in size based on a dilution calculation; the eastern lobe of Parsons Creek remains prohibited. Based on the review of dilution areas surrounding OBDs in area WN, a prohibited area surrounding 2 OBDs in Georgetown was increased in size.

Several recommendations were made for future work in order to re-evaluate several areas for upward classification changes. Further testing of water quality monitoring station under adverse weather conditions, as well as further testing of streams, is recommended for Sherman Creek, Wildcat Creek and Cross River. These areas are currently classified as prohibited, but are either meeting approved standards year round or seasonally. More data are needed in order to complete a comprehensive analysis of rainfall related and seasonal impacts; this assessment should be completed in the next triennial report.

References

Brooks, DA (2006) *A Preliminary Guide to Tidal Currents in the Coastal Region of Central Maine*, Version 2.3, June 2006.

Hess, CT, Bernhardt, GP, Churchill, JH, Bowen, M., Guiseppe, V., Breton D, Gould, T., and Smitherman P (2005) *Maine Yankee Marine Sampling Study Final Report*, submitted to Maine Yankee Atomic Power Company, February 2005.

McAlice BJ and Jaeger GB, Jr. (1983) Circulation Changes in the Sheppscot River Estuary, Maine, Following Removal of a Causeway. *Estuaries*, Vol 6, No 3, p 190-199.

McLean, J., Sewall, L., and L. Pugh. (2007). *Sheepscot River Watershed Management Plan*. Prepared for: Time & Tide Resource Conservation & Development Area, Augusta, Maine. (Maine DEP Project# 2004R-09)

.

NOAA (2007) *Tidal Station Locations and Ranges,* http://tidesandcurrents.noaa.gov/tides08/tab2ec1a.html; Accessed on June 9. 2008

Whiting M (2006) *Water Quality Summary for the Sheepscot River*, available online at http://www.sheepscot.net/documents/WhitingWQsummary.pdf. Accessed on June 11, 2009.

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Appendix A. DEP Over Board Discharge License Conditions

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

Effluent Characteristic	Discharge Limitations	
	Monthly Average	Daily Maximum
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 less than 2,000 gallons per day

Effluent Characteristic	Discharge Limitations					
	Monthly Average			Daily Maximum		
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		
❑ Fecal coliform Bacteria per 100ml. or ❑ 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 = 90th percentile

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

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

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Appendix C. Transitioning to Membrane Filtration for Seawater and Pollution Source Samples

The Maine Department of Marine Resources has switched to a Membrane Filtration (MF) method for Fecal Coliforms using mTEC agar with a two hour resuscitation step. The geometric mean and the 90th percentile are calculated on 30 data points extending over a five year period. During the transition from MPN to MF, we will be accumulating MF data points. The statistical calculations will be a combination of MPN and MF data points. During the transition the P90 standard for approved and restricted classification will migrate from the MPN standard to the MF standard. The FDA has determined that the best way to handle the data is to perform the calculations as always for the data set, but to compare the data set to a hybrid weighted 90th percentile. This hybrid standard is calculated by weighting the relative contributions of each method to the database. This will mean that as the number of MPN data points reduce and the number of MF data points increase the 90th percentile standard that the sample site is compared to will change over time. Once all 30 data points are analyzed using MF, the 90th percentile for approved classification will be 31 and for restricted (for depuration) will be 163. The geomean approved standard of 14 fecal coliforms per 100 ml and geomean restricted standard of 88 fecal coliforms per 100 ml will remain the same for both methods.

Reports that display 90th percentiles will show the number of data points derived from MF analysis and will show the appropriate 90th percentile standard for that MPN/MF combination for approved and restricted classifications. It must be remembered that this weighted standard is only used for data sets encompassing data from the two different test methods, MF and MPN (3 tube/3 dilution). If decisions are to be made on a single test result analyzed by the MF method or a multiple number of test results all exclusively analyzed by the MF method, the 90th percentile standard is 31 fecal coliforms per 100 ml.

This was the first year the water quality program documented, in the database, the inability to collect a sample based on the following parameters: if the tide stage was too low to collect the sample, there was a safety issue with collecting the sample, the location was inaccessible or “other” which was accompanied by a comment on the data sheet. Stations that were unable to be sampled due to any of these parameters show 999 in the salinity column and have no data recorded in any of the columns except the time which is recorded so the actual tide stage can be computed. Stations that were missed due to the above parameters were required to be made up to assure that each station would receive the required six samples during the sampling season.

Appendix D. 2008 Water Quality Data

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN001.00	02/26/08	CCA	F	3	-	26	R	-	C	P	<2.0	CL
WN001.00	04/13/08	CCA	E	5	-	30	R	-	C	P	<2.0	NW
WN001.00	06/15/08	JHZ	H	10	-	28	R	P	C	P	<2.0	S
WN001.00	08/10/08	CCA	E	18	-	5	R	-	C	P	320	CL
WN001.00	10/13/08	CCA	HF	10	-	30	R	-	C	P	<2.0	-
WN001.00	11/02/08	CCA	H	8	-	28	R	-	C	P	2	NW
WN002.00	02/26/08	CCA	F	3	-	29	R	-	O	A	<2.0	CL
WN002.00	04/13/08	CCA	E	5	-	28	R	-	O	A	<2.0	NW
WN002.00	06/15/08	JHZ	H	9	-	19	R	P	O	A	<2.0	S
WN002.00	08/10/08	CCA	E	18	-	12	R	-	O	A	98	CL
WN002.00	10/13/08	CCA	F	10	-	30	R	-	O	A	<2.0	-
WN002.00	11/02/08	CCA	H	8	-	30	R	-	O	A	<2.0	NW
WN003.00	02/26/08	CCA	F	1	-	28	R	W	C	P	<2.0	CL
WN003.00	04/13/08	JHZ	E	3	-	28	R	-	C	P	<2.0	NW
WN003.00	06/15/08	CCA	F	14	-	29	R	P	C	P	2	CL
WN003.00	08/10/08	JHZ	HF	13	-	26	R	-	C	P	13	CL
WN003.00	10/13/08	CCA	HF	10	-	28	R	-	C	P	3.6	-
WN003.00	11/02/08	JHZ	F	6	-	28	R	-	C	P	<2.0	NW
WN004.00	02/26/08	CCA	F	2	-	28	R	-	C	P	<2.0	CL
WN004.00	04/13/08	JHZ	E	3	-	28	R	-	C	P	<2.0	NW
WN004.00	06/15/08	CCA	F	15	-	29	R	P	C	P	2	CL
WN004.00	08/10/08	JHZ	HF	13	-	28	R	-	C	P	<2.0	CL
WN004.00	10/13/08	CCA	H	10	-	30	R	-	C	P	<2.0	-
WN004.00	11/02/08	JHZ	F	6	-	30	R	-	C	P	2	NW
WN013.00	02/26/08	CCA	F	4	-	26	R	-	C	P	<2.0	CL
WN013.00	04/13/08	JHZ	E	3	-	20	R	-	C	P	<2.0	NW
WN013.00	06/15/08	CCA	F	13	-	24	R	P	C	P	<2.0	CL
WN013.00	08/10/08	JHZ	H	14	-	14	R	-	C	P	104	CL
WN013.00	10/13/08	CCA	H	11	-	25	R	-	C	P	<2.0	-
WN013.00	11/02/08	JHZ	F	7	-	21	R	-	C	P	2	NW
WN016.00	04/13/08	JHZ	E	4	-	20	R	-	O	A	<2.0	NW
WN016.00	06/15/08	CCA	F	14	-	24	R	P	O	A	2	CL
WN016.00	08/10/08	JHZ	HE	15	-	14	R	-	O	A	84	CL
WN016.00	10/13/08	CCA	H	10	-	25	R	-	O	A	2	-
WN016.00	11/02/08	JHZ	HF	7	-	22	R	-	O	A	4	NW
WN016.00	11/19/08	AB	HF	4	-	31	R	-	O	A	22	NW
WN018.00	02/26/08	CCA	H	3	-	22	R	-	O	A	<2.0	-
WN018.00	04/13/08	JHZ	E	4	-	21	R	-	O	A	2	NW
WN018.00	06/15/08	CCA	F	14	-	24	R	P	O	A	2	CL
WN018.00	08/10/08	JHZ	HE	14	-	17	R	-	O	A	50	CL
WN018.00	10/13/08	CCA	H	11	-	25	R	-	O	A	<2.0	-

