

REPORT OF SANITARY SURVEY

AREA A-1

CALABASH AREA

DECEMBER 2007 THROUGH SEPTEMBER 2012

Prepared 10/12

Approved By: _____

Date: _____

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Area A-1 is located in the southern region of coastal North Carolina, and extends from the South Carolina state line east to Intracoastal Waterway Channel Marker #84. The area includes the waters of Calabash Creek, the Atlantic Intracoastal Waterway, and other smaller creeks and tributaries. The growing area is classified properly and no changes are required as a result of this report.

1.0 SANITARY SURVEY

1.1 INTRODUCTION

Area A-1 is composed of all waters bordered in the east by Channel Marker #84, near Shallotte Inlet, and in the west by the South Carolina state line. Area A-1 includes the waters of Mad Inlet, Tubbs Inlet, Calabash Creek, and a portion of the Intracoastal Waterway, as well as several smaller creeks and tributaries. Overall, Area A-1 contains a total of about 4,788 acres of water area (Figure 1). See Figure 2 for an area map and sampling station locations. Table 1 contains a description of each sampling site.

1.2 SHORELINE SURVEY OF SOURCES OF POLLUTION

Survey Methods

A comprehensive shoreline survey of Area A-1 was completed on June 26, 2012. Evaluations of properties in the area were conducted by NC Shellfish Sanitation staff to determine potential sources of pollution entering shellfish growing waters.

New actual and potential pollution sources for this survey were mapped using GPS (Figure 3), and pollution source data were collected using Trimble's sub-meter GeoXT GPS receiver with EVEREST multipath rejection technology. Data were collected in the SSF format using real-time corrections from the integrated Wide Area Augmentation System receiver. The data were post-processed using GPS Pathfinder Tools applications in order to get the most precise data. Additionally, a Geographic Information System (GIS) was developed, including pertinent information and digital pictures for each source.

Area A-2: Shallotte River Area

A comprehensive shoreline survey of Area A-1 was completed on June 26, 2012. Annual updates were conducted in July 2010 and June 2011. The Brunswick County Health Department was notified prior to the surveys, and agreed to provide corrective action and follow-up for any malfunctioning septic systems or illegal discharges associated with on-site wastewater.

Development surrounding the growing area was increasing rapidly when the real estate market was more enthusiastic, but has decreased substantially over the past three years with the slowing economy. According to the US census population estimates from 2010, the permanent populations within the A-1 watershed are as follows:

Sunset Beach	3,572
Calabash	1,786
Carolina Shores	3,048
Ocean Isle Beach	550

Much of the area serves as a vacation destination, so populations in the summer months may be much higher.

A new high rise bridge was completed in the spring of 2011 which replaced the old one lane pontoon bridge which provided access to Sunset Beach. A new NC Wildlife Boat Ramp is being built at the old bridge location, and was scheduled to open in June 2012.

Survey Route - The survey route began on Ocean Isle Beach and proceeded westward along the Atlantic Intracoastal Waterway (AIWW) to the Towns of Sunset Beach, Calabash, and the Calabash Creek area; the survey also included the Sea Trails and Oyster Bay Resorts. During the survey, all residences, businesses, and places of public assembly that were located adjacent to or in close proximity to estuarine waters were visited or inspected. Inspections were conducted when permission was obtained, or the septic systems and property were legally accessible. The growing area has been under drought conditions for the past three years, with rainfall levels well below normal levels.

Point Source Pollution

Wastewater Treatment Plants – The Carolina Shores Wastewater Treatment Plant (WWTP) discharges treated wastewater into a ditch that flows northwest under US Highway 17 then to a series of swamps which eventually drain to the Lumber River basin just over the South Carolina border. See [Figure 4](#) for the location of the wastewater treatment plant, and [Table 2](#) for wastewater treatment plant attribute information. The WWTP was upgraded in 2007 to improve the equalization basin, as well as the grit removal system. A sand filter and a ultraviolet (UV) disinfection system have also been added to the plant. The WWTP has a permitted capacity of 530,000 gallons per day, and the average daily flow is approximately 400,000 gallons per day (GPD). A series of upgrades are scheduled for the WWTP in 2012, which will include a new transfer pump station so wastewater can be transferred to the SW Regional Plant in Supply. On the day of the visit the effluent was cloudy with solids present.

Non-Point Source Pollution

Marinas – Marina facilities are evaluated during the shoreline survey because of their potential to affect the suitability of adjacent shellfish waters for harvest through inputs of both biological and chemical contaminants. A marina is defined as “any water area with a structure (dock, basin, floating dock, etc.) which is

utilized for docking or otherwise mooring vessels and constructed to provide temporary or permanent docking space for more than 10 boats” (15A NCAC 18A .0901). The waters enclosed by a marina are classified as *Prohibited* for the harvest of shellfish, and an additional area beyond the marina can also be classified as *Prohibited* depending on the number of boat slips present. See [Figure 5](#) for marina locations and [Table 3](#) for a summary of marina information.

The 9-slip community docks at the Bent Tree and Bricklanding Plantation subdivisions are both located along the Intracoastal Waterway within *Conditionally Approved Open* waters. Neither meets the definition of a marina, so closures are not necessary.

Otherwise, all other marinas or large multi-slip docking facilities are located in *Prohibited* or *Conditionally Approved Closed* waters. There have not been any significant changes at these marinas.

The Ocean Isle Marina and Yacht Club marina (formerly Pelican Point) has 25 wet slips, a dry stack with associated drop zone, fuel service, and a pump out. The new owner plans on applying for the Division of Coastal Management’s Clean Marina program. The marina has extra cleats but no boats were observed tied up in these areas.

The old Marsh Harbor Marina is still closed, although an application for redevelopment was submitted in 2006. If built, the new development will include a marina, a 1,200-room hotel, 66 condominium units, 80 townhomes, 200 marina condos, a clubhouse, and a restaurant. It is unknown when this development will move forward.

The Calabash Marina is still closed, and there are no plans for redevelopment at this time.

Wastewater Treatment Plants – There are two non-discharging municipal wastewater treatment plants, and two smaller package wastewater treatment plants (PWWTP) within the A-1 watershed. See [Figure 4](#) for the locations and [Table 2](#) for a description of each plant.

The largest of these plants is the Ocean Isle WWTP, which is permitted to treat up to 1.5 million gallons per day (MGD). This plant had an extensive renovation in 2002, and now consists of three large storage lagoons, a batch reactor, digesters, sand filters, and UV disinfection. Most treated wastewater is sprayed onto the 110 acre spray irrigation fields located nearby. The average daily flow for the WWTP in the off season is between 100,000 and 300,000 GPD, while the average daily flow can be as high as 1.0 MGD in July.