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN018.00	11/02/08	JHZ	HF	7	-	22	R	-	O	A	6	NW
WN020.00	02/26/08	CCA	F	1	-	22	R	-	O	A	<2.0	-
WN020.00	04/13/08	JHZ	E	4	-	22	R	-	O	A	<2.0	NW
WN020.00	06/15/08	CCA	F	14	-	26	R	P	O	A	2	CL
WN020.00	08/10/08	JHZ	H	14	-	19	R	-	O	A	9.1	CL
WN020.00	10/13/08	CCA	HF	10	-	25	R	-	O	A	<2.0	-
WN020.00	11/02/08	JHZ	F	6	-	22	R	-	O	A	<2.0	NW
WN021.00	02/26/08	CCA	HF	3	-	22	R	-	O	A	<2.0	-
WN021.00	04/13/08	JHZ	E	5	-	20	R	-	O	A	<2.0	NW
WN021.00	06/15/08	CCA	F	13	-	26	R	P	O	A	4	CL
WN021.00	08/10/08	JHZ	H	15	-	20	R	-	O	A	3.6	CL
WN021.00	10/13/08	CCA	HF	10	-	25	R	-	O	A	<2.0	-
WN021.00	11/02/08	JHZ	F	6	-	22	R	-	O	A	<2.0	NW
WN022.00	02/26/08	CCA	F	5	-	22	R	-	O	A	<2.0	-
WN022.00	04/13/08	JHZ	E	5	-	22	R	-	O	A	<2.0	NW
WN022.00	06/15/08	CCA	F	14	-	21	R	P	O	A	<2.0	CL
WN022.00	08/10/08	JHZ	H	15	-	21	R	-	O	A	6	CL
WN022.00	10/13/08	CCA	HF	9	-	25	R	-	O	A	<2.0	-
WN022.00	11/02/08	JHZ	F	5	-	22	R	-	O	A	<2.0	NW
WN027.00	02/27/08	EXT	F	2	-	28	R	-	C	P	<2.0	CL
WN027.00	05/12/08	JDO	LE	7	-	26	R	-	C	P	<2.0	E
WN027.00	06/24/08	JDO	LF	13	-	24	R	-	C	P	<2.0	NE
WN027.00	08/12/08	JDO	E	15	-	18	R	P	C	P	700	NE
WN027.00	10/06/08	JDO	HF	11	-	28	R	-	C	P	<2.0	NW
WN027.00	11/24/08	MLP	E	-1	-	30	R	-	C	P	<2.0	CL
WN027.20	02/27/08	EXT	F	2	-	28	R	-	O	A	2	CL
WN027.20	05/12/08	JDO	LE	8	-	24	R	-	O	A	2	E
WN027.20	06/24/08	JDO	E	12	-	24	R	W	O	A	2	SW
WN027.20	08/12/08	JDO	E	14	-	21	R	P	O	A	50	NE
WN027.20	10/06/08	JDO	HF	11	-	25	R	-	O	A	4	NW
WN027.20	11/24/08	MLP	E	3	-	26	R	-	O	A	<2.0	S
WN027.50	05/12/08	JDO	E	9	-	22	R	-	C	P	<2.0	NE
WN027.50	05/27/08	EXT	HF	14	-	22	R	-	C	P	2	SW
WN027.50	06/24/08	JDO	F	19	-	14	R	-	C	P	<2.0	CL
WN027.50	08/12/08	JDO	E	14	-	18	R	P	C	P	35	N
WN027.50	10/06/08	JDO	H	12	-	21	R	-	C	P	6	W
WN027.50	11/24/08	MLP	HE	3	-	25	R	-	C	P	<2.0	S
WN028.00	02/27/08	EXT	F	3	-	20	R	-	C	P	<2.0	CL
WN028.00	05/27/08	EXT	H	13	-	28	R	-	C	P	<2.0	SW
WN028.00	06/24/08	JDO	F	16	-	26	R	-	C	P	8	NE
WN028.00	08/12/08	JDO	E	14	-	20	R	P	C	P	1500	NE
WN028.00	10/06/08	JDO	HF	11	-	27	R	-	C	P	<2.0	W