The Sea Trails Package Wastewater Treatment (PWWTP) is a 500,000 GPD tertiary wastewater treatment plant that uses UV for disinfection. The plant was

expanded in 2007 by attaching portions of an old package wastewater treatment plant to the system, which allowed for some increased capacity. Treated wastewater from this plant is piped to nearby golf courses, where it is used for irrigation. The PWWTP also has a 1.0 MGD transfer station to divert wastewater to the Regional WWTP in Supply. The average daily flow to the PWWTP is approximately 300,000 GPD; however 100,000 GPD is routinely routed to the Supply Regional WWTP. The PWWTP received a recent notice of violation (NOV) from the Division of Water Quality for an emergency generator that was not functioning in 2010. The plant also has a lot of corrosion on the pipes, handrails, and decking. On the day of the visit the effluent was clear and free of solids, and the emergency generator was functioning properly.

The Oyster Bay subdivision utilizes a PWWTP with a permitted capacity of 40,000 gallons per day, and discharges treated wastewater to a large subsurface low pressure pipe (LPP) system for disposal under the driving range. It is scheduled to go offline in 2012.

The Bricklanding subdivision PWWTP has already gone off line and has been replaced with a lift station. The wastewater from Bricklanding is now going to the Regional WWTP in Supply.

The Town of Sunset Beach has installed a sewer system. The system is a vacuum system with one main lift station located at the north end of Fifth St. (Figure 4). The new sewer system is operational and home owners are already connecting on to it. Sunset Beach has annexed the land across the AIWW, which included Oyster Bay and Sea Trails, and several subdivisions along the AIWW and Calabash Creek. The wastewater from Sunset Beach will be going to the Sea Trails PWWTP and to the Regional WWTP in Supply.

Stormwater – Stormwater can adversely impact shellfish growing areas by rapidly transporting fecal coliform bacteria and other contaminants from the land to the water. Runoff from impervious surfaces, subdivisions, golf courses, and other cleared land is the primary contributor to fecal coliform levels throughout the A-1 area.

The towns of Ocean Isle and Sunset Beach have a series of man-made canals which drain into the Intracoastal Waterway. All of these canals are bulkheaded, and most of the homes surrounding them include lawns that are manicured right up to the water's edge. In addition, stormwater culverts and drain pipes from throughout the towns drain into the heads of these canals, which serve as a significant source of bacterial pollution to the surrounding estuarine waters (Figure 6).

Subdivisions – Subdivisions are noted in the survey as an indicator of population growth, as well as for their tendency to concentrate potential sources of pollution such as septic systems, lift station failures, pet wastes, and

stormwater. On this survey, GIS parcel data was used to determine the location and extent of each subdivision. See [Figure 7](#) for locations of Subdivisions and [Table 4](#) for descriptions and data.

New municipal wastewater has been installed in eight areas and subdivisions including the Town of Sunset Beach, Sea Trails, Oyster Bay, Sunset Lakes, Shoreline Drive, Sea Walk, Bay Point, Calabash Acres, and Capt. Andy's Campground. The new connections tie into the Brunswick County system through the Sea Trails PWWTP.

Golf Courses – There are 14 golf courses within the A-1 watershed. See [Figure 8](#) for a map of golf course locations, and [Table 5](#) for a description of those courses. Many of these make use of treated wastewater for irrigation, so should any problems occur during the treatment process, they could impact the surrounding waters. Four of these courses are located near to estuarine waters, while the rest are further inland.

Wildlife and Domestic Animals – Only two wild goats were observed on the spoil islands along the AIWW behind Sunset Beach and Ocean Isle Beach. As many as fifty goats have been seen in the past, and the goat feeding stations look abandoned and over grown with weeds and grass. Waste from these goats could serve as a significant source of contamination in areas where they congregate. There has been a push recently to remove these goats from the islands ([Figure 9](#)).

Bird Island, just west of Sunset Beach, has recently been purchased by the State of North Carolina, and has been turned into a wildlife preserve. Shorebirds and other wildlife congregate here year-round, and could have some impact on the surrounding water quality.

Poisonous or Deleterious Substances – There are no known problems with poisonous or deleterious substances affecting shellfish in this area.

1.3 HYDROGRAPHIC FACTORS RESPONSIBLE FOR THE SPREAD OF POLLUTION

Currents and tides in much of Area A-1 are influenced primarily by Little River Inlet, just across the South Carolina state line. Shallotte Inlet in Area A-2 provides much of the flushing for the eastern portion of this growing area. Madd and Tubbs Inlets, on the other hand, provide little flushing, as Madd Inlet is entirely shoaled over, while Tubbs Inlet has extensive shoaling throughout. Salinities in the area tend to be high, ranging from 14 to 39 parts per thousand during this survey period ([Table 7](#)).

Land contours on the mainland may promote bacterial loading due to runoff, especially in the central and western portions of the area. Drops of up to 35 feet

of elevation occur over relatively short distances, so stormwater can flow rapidly downhill, meeting little to no resistance from vegetation or other buffers. Much of this runoff eventually drains to either Calabash Creek or to the Intracoastal Waterway, where fecal coliform levels are routinely high. The eastern portion of the growing area shows a much more gradual change in elevation.

Rainfall appears to be the main conduit for bacterial contamination in A-1 so the area is managed by a conditional area management plan. A large portion of the area is classified as *Conditionally Approved Closed*, and two smaller portions are classified as *Conditionally Approved Open* (Figure 2).

The portions of A-1 that are classified as *Conditionally Approved Closed* are normally closed, but can be temporarily opened when weather conditions are favorable and when water and shellfish samples meet acceptable bacteriological standards. During the time period of this report, there was one temporary opening of the Jinks Creek area beginning on 11/22/11 that was open for 6 days (Table 8). Satisfactory water samples (Table 9) and meat samples were collected prior to opening during this dry weather period.

The first of the two *Conditionally Approved Open* areas is located along the eastern edge of the growing area between Channel Markers “84” and “89”, and the second includes a small area around Tubbs Inlet. These areas are normally open to shellfishing, but can be closed when management plan criteria are exceeded. In this case, temporary closures to shellfish harvest are recommended following one or more inches of rain within a 24-hour period. During the effective period of this report, there have been 41 temporary closures of A-1 waters, lasting for a total of 364 days. Four of these closures were due to named storms, lasting for 52 days, due to extremely heavy rainfall and flooding caused by Tropical Storm Ida in November 2009, Tropical Storm Nicole in September 2010, Hurricane Irene in August 2011 and Tropical Depression Beryl in May 2012. See Table 10 for a listing of all temporary closures in this area, and Table 11 for a summary of all bacteriological sampling done prior to reopening these areas.