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN028.00	11/24/08	MLP	E	3	-	28	R	-	C	P	5.5	S
WN029.00	02/26/08	CCA	H	2	-	10	R	-	C	P	2	-
WN029.00	04/13/08	JHZ	E	4	-	5	R	-	C	P	14	NW
WN029.00	06/15/08	CCA	F	15	-	15	R	P	C	P	10	CL
WN029.00	08/10/08	JHZ	HE	16	-	3	R	-	C	P	156	CL
WN029.00	10/13/08	CCA	HE	10	-	25	R	-	C	P	4	-
WN029.00	11/02/08	JHZ	H	5	-	10	R	-	C	P	12	NW
WN030.00	04/13/08	JHZ	E	4	-	2	R	-	C	P	24	NW
WN030.00	06/15/08	CCA	F	15	-	8	R	P	C	P	50	CL
WN030.00	08/10/08	JHZ	HE	16	-	2	R	-	C	P	320	CL
WN030.00	10/13/08	CCA	HE	11	-	22	R	-	C	P	4	-
WN030.00	11/02/08	JHZ	H	6	-	5	R	-	C	P	40	NW
WN030.00	11/19/08	AB	HF	4	-	4	R	-	C	P	112	NW
WN030.50	02/26/08	CCA	H	3	-	4	R	-	C	P	22	CL
WN030.50	04/13/08	JHZ	E	4	-	2	R	-	C	P	24	NW
WN030.50	06/15/08	CCA	HF	14	-	8	R	P	C	P	76	CL
WN030.50	08/10/08	JHZ	E	16	-	2	R	-	C	P	224	CL
WN030.50	10/13/08	CCA	HE	11	-	20	R	-	C	P	2	-
WN030.50	11/02/08	JHZ	H	6	-	6	R	-	C	P	24	NW
WN032.40	02/26/08	EXT	H	1	-	12	R	-	O	A	4	S
WN032.40	04/28/08	EXT	F	13	-	8	R	P	O	A	2	SE
WN032.40	07/02/08	MLP	HF	19	-	10	R	-	O	A	31	S
WN032.40	08/12/08	MLP	HF	16	-	5	R	P	O	A	128	CL
WN032.40	10/06/08	EXT	F	13	-	14	R	-	O	A	6	NE
WN032.40	11/12/08	MLP	HF	5	-	20	R	-	O	A	5.5	CL
WN032.60	02/26/08	EXT	H	1	-	12	R	-	O	A	<2.0	CL
WN032.60	04/28/08	EXT	F	13	-	7	R	P	O	A	2	SE
WN032.60	07/02/08	MLP	HF	18	-	10	R	-	O	A	14	S
WN032.60	08/12/08	MLP	HF	16	-	5	R	P	O	A	>1600	CL
WN032.60	10/06/08	EXT	F	13	-	14	R	-	O	A	8	CL
WN032.60	11/12/08	MLP	E	7	-	15	R	-	O	A	20	SW
WN033.00	02/26/08	EXT	HF	1	-	18	R	-	O	A	12	CL
WN033.00	04/28/08	EXT	F	12	-	7	R	P	O	A	<2.0	SE
WN033.00	07/02/08	MLP	H	20	-	11	R	-	O	A	29	SW
WN033.00	08/12/08	MLP	H	15	-	5	R	P	O	A	96	CL
WN033.00	10/06/08	EXT	F	13	-	15	R	-	O	A	8	CL
WN033.00	11/12/08	MLP	E	5	-	12	R	-	O	A	4	W
WN034.00	02/27/08	EXT	F	1	-	20	R	-	O	A	9.1	CL
WN034.00	05/12/08	JDO	E	9	-	18	R	-	O	A	<2.0	N
WN034.00	06/24/08	JDO	E	15	-	14	R	-	O	A	9.1	CL
WN034.00	08/12/08	JDO	E	16	-	8	R	P	O	A	35	N
WN034.00	10/06/08	JDO	HF	11	-	24	R	-	O	A	1160	NW

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN034.00	11/24/08	MLP	HE	3	-	20	R	-	O	A	8	CL
WN035.00	02/26/08	EXT	F	0	-	8	R	-	O	A	2	S
WN035.00	04/28/08	EXT	F	11	-	2	R	P	O	A	2	SE
WN035.00	06/23/08	FP	LF	16	-	6	R	-	O	A	22	CL
WN035.00	08/12/08	MLP	H	16	-	4	R	P	O	A	820	CL
WN035.00	10/06/08	EXT	F	11	-	12	R	-	O	A	13	CL
WN035.00	11/12/08	MLP	E	5	-	16	R	-	O	A	44	SW
WN035.10	02/26/08	EXT	HF	1	-	10	R	-	O	A	10	S
WN035.10	04/28/08	EXT	F	10	-	4	R	P	O	A	<2.0	SE
WN035.10	06/23/08	FP	F	16	-	8	R	-	O	A	30	CL
WN035.10	08/12/08	MLP	H	16	-	4	R	P	O	A	280	E
WN035.10	10/06/08	EXT	F	13	-	10	R	-	O	A	3.6	CL
WN035.10	11/12/08	MLP	E	7	-	14	R	-	O	A	2	SW
WN035.40	02/26/08	EXT	HF	1	-	12	R	-	O	A	4	SE
WN035.40	04/28/08	EXT	F	10	-	5	R	P	O	A	2	SE
WN035.40	07/02/08	MLP	H	19	-	10	R	-	O	A	35	CL
WN035.40	08/12/08	MLP	H	15	-	4	R	P	O	A	>1600	NE
WN035.40	10/06/08	EXT	F	11	-	10	R	-	O	A	16	CL
WN035.40	11/24/08	MLP	HF	-3	-	12	R	-	O	A	15	CL
WN035.70	02/26/08	EXT	F	1	-	14	R	-	O	A	2	CL
WN035.70	04/28/08	EXT	F	13	-	8	R	P	O	A	2	CL
WN035.70	06/23/08	FP	F	17	-	12	R	-	O	A	15	S
WN035.70	08/12/08	MLP	HE	15	-	8	R	P	O	A	80	NE
WN035.70	10/06/08	EXT	F	12	-	14	R	-	O	A	<2.0	CL
WN035.70	11/12/08	MLP	E	6	-	16	R	-	O	A	16	CL
WN036.00	02/26/08	EXT	F	1	-	14	R	-	O	A	8	S
WN036.00	04/28/08	EXT	F	13	-	8	R	P	O	A	4	SE
WN036.00	06/23/08	FP	F	18	-	12	R	-	O	A	13	S
WN036.00	08/12/08	MLP	HE	16	-	7	R	P	O	A	88	NE
WN036.00	10/06/08	EXT	F	12	-	16	R	-	O	A	2	CL
WN036.00	11/12/08	MLP	E	7	-	17	R	-	O	A	12	SW
WN038.50	02/26/08	EXT	F	1	-	18	R	-	O	A	2	CL
WN038.50	04/28/08	EXT	F	13	-	8	R	-	O	A	<2.0	SE
WN038.50	06/23/08	FP	F	17	-	13	R	-	O	A	16	CL
WN038.50	08/12/08	MLP	HE	16	-	6	R	P	O	A	>1600	NE
WN038.50	10/06/08	EXT	F	13	-	15	R	-	O	A	5.5	CL
WN038.50	11/12/08	MLP	E	6	-	16	R	-	O	A	8	SW
WN040.00	02/26/08	EXT	F	2	-	16	R	-	O	A	2	CL
WN040.00	04/28/08	EXT	F	14	-	8	R	-	O	A	4	CL
WN040.00	06/23/08	FP	F	18	-	13	R	-	O	A	16	SW
WN040.00	08/12/08	MLP	E	16	-	9	R	P	O	A	1100	NE
WN040.00	10/06/08	EXT	F	12	-	15	R	-	O	A	9.1	NE

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN040.00	11/12/08	MLP	E	6	-	18	R	-	O	A	7.3	SW
WN041.00	02/26/08	EXT	F	1	-	20	R	-	O	A	4	CL
WN041.00	04/28/08	EXT	F	13	-	8	R	-	O	A	<2.0	E
WN041.00	06/23/08	FP	F	15	-	15	R	-	O	A	10	CL
WN041.00	08/12/08	MLP	E	16	-	12	R	P	O	A	76	NE
WN041.00	10/06/08	EXT	F	12	-	15	R	-	O	A	2	NE
WN041.00	11/12/08	MLP	E	7	-	19	R	-	O	A	4	S
WN042.00	02/26/08	EXT	F	2	-	20	R	-	O	A	2	CL
WN042.00	04/28/08	EXT	F	13	-	8	R	-	O	A	<2.0	E
WN042.00	06/23/08	FP	F	15	-	20	R	-	O	A	29	S
WN042.00	08/12/08	MLP	E	15	-	15	R	P	O	A	46	NE
WN042.00	10/06/08	EXT	F	11	-	15	R	-	O	A	2	CL
WN042.00	11/12/08	MLP	LE	7	-	20	R	-	O	A	6	CL
WN043.00	02/26/08	EXT	F	2	-	20	R	-	C	P	2	CL
WN043.00	04/28/08	EXT	F	10	-	12	R	-	C	P	<2.0	E
WN043.00	06/23/08	FP	F	14	-	20	R	-	C	P	2	S
WN043.00	08/12/08	MLP	E	14	-	21	R	P	C	P	54	CL
WN043.00	10/06/08	EXT	F	11	-	22	R	-	C	P	<2.0	CL
WN043.00	11/12/08	MLP	LE	7	-	22	R	-	C	P	4	CL
WN043.30	02/27/08	EXT	F	2	-	19	R	-	O	A	2	CL
WN043.30	05/12/08	JDO	E	10	-	16	R	-	O	A	<2.0	NE
WN043.30	06/24/08	JDO	E	16	-	12	R	-	O	A	2	CL
WN043.30	08/12/08	JDO	HE	17	-	9	R	P	O	A	154	N
WN043.30	10/06/08	JDO	F	12	-	16	R	-	O	A	2	NW
WN043.30	11/24/08	MLP	H	0	-	13	R	-	O	A	18	CL
WN043.50	02/27/08	EXT	F	1	-	13	R	-	O	R	8	CL
WN043.50	05/12/08	JDO	E	9	-	15	R	-	O	R	2	N
WN043.50	06/24/08	JDO	E	16	-	8	R	W	O	R	10	CL
WN043.50	08/12/08	JDO	H	15	-	8	R	P	O	R	240	N
WN043.50	10/06/08	JDO	F	12	-	14	R	-	O	R	2	NW
WN043.50	11/24/08	MLP	H	0	-	13	R	-	O	R	13	CL
WN044.00	02/27/08	EXT	F	0	-	12	R	-	O	R	8	CL
WN044.00	05/12/08	JDO	E	10	-	12	R	-	O	R	4	N
WN044.00	06/24/08	JDO	E	17	-	12	R	-	O	R	13	CL
WN044.00	08/12/08	JDO	HE	16	-	4	R	P	O	R	64	N
WN044.00	09/17/08	AB	HF	19	-	15	E	-	O	R	8	SE
WN044.00	10/06/08	JDO	H		-	11	R	-	O	R	4	NW
WN044.00	11/24/08	MLP	HE	-1	-	13	R	-	O	R	<2.0	CL
WN044.10	02/27/08	EXT	F	-1	-	11	R	-	O	R	4	CL
WN044.10	05/12/08	JDO	E	10	-	11	R	-	O	R	2	N
WN044.10	06/24/08	JDO	E	18	-	10	R	-	O	R	6	CL
WN044.10	08/12/08	JDO	HE	17	-	7	R	P	O	R	92	N

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN044.10	10/06/08	JDO	H	-	-	10	R	-	O	R	<2.0	NW
WN044.10	11/24/08	MLP	HE	0	-	12	R	-	O	R	6	CL
WN044.50	02/27/08	EXT	F	1	-	14	R	-	O	A	6	CL
WN044.50	05/12/08	JDO	E	10	-	14	R	-	O	A	<2.0	N
WN044.50	06/24/08	JDO	E	16	-	8	R	-	O	A	6	CL
WN044.50	08/12/08	JDO	HE	16	-	5	R	P	O	A	54	N
WN044.50	10/06/08	JDO	H	11	-	11	R	-	O	A	4	NW
WN044.50	11/24/08	MLP	HE	1	-	16	R	-	O	A	4	CL
WN047.00	02/27/08	EXT	F	2	-	22	R	-	C	P	6	NW
WN047.00	05/12/08	JDO	L	9	-	20	R	-	C	P	<2.0	E
WN047.00	06/24/08	JDO	LE	15	-	18	R	-	C	P	<2.0	NE
WN047.00	08/12/08	JDO	E	14	-	20	R	P	C	P	9.1	N
WN047.00	10/06/08	JDO	F	11	-	20	R	-	C	P	<2.0	NW
WN047.00	11/24/08	MLP	E	4	-	25	R	-	C	P	<2.0	SW
WN048.00	02/26/08	EXT	F	1	-	20	R	W	O	A	<2.0	CL
WN048.00	04/28/08	EXT	HF	10	-	19	R	P	C	P	<2.0	SE
WN048.00	06/23/08	FP	F	15	-	21	R	-	C	P	<2.0	S
WN048.00	08/12/08	MLP	E	15	-	17	R	P	C	P	18	NE
WN048.00	10/06/08	EXT	HF	11	-	20	R	-	C	P	4	N
WN048.00	11/24/08	MLP	H	1	-	21	R	-	C	P	8	CL
WN050.00	01/08/08	FP	HE	0	-	22	R	-	C	P	3.6	S
WN050.00	03/04/08	LL	HE	0	-	22	R	T	C	P	2	CL
WN050.00	05/28/08	EXT	F	21	-	25	R	-	C	P	2	CL
WN050.00	06/24/08	FP	HF	18	-	22	R	-	C	P	<2.0	SW
WN050.00	08/13/08	MLP	H	14	-	18	R	-	C	P	7.3	CL
WN050.00	10/07/08	MLP	F	16	-	24	R	-	C	P	4	NW
WN051.00	01/02/08	LL	E	1	C	26	R	-	O	CA	13	CL
WN051.00	02/26/08	EXT	HE	2	-	16	R	-	O	CA	<2.0	S
WN051.00	03/11/08	CLV	E	3	-	23	R	-	O	CA	<2.0	CL
WN051.00	04/28/08	EXT	HF	13	-	16	R	P	C	P	16	SE
WN051.00	05/12/08	CLV	F	10	-	22	R	-	C	P	<2.0	CL
WN051.00	06/23/08	FP	F	15	-	20	R	-	C	P	4	S
WN051.00	08/12/08	MLP	E	15	-	16	R	P	C	P	260	NE
WN051.00	09/16/08	MLP	F	14	-	23	R	-	C	P	14	CL
WN051.00	10/06/08	EXT	HF	12	-	22	R	-	C	P	4	CL
WN051.00	11/12/08	MLP	HF	7	-	25	R	-	C	P	4	CL
WN052.00	01/02/08	LL	E	0	C	24	R	-	O	CA	26	N
WN052.00	02/26/08	EXT	F	1	-	22	R	-	O	CA	<2.0	CL
WN052.00	03/11/08	CLV	E	2	-	20	R	-	O	CA	<2.0	CL
WN052.00	04/28/08	EXT	F	9	-	16	R	-	C	P	<2.0	NE
WN052.00	05/12/08	CLV	F	8	-	24	R	-	C	P	<2.0	NW
WN052.00	06/23/08	FP	F	13	-	22	R	-	C	P	27	S
WN052.00	08/12/08	MLP	E	15	-	18	R	P	C	P	220	CL