Several rain gauge stations have been used to monitor rainfall within the A-1 growing area during the time period of this report. A rain gauge located on Sunset Beach was used until 7/25/11 when it became unavailable. At that time, the rain gauge in neighboring Growing Area A-2 on Shallotte River was used until two Town of Ocean Isle rain gauges became available in August 2012. The gauge in A-2 is also used when others are unavailable. Rainfall information from NOAA and other web based resources are used as well to determine the scope of rainfall amounts and locations.

Average monthly rainfall at the Sunset Beach station prior to being discontinued was 3.52 inches (Table 12).

1.4 BACTERIOLOGICAL SURVEY OF SHELLFISH GROWING WATERS

The monitoring of Area A-1 adheres to the systematic random sampling strategy outlined by the National Shellfish Sanitation Program (NSSP) and consists of 30 sample sets from 13 sampling stations ([Figure 2](#)).

The bacteriological survey covered for the preparation of this report included water samples from 12/4/2007 through 9/20/12. During that time period, a total of 390 water samples were collected during times that the waters were open to the harvest of shellfish, and analyzed for fecal coliform bacteria in compliance with the systematic random sampling regime. [Table 13](#) lists, for each individual sampling station, the date the sample was obtained, the tidal cycle upon which the sample was taken, and ambient salinity. Fecal coliform Most Probable Number (MPN) and summary statistics are listed as well.

Five of the thirteen sampling stations currently exceed approved NSSP bacteriological standards. All of these stations are located in areas that are closed to shellfish harvest.

1.5 SUMMARY OF BACTERIOLOGICAL DATA ANALYSIS

Station #9 has shown an increase in bacteriological summary statistics since the last Sanitary Survey Report in 2009. At that time, the geometric mean was 6.57 and the estimated 90th was 23. Currently the geometric mean is 9.44 and the estimated 90th percentile is 35. Although this does not exceed bacteriological standards, this station will be monitored for further change as it is near the closure line leading into the open portion of Jinks Creek and Tubbs Inlet.

Refer to [Table 14](#) for summary and descriptive bacteriological statistics.

1.6 OVERALL EVALUATION AND RECOMMENDATIONS

Classification of the A-1 area appears to be adequate. No changes in classification are recommended at this time. The growing area will continue to be monitored closely, and any changes will be made as needed.

2.0 CONDITIONAL AREA MANAGEMENT PLAN

2.1 INTRODUCTION

Area A-1 is composed of all waters bordered in the east by Channel Marker #84, near Shallotte Inlet, and in the west by the South Carolina state line. The portions of this area classified as *Conditionally Approved* that are normally open to shellfishing include: all waters between Channel Marker #84 and Channel

Marker #89; and a small portion of creek and marsh surrounding Tubbs Inlet. See [Figure 2](#) for a map of all growing area classifications.

With the exception of the *Conditionally Approved Open* waters around Tubbs Inlet and the *Prohibited* waters within the canals behind Ocean Isle and Sunset Beach, all of growing area A-1 south of the Intracoastal Waterway and west of Channel Marker #89 is classified as *Conditionally Approved Closed*.

Water quality throughout the A-1 area is affected by rainfall and the resultant runoff. Sources that have a significant contribution to the pollution load include development and golf courses.

2.2 MANAGEMENT PLAN

The conditionally approved waters of Area A-1 that are normally open to shellfishing will be immediately recommended closed to harvest after one inch of rainfall or greater within a 24-hour period. Recommended closures take effect immediately, and these areas will remain closed until such time as the rainfall event has ended, sampling indicates that water quality meets approved area criteria, and the shellfish have had sufficient time to cleanse.

The conditionally approved waters of Area A-1 that are normally closed to shellfishing are only opened on a temporary basis, after favorable weather conditions have made non-point source contamination unlikely. Sampling is conducted on both water and shellfish meats prior to any temporary opening, and satisfactory results on both allow for the opening to occur. Sampling will continue after the opening, with the frequency being determined by the area, as well as by the hydrographic and meteorological conditions. The area will be closed after 0.5 inches of rain or greater within a 24-hour period, or after 0.75 inches or greater within a 48-hour period. DMF Marine Patrol enforces all closures.

Rainfall has been monitored by participating rain gauges within the A-1 and A-2 areas, at Sunset Beach, Ocean Isle, Calabash Creek and Shallotte River. Taken together, these stations along with NOAA and other web based resources provide adequate rainfall information to manage the entire area. Rainfall monitoring participants maintain daily precipitation logs that are mailed to the Shellfish Sanitation Office for record keeping. Participants are also asked to phone in 24-hour rainfall amounts exceeding one inch to the Division of Marine Fisheries Communications Center, which is open 24 hours per day. Shellfish Sanitation staff also place calls to the monitoring participants when rainfall is suspected.

2.3 IMPLEMENTATION OF MANAGEMENT PLAN

If the rainfall level in the management plan for this area is exceeded, a proclamation is issued for immediate closure of all *Conditionally Approved Open*

waters within A-1, or the immediate closure of all temporarily opened portions of the area. The proclamation closing the area is issued by fax, mail, email, the internet, and through area law enforcement officers, who in turn distribute it to local establishments in the affected area for public notification.

After hours and on weekends, Shellfish Sanitation personnel will be in contact with the DMF Communications Center in Morehead City and the rain gauge contacts directly for information regarding rainfall reports. If management plan criteria are exceeded, DMF issues a temporary closure proclamation.

2.4 PATROL OF THE CLOSED AREA

Patrol of shellfish harvesting areas is the sole responsibility of the Division of Marine Fisheries Marine Patrol Section. For information regarding enforcement of closures and patrol of closed areas, see the Patrol Policy of the DMF Marine Patrol Section.

2.5 REOPENING CRITERIA

After the rainfall event has ended and sufficient time has elapsed to allow shellfish to cleanse, the temporarily closed area will be sampled. If the results indicate fecal coliform levels to be acceptable, a proclamation will be issued to reopen the area. In accordance with 15A NCAC 113-221 of the DMF rules, a 12-hour notification period is required for the reopening of closed shellfishing areas.

3.0 CONDITIONAL AREA EVALUATION

3.1 INTRODUCTION

The National Shellfish Sanitation Program (NSSP) conditionally approved classification for shellfish growing waters allows the utilization of valuable shellfish resources by permitting harvesting when environmental conditions cause fecal coliform levels to be satisfactory in areas that would otherwise be closed to the harvesting of shellfish. In order for the State to be in compliance with NSSP guidelines, conditionally approved areas must be evaluated yearly in accordance with Model Ordinance, Chapter IV, @ 03, C., (3), (a) and (b) of the NSSP Guide for the Control of Molluscan Shellfish. This report is intended to comply with that portion of the NSSP yearly evaluation of the conditionally approved portions of the Calabash Area, A-1, in Brunswick County. Each of the six required elements of the evaluation will be included in this report.