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN052.00	09/16/08	MLP	F	13	-	24	R	-	C	P	5.5	CL
WN052.00	10/06/08	EXT	F	11	-	18	R	-	C	P	8	NE
WN052.00	11/12/08	MLP	L	7	-	22	R	-	C	P	22	CL
WN052.00	12/10/08	MLP	-	4		23	R	P	C	P	10	SW
WN054.00	01/08/08	FP	H	1	-	26	R	-	O	A	2	CL
WN054.00	03/04/08	LL	H	1	-	24	R	T	O	A	<2.0	CL
WN054.00	05/28/08	EXT	F	18	-	24	R	-	C	P	<2.0	NW
WN054.00	06/24/08	FP	HF	14	-	22	R	-	C	P	2	CL
WN054.00	08/13/08	MLP	H	15	-	18	R	-	C	P	6	CL
WN054.00	10/07/08	MLP	F	12	-	18	R	-	C	P	<2.0	NW
WN056.00	02/26/08	EXT	HE	2	-	18	R	-	C	P	<2.0	S
WN056.00	04/28/08	EXT	H	13	-	16	R	P	C	P	<2.0	SE
WN056.00	06/23/08	FP	HF	20	-	20	R	-	C	P	2	S
WN056.00	08/12/08	MLP	E	16	-	17	R	P	C	P	36	CL
WN056.00	10/06/08	EXT	HF	12	-	18	R	-	C	P	2	CL
WN056.00	11/12/08	MLP	HF	4	-	20	R	-	C	P	10	CL
WN057.00	02/26/08	EXT	E	2	-	18	R	-	O	A	<2.0	CL
WN057.00	04/28/08	EXT	H	12	-	16	R	P	O	A	<2.0	CL
WN057.00	06/23/08	FP	HF	14	-	20	R	-	O	A	8	S
WN057.00	08/12/08	MLP	E	15	-	19	R	P	O	A	22	N
WN057.00	10/06/08	EXT	H	12	-	20	R	-	O	A	<2.0	CL
WN057.00	11/24/08	MLP	HF	-1	-	20	R	-	O	A	<2.0	CL
WN060.00	01/08/08	FP	H	1	-	22	R	-	O	A	<2.0	S
WN060.00	03/04/08	LL	H	1	-	21	R	T	O	A	2	CL
WN060.00	05/28/08	EXT	F	18	-	24	R	-	C	P	<2.0	N
WN060.00	06/24/08	FP	HF	22	-	22	R	-	C	P	4	CL
WN060.00	08/13/08	MLP	H	16	-	16	R	-	C	P	6	CL
WN060.00	10/07/08	MLP	F	11	-	18	R	-	C	P	<2.0	NW
WN063.00	02/26/08	EXT	E	1	-	8	R	-	O	A	<2.0	CL
WN063.00	04/28/08	EXT	H	12	-	14	R	P	O	A	<2.0	SE
WN063.00	06/23/08	FP	HF	16	-	22	R	-	O	A	2	CL
WN063.00	08/12/08	MLP	E	16	-	16	R	P	O	A	25	CL
WN063.00	10/06/08	EXT	H	12	-	15	R	-	O	A	8	CL
WN063.00	11/24/08	MLP	HF	-1	-	17	R	-	O	A	4	CL
WN064.00	05/14/08	AB	E	11	-	20	R	-	O	R	<2.0	CL
WN064.00	05/28/08	EXT	F	16	-	20	R	-	O	R	<2.0	N
WN064.00	06/24/08	FP	H	17	-	22	R	-	O	R	2	SW
WN064.00	07/15/08	LL	HE	21	-	24	R	-	O	R	<2.0	SW
WN064.00	08/13/08	MLP	E	19	-	18	R	-	O	R	13	SW
WN064.00	10/07/08	MLP	HF	11	-	16	R	-	O	R	<2.0	NW
WN065.00	01/08/08	FP	HF	-1	-	8	R	-	O	R	3.6	CL
WN065.00	03/04/08	LL	H	0	-	6	R	T	O	R	2	SW

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN065.00	05/28/08	EXT	F	23	-	12	R	-	O	R	2	CL
WN065.00	06/24/08	FP	H	22	-	14	R	-	O	R	9.1	CL
WN065.00	08/13/08	MLP	E	17	-	12	R	-	O	R	48	CL
WN065.00	10/07/08	MLP	F	11	-	8	R	-	O	R	2	N
WN066.00	02/26/08	EXT	E	1	-	6	R	-	O	R	14	CL
WN066.00	04/28/08	EXT	H	12	-	11	R	P	O	R	<2.0	CL
WN066.00	06/23/08	FP	H	18	-	18	R	-	O	R	4	S
WN066.00	08/12/08	MLP	E	17	-	3	R	P	O	R	140	CL
WN066.00	10/06/08	EXT	H	12	-	14	R	-	O	R	<2.0	CL
WN066.00	11/12/08	MLP	LE	5	-	0	R	-	O	R	25	CL
WN067.00	02/26/08	EXT	E	0	-	6	R	W	C	P	4	CL
WN067.00	04/28/08	EXT	H	12	-	11	R	P	C	P	2.8	CL
WN067.00	06/23/08	FP	H	18	-	18	R	-	C	P	9.5	S
WN067.00	08/12/08	MLP	LE	18	-	8	R	PW	C	P	440	CL
WN067.00	10/06/08	EXT	H	12	-	14	R	W	C	P	4	CL
WN067.00	11/12/08	MLP	L	5	-	2	R	-	C	P	6	SW
WN068.00	01/08/08	FP	H	1	-	24	R	W	O	A	2	CL
WN068.00	03/04/08	LL	H	0	-	20	R	T	O	A	2	CL
WN068.00	05/28/08	EXT	F	17	-	22	R	-	O	A	<2.0	CL
WN068.00	06/24/08	FP	HE	17	-	21	R	-	O	A	<2.0	SW
WN068.00	08/13/08	MLP	E	17	-	18	R	-	O	A	4	CL
WN068.00	10/07/08	MLP	F	11	-	18	R	-	O	A	2	CL
WN068.50	01/08/08	FP	H	1	-	16	R	W	O	A	<2.0	SW
WN068.50	03/04/08	LL	HF	0	-	14	R	T	O	A	<2.0	SW
WN068.50	05/28/08	EXT	F	16	-	19	R	-	O	A	<2.0	N
WN068.50	06/24/08	FP	HF	20	-	22	R	-	O	A	<2.0	CL
WN068.50	08/13/08	MLP	HE	19	-	15	R	-	O	A	44	CL
WN068.50	10/07/08	MLP	F	12	-	10	R	-	O	A	<2.0	CL
WN069.00	01/08/08	FP	HF	-2	-	2	R	-	O	R	28	CL
WN069.00	03/04/08	LL	HF	-1	-	0	R	T	O	R	<2.0	SW
WN069.00	05/28/08	EXT	F	19	-	14	R	-	O	R	7.3	N
WN069.00	06/24/08	FP	H	21	-	20	R	-	O	R	2	CL
WN069.00	08/13/08	MLP	HE	19	-	8	R	-	O	R	280	CL
WN069.00	10/07/08	MLP	F	11	-	4	R	-	O	R	9.1	CL
WN071.00	01/08/08	FP	HF	-1	-	14	R	-	O	A	<2.0	CL
WN071.00	03/04/08	LL	HF	0	-	14	R	T	O	A	<2.0	SW
WN071.00	05/28/08	EXT	F	16	-	18	R	-	O	A	<2.0	CL
WN071.00	06/24/08	FP	H	19	-	22	R	-	O	A	2	CL
WN071.00	08/13/08	MLP	HE	19	-	15	R	-	O	A	90	CL
WN071.00	11/05/08	MLP	F	7	-	14	R	-	O	A	<2.0	SW
WN073.00	02/27/08	EXT	HF	2	-	24	R	-	C	P	2	CL
WN073.00	05/27/08	EXT	H	13	-	26	R	-	C	P	<2.0	CL

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN073.00	06/24/08	JDO	F	16	-	21	R	-	C	P	2	NE
WN073.00	08/12/08	JDO	E	15	-	17	R	P	C	P	138	NE
WN073.00	10/06/08	JDO	HE	11	-	22	R	-	C	P	3.6	NW
WN073.00	11/24/08	MLP	E	5	-	29	R	-	C	P	<2.0	NE
WN076.00	02/27/08	EXT	HF	2	-	29	R	-	C	P	2	CL
WN076.00	05/12/08	JDO	L	8	-	25	R	-	C	P	2	E
WN076.00	06/24/08	JDO	F	13	-	24	R	-	C	P	<2.0	NE
WN076.00	08/12/08	JDO	E	15	-	15	R	P	C	P	600	NE
WN076.00	10/06/08	JDO	F	10	-	26	R	-	C	P	<2.0	NW
WN076.00	11/24/08	MLP	E	5	-	30	R	-	C	P	6	S
WN077.20	02/27/08	EXT	F	2	-	28	R	-	O	A	<2.0	NW
WN077.20	05/27/08	EXT	H	11	-	28	R	-	O	A	<2.0	CL
WN077.20	06/24/08	JDO	F	14	-	26	R	-	O	A	<2.0	NE
WN077.20	08/12/08	JDO	E	14	-	21	R	P	O	A	160	NE
WN077.20	10/06/08	JDO	HF	12	-	26	R	-	O	A	2	W
WN077.20	11/24/08	MLP	E	3	-	28	R	-	O	A	2	CL
WN077.30	02/27/08	EXT	F	3	-	28	R	-	C	P	2	CL
WN077.30	05/12/08	JDO	LE	8	-	26	R	-	C	P	<2.0	NE
WN077.30	06/24/08	JDO	F	15	-	25	R	-	C	P	4	NE
WN077.30	08/12/08	JDO	E	13	-	24	R	P	C	P	35	N
WN077.30	10/06/08	JDO	HF	11	-	27	R	-	C	P	<2.0	W
WN077.30	11/24/08	MLP	E	5	-	29	R	-	C	P	<2.0	S
WN078.00	01/08/08	FP	HE	4	-	30	R	-	O	A	<2.0	CL
WN078.00	03/04/08	LL	HE	1	-	28	R	T	O	A	<2.0	CL
WN078.00	05/28/08	EXT	F	9	-	29	R	-	C	P	<2.0	CL
WN078.00	06/24/08	FP	HF	11	-	28	R	-	C	P	<2.0	CL
WN078.00	08/13/08	MLP	H	13	-	24	R	-	C	P	7.3	CL
WN078.00	10/07/08	MLP	F	10	-	28	R	-	C	P	<2.0	CL
WN079.00	01/08/08	FP	E	4	-	30	R	-	C	P	<2.0	CL
WN079.00	03/04/08	LL	E	2	-	30	R	T	C	P	4	CL
WN079.00	05/28/08	EXT	F	12	-	30	R	-	C	P	<2.0	N
WN079.00	06/24/08	FP	F	11	-	28	R	-	C	P	2	N
WN079.00	08/13/08	MLP	E	14	-	26	R	-	C	P	6	SW
WN079.00	10/07/08	MLP	F	10	-	28	R	-	C	P	<2.0	CL
WN080.00	01/08/08	FP	HE	3	-	28	R	-	O	A	<2.0	CL
WN080.00	03/04/08	LL	HE	1	-	24	R	T	O	A	<2.0	CL
WN080.00	05/28/08	EXT	HF	15	-	30	R	-	C	P	<2.0	CL
WN080.00	06/24/08	FP	HF	16	-	28	R	-	C	P	<2.0	NW
WN080.00	08/13/08	MLP	HF	13	-	24	R	-	C	P	40	CL
WN080.00	10/07/08	MLP	F	12	-	26	R	-	C	P	<2.0	CL
WN080.50	01/08/08	FP	HE	1	-	25	R	-	O	A	<2.0	CL
WN080.50	03/04/08	LL	HE	1	-	22	R	T	O	A	<2.0	CL