3.2 COMPLIANCE WITH MANAGEMENT PLAN

The monitoring of Area A-1 adheres to the systematic random sampling strategy outlined by the National Shellfish Sanitation Program (NSSP), and consists of 30 sample sets from 13 stations ([Figure 2](#)). The area has also been sampled in

accordance with management plan criteria for the conditionally approved classification of the NSSP.

Review of the management plan during this report period indicates that, on 7 occasions, rainfall exceeding the management plan was recorded on the monthly tally sheet, but a closure was not made. All of these occurred during the 2008 year and were also covered in the 2009 Sanitary Survey when there was some confusion about the management plan criteria. On two of those occasions, the rain gauge contact was not able to be reached, and an adjacent rain gauge showed rainfall below the closure threshold. When the monthly tally sheet was received, it showed an exceedance.

Since mid 2008, all rainfall events of one inch or greater have resulted in a temporary closure in accordance with the management plan.

In order to detect all events that exceed management plan criteria, the rain gauges are now polled after any rain event. It is also requested that the rain gauge contact persons call the office after rainfall amounts that exceed the management criteria. Additional resources are now being used to determine the locations and amount of precipitation, such as the NOAA National Weather Service and other commercial weather websites.

3.3 ADEQUACY OF REPORTING

For coastal North Carolina, rainfall and the resultant runoff is the event most detrimental to shellfish water quality. Currently, all management plans for conditionally approved waters are dependent on the amount of rainfall for the particular growing area. The process of developing management plans for conditionally approved areas is complex. Rainfall amounts vary tremendously, and there are often significant differences within a small area. Current procedures for obtaining rainfall information for Area A-1 include the use of two rainfall stations and web based resources such as NOAA. Monthly tally sheets are received from these stations, and rainfall amounts are checked by telephone as needed.

3.4 COOPERATION OF PERSONS INVOLVED

The conditionally approved area concept is a cooperative effort involving the Marine Patrol and Shellfish Sanitation Sections of the Division of Marine Fisheries (DMF). The Shellfish Sanitation Section is responsible for monitoring conditionally approved growing areas and developing management plans. Patrol of shellfish harvesting waters and authority to open and close these waters is the sole responsibility of the DMF Marine Patrol. The administrative procedures to implement these actions are outlined in a memorandum of understanding between the Division of Marine Fisheries and the Shellfish Sanitation Section.

No major problems have occurred with implementing the conditionally approved area concept in North Carolina.

Rainfall information is gathered from various individuals throughout the state including private citizens, DMF marine patrol and Shellfish Sanitation personnel. Additional resources are used to determine the amount and locations of precipitation, such as the NOAA National Weather Service precipitation website.

3.5 COMPLIANCE WITH APPROVED GROWING AREA CRITERIA

All sampling stations located within *Conditionally Approved Open* waters currently meet the standards for approved status. All stations exceeding NSSP approved criteria are located in *Conditionally Approved Closed* or *Prohibited* waters, so no changes in classification are necessary at this time.

3.6 FIELD INSPECTION OF POLLUTION SOURCES

A comprehensive shoreline survey of Area A-1 was completed on June 26, 2012. Annual shoreline surveys are completed in years other than when a triennial shoreline survey is completed. All surveys were conducted in accordance with the requirements set forth in the NSSP Guide for the Control of Molluscan Shellfish.

3.7 COLLECTION OF WATER SAMPLES

Sampling in Area A-1 adheres to the systematic random sampling strategy outlined by the NSSP, and consists of 30 sample sets from each of 13 stations located throughout the area (Figure 2).

The bacteriological survey discussed within this report includes water samples from 12/4/2007 through 9/20/2012. Table 13 lists, for each individual sampling station, the date the sample was obtained, the tidal cycle upon which the sample was taken, and ambient salinity. Fecal coliform MPN and summary statistics are presented as well.

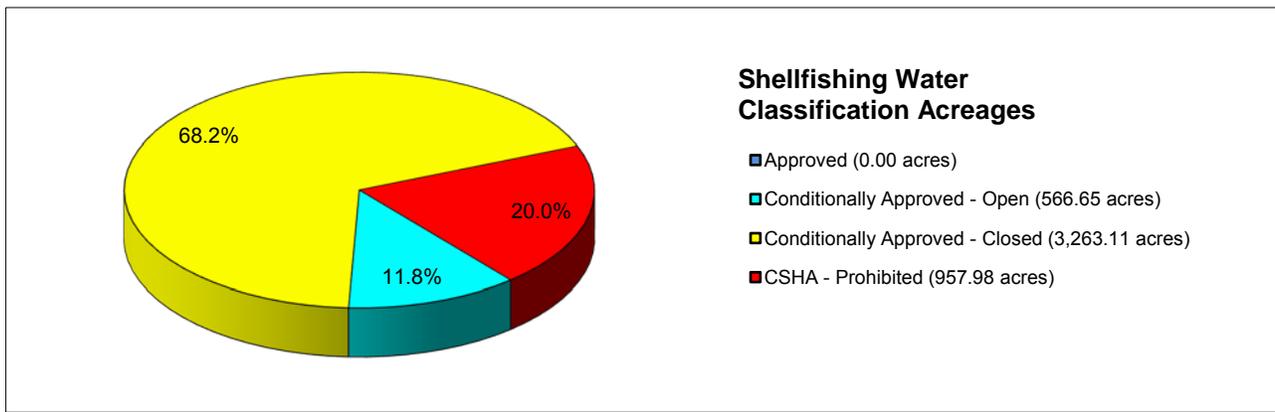
In addition to the routine samples, 73 water samples were collected in order to assess area status prior to reopening *Conditionally Approved Open* areas that had been closed due to rainfall (Table 11).