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN080.50	05/28/08	EXT	HF	14	-	29	R	-	C	P	<2.0	N
WN080.50	06/24/08	FP	HF	15	-	28	R	-	C	P	2	NW
WN080.50	08/13/08	MLP	HF	14	-	21	R	-	C	P	130	CL
WN080.50	10/07/08	MLP	F	10	-	26	R	-	C	P	<2.0	CL
WN082.00	01/08/08	FP	E	-1	-	2	R	-	C	P	4	CL
WN082.00	03/04/08	LL	HE	1	-	2	R	T	C	P	<2.0	CL
WN082.00	05/28/08	EXT	HF	17	-	24	R	-	C	P	<2.0	CL
WN082.00	06/24/08	FP	F	20	-	28	R	-	C	P	6	NE
WN082.00	08/13/08	MLP	HF	14	-	20	R	-	C	P	280	CL
WN082.00	10/07/08	MLP	HF	11	-	22	R	-	C	P	2	CL
WN083.00	01/08/08	FP	E	0	-	5	R	-	C	P	8	CL
WN083.00	03/04/08	LL	E	1	-	6	R	T	C	P	2	CL
WN083.00	06/04/08	EXT	F	13	-	28	R	-	C	P	20	CL
WN083.00	06/24/08	FP	F	20	-	28	R	-	C	P	<2.0	SE
WN083.00	08/13/08	MLP	HF	15	-	7	R	-	C	P	440	CL
WN083.00	10/07/08	MLP	F	13	-	20	R	-	C	P	<2.0	CL
WN084.00	01/08/08	FP	E	1	-	30	R	-	C	P	2	S
WN084.00	03/04/08	LL	E	2	-	28	R	T	C	P	<2.0	CL
WN084.00	05/28/08	EXT	HF	21	-	30	R	-	C	P	<2.0	CL
WN084.00	06/24/08	FP	F	18	-	28	R	-	C	P	12	NW
WN084.00	08/13/08	MLP	HF	14	-	20	R	-	C	P	320	CL
WN084.00	10/07/08	MLP	F	15	-	28	R	-	C	P	<2.0	N
WN085.00	01/08/08	FP	F	3	-	30	R	-	O	A	<2.0	CL
WN085.00	03/04/08	LL	E	1	-	28	R	T	O	A	<2.0	CL
WN085.00	05/28/08	EXT	H	8	-	30	R	-	C	P	<2.0	S
WN085.00	06/24/08	FP	F	11	-	28	R	-	C	P	<2.0	NE
WN085.00	08/13/08	MLP	LE	15	-	26	R	P	O	A	2	SW
WN085.00	10/07/08	MLP	H	10	-	28	R	-	O	A	<2.0	CL
WN085.50	01/08/08	FP	E	2	-	28	R	-	O	A	<2.0	CL
WN085.50	03/04/08	LL	E	1	-	30	R	T	O	A	<2.0	CL
WN085.50	05/28/08	EXT	F	12	-	30	R	-	C	P	<2.0	N
WN085.50	06/24/08	FP	F	15	-	28	R	-	C	P	2	NE
WN085.50	08/13/08	MLP	E	16	-	23	R	-	O	A	6	SW
WN085.50	10/07/08	MLP	F	11	-	28	R	-	O	A	<2.0	N
WN086.00	05/15/08	AB	H	7	-	26	R	-	C	P	<2.0	W
WN086.00	05/28/08	EXT	H	13	-	30	R	-	C	P	<2.0	CL
WN086.00	06/24/08	FP	F	20	-	28	R	-	C	P	2	CL
WN086.00	07/15/08	LL	E	19	-	28	R	-	C	P	4	CL
WN086.00	08/14/08	MLP	F	14	-	26	R	P	C	P	6	CL
WN086.00	10/07/08	MLP	H	11	-	28	R	-	C	P	2	CL
WN087.00	01/08/08	FP	E	4	-	22	R	-	C	P	<2.0	CL
WN087.00	03/04/08	LL	E	3	-	28	R	T	C	P	<2.0	CL

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN087.00	05/28/08	EXT	H	11	-	29	R	-	C	P	<2.0	CL
WN087.00	06/24/08	FP	F	17	-	30	R	-	C	P	<2.0	CL
WN087.00	08/14/08	MLP	F	12	-	26	R	P	C	P	6.9	CL
WN087.00	10/07/08	MLP	H	10	-	28	R	-	C	P	<2.0	NW
WN089.00	01/08/08	FP	E	4	-	30	R	-	C	P	<2.0	CL
WN089.00	03/04/08	LL	E	2	-	30	R	T	C	P	<2.0	CL
WN089.00	05/28/08	EXT	F	10	-	29	R	-	C	P	<2.0	N
WN089.00	06/24/08	FP	F	12	-	28	R	W	C	P	8	CL
WN089.00	08/13/08	MLP	E	13	-	26	R	WP	C	P	12	CL
WN089.00	10/07/08	MLP	F	10	-	29	R	-	C	P	<2.0	CL
WN090.00	01/08/08	EXT	HE	0	R	28	R	P	C	P	<2.0	CL
WN090.00	03/04/08	EXT	E	2	-	28	R	-	C	P	<2.0	CL
WN090.00	04/28/08	FP	E		-	26	R	-	C	P	2	CL
WN090.00	06/25/08	MLP	F	13	-	28	R	-	C	P	<2.0	NW
WN090.00	08/18/08	MLP	H	15	-	26	R	-	C	P	32	SW
WN090.00	10/07/08	EXT	F	11	-	28	R	-	C	P	2	NW
WN091.00	01/08/08	FP	E	3	-	30	R	-	C	P	<2.0	CL
WN091.00	03/04/08	LL	E	3	-	28	R	T	C	P	<2.0	CL
WN091.00	05/28/08	EXT	H	16	-	31	R	-	C	P	2	SW
WN091.00	06/24/08	FP	F	24	-	28	R	-	C	P	<2.0	CL
WN091.00	08/14/08	MLP	F	13	-	25	R	P	C	P	15	CL
WN091.00	10/07/08	MLP	H	13	-	28	R	-	C	P	<2.0	CL
WN092.00	01/08/08	FP	E	3	-	30	R	-	O	A	<2.0	CL
WN092.00	03/04/08	LL	E	3	-	28	R	T	O	A	<2.0	CL
WN092.00	04/29/08	EXT	LE	8	-	22	R	P	C	P	26	SE
WN092.00	05/28/08	EXT	F	12	-	29	R	-	C	P	<2.0	N
WN092.00	06/24/08	FP	F	12	-	28	R	-	C	P	<2.0	NE
WN092.00	08/13/08	MLP	E	15	-	24	R	-	C	P	5.5	S
WN092.00	10/07/08	MLP	F	10	-	28	R	-	C	P	<2.0	NE
WN093.00	01/08/08	EXT	HE	1	R	29	R	P	O	A	<2.0	CL
WN093.00	03/04/08	EXT	HE	2	-	28	R	-	O	A	<2.0	CL
WN093.00	04/28/08	FP	E		-	26	R	-	C	P	<2.0	CL
WN093.00	06/25/08	MLP	F	12	-	27	R	-	C	P	2	NW
WN093.00	08/18/08	MLP	H	13	-	28	R	-	C	P	3.6	SW
WN093.00	10/07/08	EXT	F	11	-	28	R	-	C	P	2	CL
WN098.00	01/08/08	EXT	HE	1	R	28	R	P	C	P	<2.0	CL
WN098.00	03/04/08	EXT	E	2	-	28	R	-	C	P	<2.0	CL
WN098.00	04/28/08	FP	E		-	26	R	-	C	P	<2.0	CL
WN098.00	06/25/08	MLP	F	16	-	28	R	-	C	P	2	CL
WN098.00	08/18/08	MLP	H	17	-	28	R	-	C	P	<2.0	SW
WN098.00	10/07/08	EXT	F	11	-	28	R	-	C	P	<2.0	CL
WN099.00	01/08/08	EXT	HE	2	R	28	R	P	O	A	<2.0	CL