3.8 SUMMARY

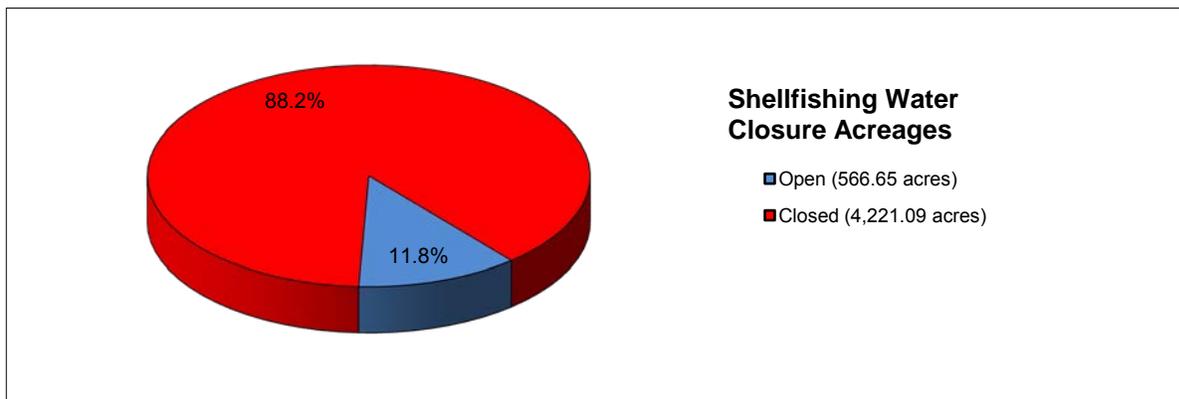
Properly indentifying rainfall events that necessitate a closure within the A-1 growing was an issue during the early part of this report period, as discussed in the 2009 Sanitary Survey. However, changes have been made in the way data is received from the rain gauge monitors within the area, and since that time, no rainfall events have been “missed.” The conditional area management plan for

growing area A-1 is adequate as it is currently described, and continued effort will be made to assure that all rainfall events are properly identified when they occur. Should yearly reviews of management plan success continue to reveal problems, then significant changes will most likely have to be made in order to assure that all portions of A-1 are managed properly.

Figure 1: Acreage



Classification	Acres	Percent of Total
Approved	0.00	
Conditionally Approved - Open	566.65	11.8%
Conditionally Approved - Closed	3,263.11	68.2%
CSHA - Prohibited	957.98	20.0%
Total	4,787.74	100.0%



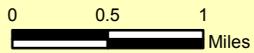
Status	Acres	Percent of Total
Open	566.65	11.8%
Closed	4,221.09	88.2%
Total	4,787.74	100.0%

A-1 Growing Area:

Shellfishing Water Sampling Stations

Legend

- # STATIONS
 - Shellfish Growing Area Boundaries
 - 14-digit Hydrologic Units
- Shellfish Growing Area Classifications**
- █ Approved
 - █ Conditionally Approved-Open
 - █ Conditionally Approved-Closed
 - █ Prohibited



North Carolina Department of
Environment and Natural Resources
Division of Marine Fisheries
Shellfish Sanitation and
Recreational Water Quality Section
September 20, 2012



Sampling Stations

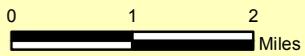
Table 1: Sampling Station Descriptions

Station #	Station Description	County
5	Marker #111, ICWW	Brunswick
8	Marker #101, ICWW	Brunswick
9	700 Yards SSE From Day Marker #105, In Creek	Brunswick
9B	Sunset Beach Harbor	Brunswick
9D	500 Yards SSE Of Station #9	Brunswick
10A	Wilson Creek At Eastern Channel	Brunswick
11	Marker #98, ICWW	Brunswick
12	Flashing Beacon #93, ICWW	Brunswick
15	Marker #87, ICWW	Brunswick
17A	Still Creek	Brunswick
28A	Eastern Channel, Creek West Of Old Station #16	Brunswick
35	Day Beacon #89, ICWW	Brunswick
36	Junction of Johns Creek and ICWW	Brunswick

A-1 Growing Area: Actual and Potential Pollution Sources

Legend

- Animals
 - Areas of Concern
 - Dockage
 - Golf Courses
 - Stormwater
 - Subdivisions
 - Wastewater
 - # STATIONS
 - Shellfish Growing Area Boundaries
 - 14-digit Hydrologic Units
- Shellfish Growing Area Classifications**
- Approved
 - Conditionally Approved-Open
 - Conditionally Approved-Closed
 - Prohibited



North Carolina Department of
Environment and Natural Resources
Division of Marine Fisheries
Shellfish Sanitation and
Recreational Water Quality Section
September 20, 2012



Pollution: All Sources

A-1 Growing Area: Wastewater

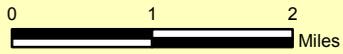
Legend

Wastewater

-  LIFTSTATION
-  MUNICIPAL WWTP
-  PACKAGE PLANT
-  Shellfish Growing Area Boundaries
-  14-digit Hydrologic Units

Shellfish Growing Area Classifications

-  Approved
-  Conditionally Approved-Open
-  Conditionally Approved-Closed
-  Prohibited



North Carolina Department of
Environment and Natural Resources
Division of Marine Fisheries
Shellfish Sanitation and
Recreational Water Quality Section
September 20, 2012

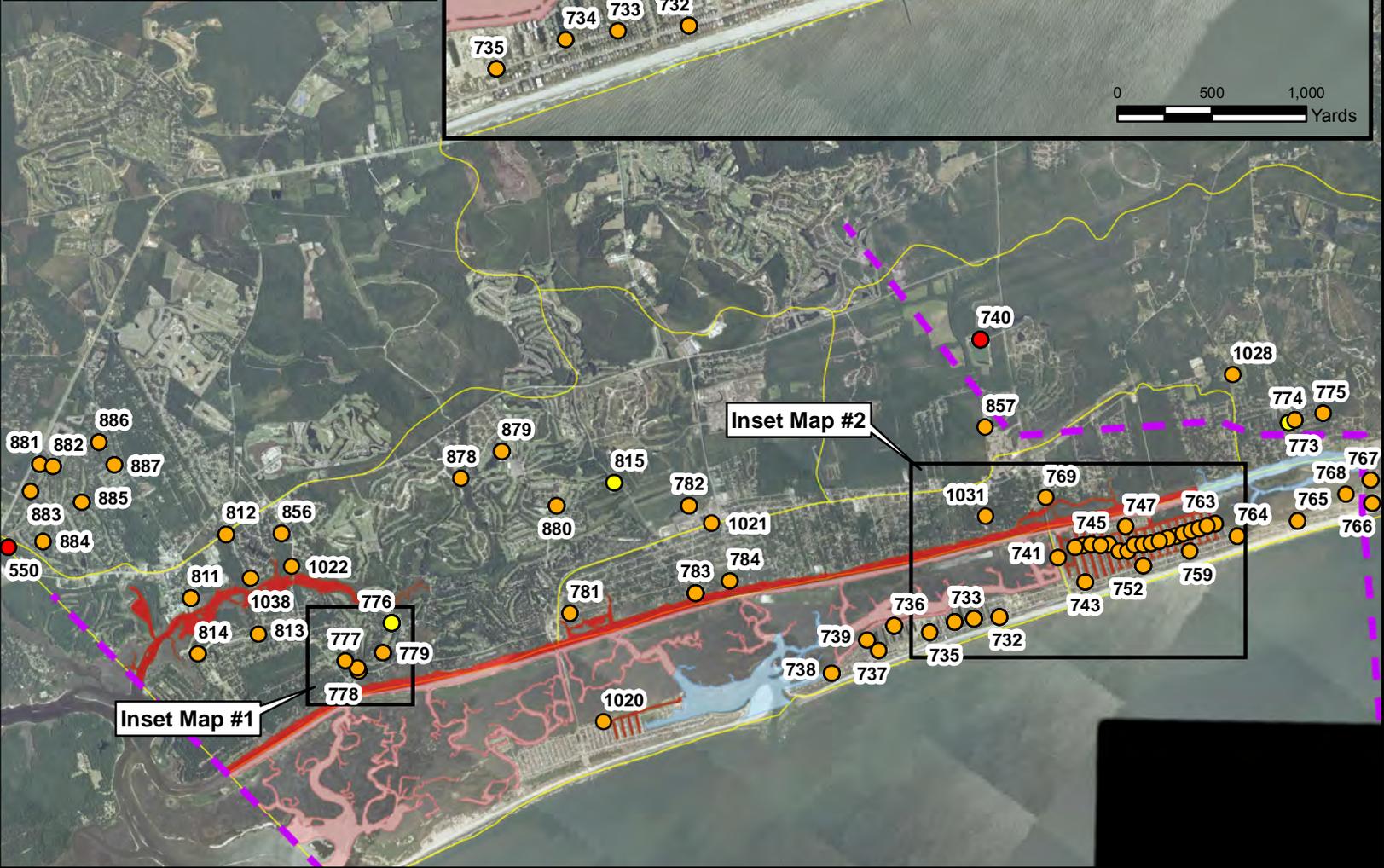
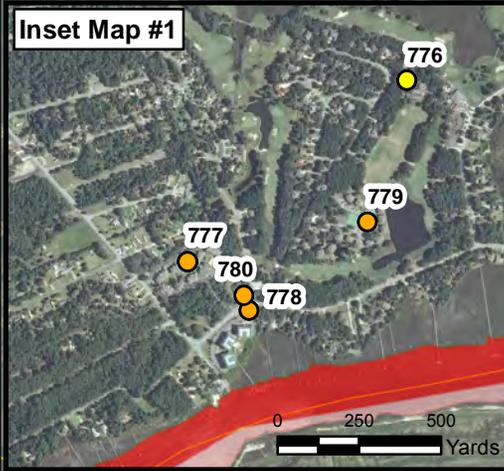


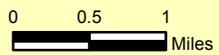
Table 2: Wastewater

SGA INDEX	WWTP	TYPE	Capacity	DISCHARGE
550	Carolina Shores	Aerated lagoon/Tertiary	530,000 GPD	Discharges to a ditch that goes to Persimmon Swamp In South Carolina
776	Oyster Bay	PWWTP	40,000 GPD	Subsurface Low Pressure Pipe System, Going Offline In 2012
740	Ocean Isle Beach	SBR/Sprayfields, Tertiary	1,500,000 GPD	Reuse-Spray on Golf Courses or Sprayfields
773	Bricklanding Plantation	PWWTP	100,000 GPD	Offline- Replaced with L/S
815	Sea Trails	PWWTP	500,000 GPD	Reuse-Spray on Golf Courses

A-1 Growing Area: Dockage

Legend

- Dockage
- Shellfish Growing Area Boundaries
- 14-digit Hydrologic Units
- Shellfish Growing Area Classifications**
- Approved
- Conditionally Approved-Open
- Conditionally Approved-Closed
- Prohibited