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN099.00	03/04/08	EXT	E	2	-	27	R	-	O	A	<2.0	SW
WN099.00	04/28/08	FP	E		-	25	R	-	O	A	<2.0	S
WN099.00	06/25/08	MLP	F	14	-	26	R	-	O	A	2	NW
WN099.00	08/18/08	MLP	H	16	-	28	R	-	O	A	2	SW
WN099.00	10/07/08	EXT	F	11	-	28	R	-	O	A	<2.0	CL
WN100.00	01/08/08	EXT	HE	1	R	28	R	P	C	P	<2.0	CL
WN100.00	03/04/08	EXT	E	2	-	28	R	-	C	P	<2.0	SW
WN100.00	04/28/08	FP	E		-	25	R	-	C	P	2	CL
WN100.00	06/25/08	MLP	F	15	-	26	R	-	C	P	<2.0	NW
WN100.00	08/18/08	MLP	H	17	-	28	R	-	C	P	6	SW
WN100.00	10/07/08	EXT	F	11	-	28	R	-	C	P	2	NW
WN104.50	01/08/08	EXT	E	2	R	28	R	P	O	A	<2.0	CL
WN104.50	03/04/08	EXT	E	2	-	26	R	-	O	A	<2.0	SW
WN104.50	04/28/08	FP	LE	7	-	25	R	W	O	A	<2.0	S
WN104.50	06/25/08	MLP	H	15	-	28	R	W	O	A	2	SW
WN104.50	08/18/08	MLP	HE	18	-	26	R	-	O	A	2	SW
WN104.50	10/07/08	EXT	F	11	-	26	R	-	O	A	<2.0	NW
WN105.00	01/08/08	EXT	E	1	R	18	R	P	O	A	4	CL
WN105.00	03/04/08	EXT	E	1	-	16	R	-	O	A	2	CL
WN105.00	05/14/08	AB	HE	8	-	26	R	-	O	A	<2.0	N
WN105.00	06/25/08	MLP	H	16	-	28	R	-	O	A	380	CL
WN105.00	08/18/08	MLP	HE	15	-	28	R	-	O	A	<2.0	CL
WN105.00	10/07/08	EXT	F	12	-	10	R	-	O	A	6	CL
WN112.00	01/08/08	EXT	E	2	R	26	R	P	C	P	<2.0	SE
WN112.00	03/04/08	EXT	E	3	-	26	R	-	C	P	<2.0	SW
WN112.00	04/28/08	FP	LE	6	-	27	R	-	C	P	<2.0	CL
WN112.00	06/25/08	MLP	H	15	-	28	R	-	C	P	<2.0	SW
WN112.00	08/18/08	MLP	HE	19	-	30	R	-	C	P	10	SW
WN112.00	10/07/08	EXT	F	11	-	30	R	-	C	P	<2.0	CL
WN114.00	01/08/08	EXT	E	1	R	30	R	P	C	P	<2.0	CL
WN114.00	03/04/08	EXT	E	2	-	28	R	-	C	P	<2.0	CL
WN114.00	04/28/08	FP	LE	6	-	28	R	-	C	P	<2.0	CL
WN114.00	06/25/08	MLP	HE	15	-	30	R	-	C	P	4	S
WN114.00	08/18/08	MLP	E	19	-	30	R	-	C	P	<2.0	CL
WN114.00	10/07/08	EXT	F	12	-	30	R	-	C	P	<2.0	CL
WN115.00	01/08/08	EXT	E	1	R	30	R	P	C	P	<2.0	SE
WN115.00	03/04/08	EXT	E	3	-	28	R	-	C	P	2	SW
WN115.00	04/28/08	FP	L	6	-	28	R	-	C	P	<2.0	CL
WN115.00	06/25/08	MLP	HE	16	-	30	R	-	C	P	<2.0	CL
WN115.00	08/18/08	MLP	E	16	-	30	R	-	C	P	2	CL
WN115.00	10/07/08	EXT	F	12	-	30	R	-	C	P	<2.0	NW
WN117.00	01/08/08	EXT	E	3	R	18	R	P	C	P	<2.0	SE

Station	Date	Collect	Tide	Temp	Weather	Sal	Strat	ADV	Stat	CL	MF COL	WIND
WN117.00	03/04/08	EXT	E	2	-	22	R	-	C	P	<2.0	CL
WN117.00	04/28/08	FP	L	7	-	27	R	-	C	P	10	CL
WN117.00	06/25/08	MLP	HE	16	-	30	R	-	C	P	<2.0	S
WN117.00	08/18/08	MLP	E	21	-	28	R	-	C	P	8	S
WN117.00	10/07/08	EXT	F	12	-	30	R	-	C	P	<2.0	CL