Inset Map #1

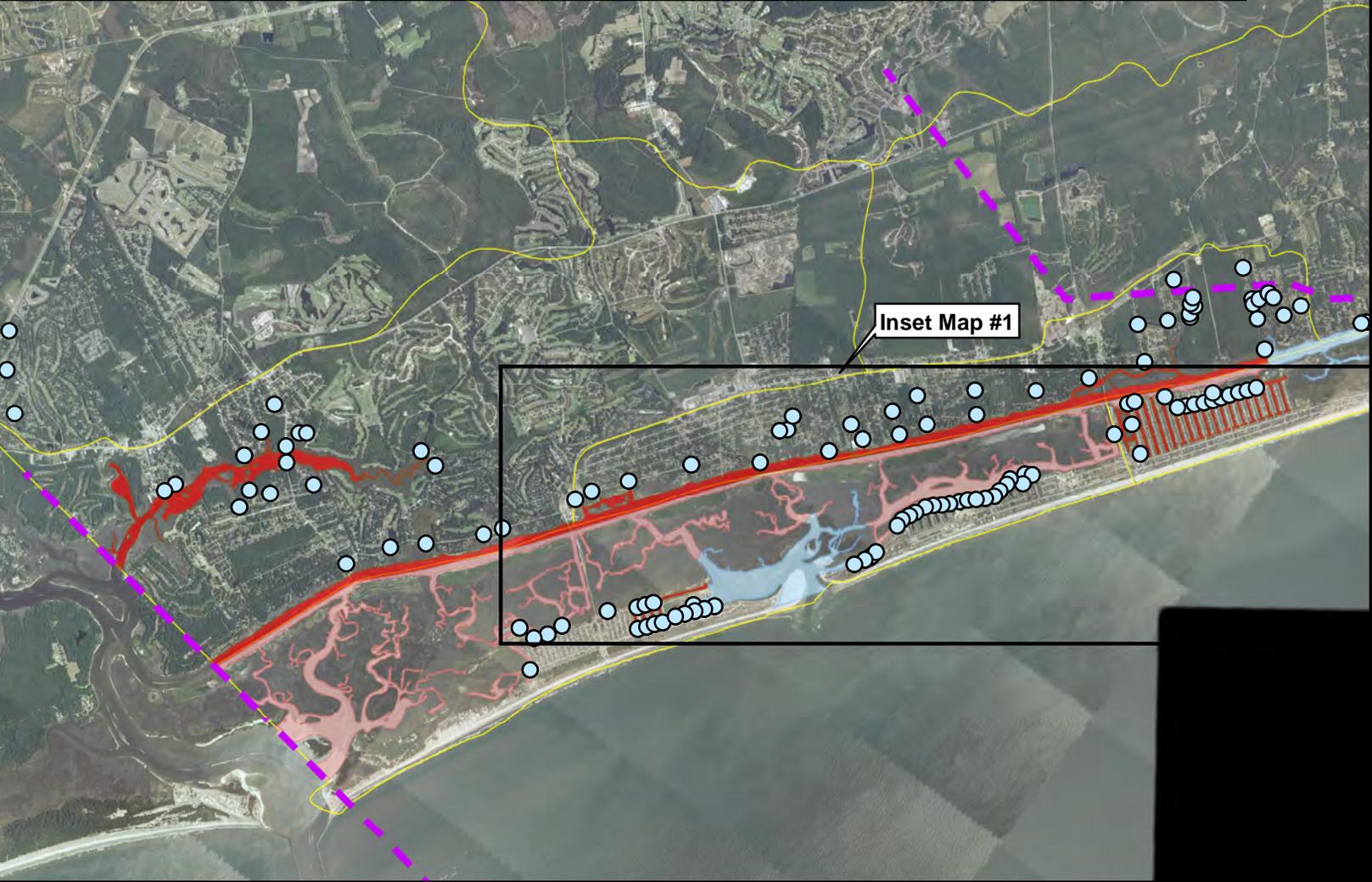


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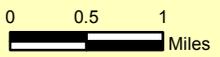
Table 3: Marinas

SGA Index	Marina	# Slips 2011	# Slips 2012	Comments
528	Ocean Isle Fishing Center	10	10	Prohibited Area, Fuel Sales, Restaurant, Restrooms
527	Captains landing	10	10	Prohibited Area
386	Marsh Harbor	0	0	Calabash Creek, Prohibited Area, Abandoned, Disrepair
387	Hurricane Fleet Docks	8	8	Calabash Creek, Prohibited Area, Commercial Fishing and Shrimp Boats
388	Price's Family Dock	5	5	Calabash Creek, Prohibited Area, Commercial Fishing and Shrimp Boats
389	Calabash Waterfront Docks, Capt. Nance's Seafood Restaurant	5	5	Calabash Creek, Prohibited Area, Commercial Fishing and Shrimp Boats
391	Coleman Docks, Coleman's Seafood House Restaurant	4	4	Calabash Creek, Prohibited Area, Commercial Fishing and Shrimp
392	Capt. John's Docks, Capt. John's Seafood House	4	4	Calabash Creek, Prohibited Area, Commercial Fishing and Shrimp Boats
390	Calabash Marina	6	6	Calabash Creek, In state of disrepair, abandoned, Prohibited Area
393	Ocean Isle Marina and Yacht Club, formerly Pelican Pointe	25	25	AIWW, Prohibited Area, 467 dry stack spaces, fuel sales, pump out
394	Parker's Pointe	10	10	AIWW, Prohibited Area, 10-Slip
529	Bent Tree HOA	9	9	AIWW, Prohibited Area, 9-Slip, Not Visited, Gated Community
395	Bricklanding HOA	7	7	AIWW, Open Area, 7-Slip

A-1 Growing Area: Stormwater



- Legend**
- Stormwater
 - Shellfish Growing Area Boundaries
 - 14-digit Hydrologic Units
- Shellfish Growing Area Classifications**
- Approved
 - Conditionally Approved-Open
 - Conditionally Approved-Closed
 - Prohibited

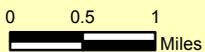


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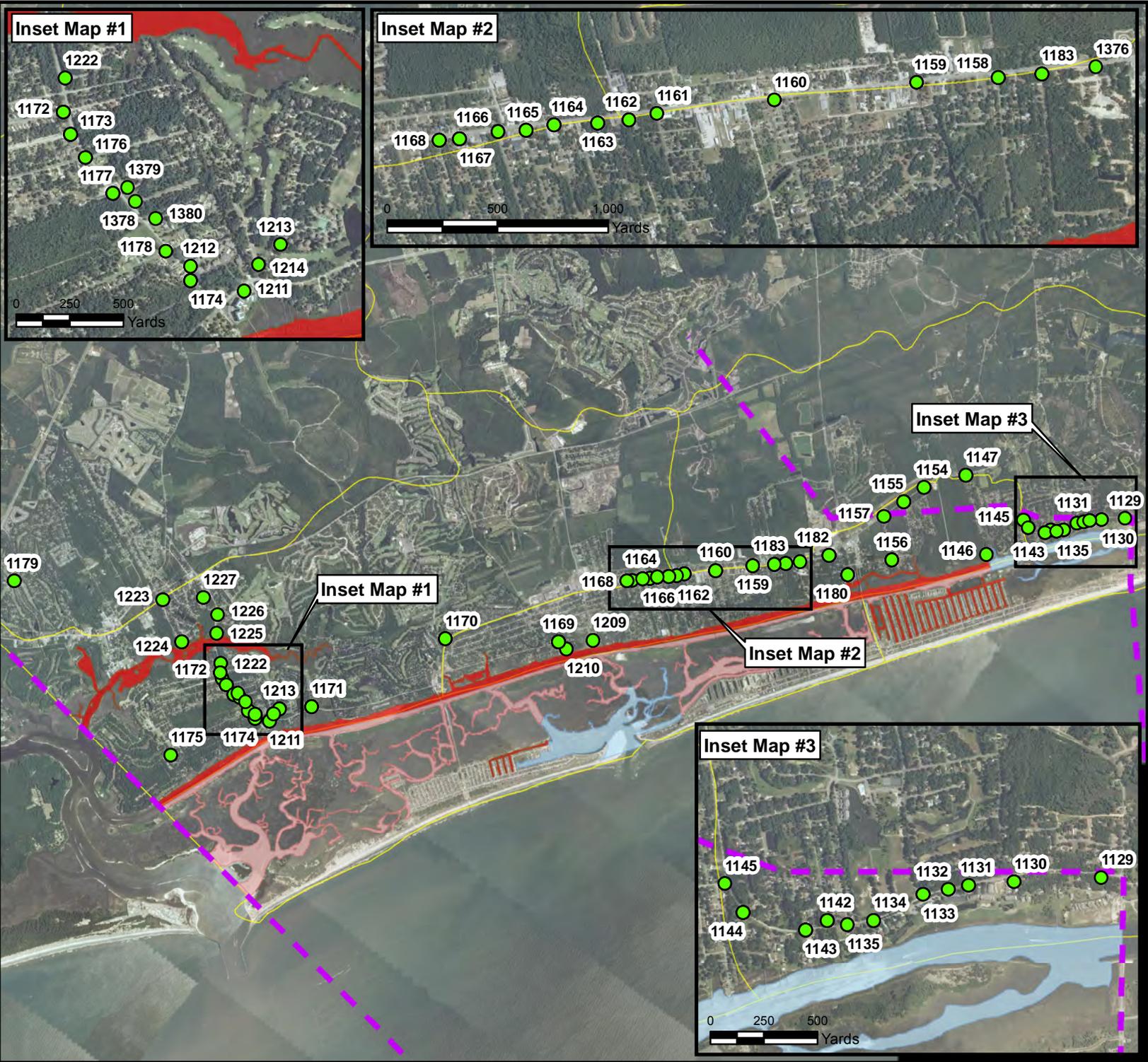
A-1 Growing Area: Subdivisions

Legend

- Subdivisions
 - Shellfish Growing Area Boundaries
 - 14-digit Hydrologic Units
- Shellfish Growing Area Classifications**
- Approved
 - Conditionally Approved-Open
 - Conditionally Approved-Closed
 - Prohibited



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Pollution: Subdivisions

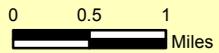
Table 4: Subdivisions

SGA INDEX No.	Name	# Homes	# Lots	Sewage Disposal	Stormwater	Comments
1129	The Beach @ Bricklanding	10	14	Community LPP System	SW Retention Pond	SFD's
1130	The Village @ Inlet Wacche	14	1	Municipal Sewer	SW Retention Pond	Condos
1131	Mariners Wacche	60	1	Municipal Sewer	SW Retention Pond	Condos
1132	Charlestownes on the Waterway	10	1	Municipal Sewer	SW Retention Pond	Condos
1133	Bricklanding	254	386	Municipal Sewer	SW Retention Pond	Golf Course, HOA Marina, SFD's
1134	Ships Wacche	6	6	Municipal Sewer	SW Retention Pond	SFD's
1135	Water Way MHP	9	1	Community LPP System	None	SFD's & MH's
1142	Long Acres Drive	71	100	On-Site Septic Systems	None	MH's
1143	Oak Harbor	17	20	On-Site Septic Systems	None	SFD's, Boat Ramp
1144	Brunswick Shores	18	36	On-Site Septic Systems	None	SFD's
1145	Shangria	116	243	On-Site Septic Systems	None	Boat Ramp
1146	Gores landing	8 Units	1	On-Site Community LPP System	SW Retention Pond	9-Slip HOA Marina
1147	Bent Tree Plantation	205	224	On-Site Septic Systems	SW Retention Pond	18 Condo Units, Boat Ramp
1157	Eyota Drive S/D	36	76	On-Site Septic Systems	SW Retention Pond	MH's
1156	Crown Stream	39	65	On-Site Septic Systems	SW Retention Pond	SFD's
1155	Branchwood Bay-Kilbart Dr	113	122	On-Site Septic Systems	SW Retention Pond	MH's
1154	Branchwood Village	52	76	On-Site Septic Systems	SW Retention Pond	MH's
1180	Parkers Pointe	23	30	Community LPP System	None	10 Slip HOA Marina
1182	Gause Landing Rd	73	105	On-Site Septic System	None	SFD's
1183	Ocean Isle Estate	22	35	On-Site Septic System	None	SFD's
1158	Frink Rd	20	31	On-Site Septic System	None	SFD's
1159	Lake Tree Shores	86	92	On-Site Septic System	None	SFD's
1160	Tarheelland Acres	84	126	On-Site Septic Systems	None	SFD's
1161	Ocean Haven	62	134	On-Site Septic Systems	None	SFD's & MH's Boat Ramp
1162	Thorpe Landing Rd.	17	38	On-Site Septic Systems	None	SFD's & MH's
1163	Oak Land	99	120	On-Site Septic Systems	None	Boat Ramp
1164	Ocean View Landing	76	142	On-Site Septic Systems	None	Boat Ramp
1165	Somerset Rd	44	62	On-Site Septic Systems	None	SFD's & MD
1166	Whispering Pines Rd	25	65	On-Site Septic Systems	None	SFD's & MH's
1167	Water Wonderland	96	100	On-Site Septic Systems	None	SFD's & MH's
1168	Marlee Acres	179	360	On-Site Septic Systems	None	Boat Ramp and Dock
1169	Shoreline Dr.	108	154	Sea Trails PWWTP	SW Retention Pond	SFD's
1170	Sea Trails	671 Homes, 333 Condo Units, 199 Townhome Units	1400	PWWTP to Irrigate GC	SW Retention Ponds	Golf Course
1171	Oyster Bay/ Sunset Lakes	182	310	PWWTP	SW Retention Pond	Golf Course, SFD's
1172	Bonaparte's Retreat	210	244	On-Site Septic Systems	None	MH's
1173	Oak Ridge Plantation	36	68	PWWTP-Sea Trails	None	SFD's
1174	Bonaparte's Retreat II	46	75	On-Site Septic Systems	None	Homes
1176	Shady Forest	63	86	On-Site Septic Systems	None	SFD's
1175	Devaun Park	34	240	PWWTP-Sea Trails	None	SFD's
1177	The Landing III	73	110	On-Site Septic Systems	None	SFD's
1178	Heritage Drive	52	104	On-Site Septic Systems	None	MH's & SFD's
1179	Carolina Shores	1253	1400	WWTP	SW Retention Pond	SFD's
1209	Seaside Landing	52	1	PWWTP-Sea Trails	SW Retention Pond	Condos, 3 Buildings
1210	Waterway Landing	52	1	PWWTP-Sea Trails	SW Retention Pond	Condos, 4 Buildings
1211	The Regency @ Sunset Beach	54	1	PWWTP-Sea Trails	SW Retention Pond	Condos, 3 Buildings
1212	The Colony II @ Oyster Bay	96	1	PWWTP-Sea Trails	SW Retention Pond	Condos, 9 Buildings
1213	The Colony @ Oyster Bay	96	1	PWWTP-Oyster Bay	SW Retention Pond	Condos, 16 Buildings
1214	Oyster Pointe @ Sea Trails	85	120	PWWTP-Oyster Bay	SW Retention Pond	SFD's
1222	The Landing One	17	28	On-Site Septic Systems	None	SFD's
1223	Calabash Acres	157	240	Municipal Sewer	SW Retention Pond	SFD's
1224	Captain Andy's Camp Ground	18	1	Municipal Sewer	None	RV Park
1225	Hughes Family Camp Ground	24	1	On-Site Septic Systems	None	RV Park
1226	Bay Point	30	46	Municipal Sewer	None	MH's
1227	Hidden Valley	50	50	PWWTP-Sea Trails	SW Retention Pond	SFD's
1376	Waterway Cove	6	200	Municipal Sewer	SW Retention Pond	SFD's
3003	Sea Walk	1	28	Municipal Sewer	None	SFD'S, New
3004	The Landing III	18	24	On-Site Septic Systems	None	SFD'S
3006	Pearl Bay I	16	24	On-Site Septic Systems	None	SFD'S

A-1 Growing Area: Golf Courses

Legend

- Golf Courses
- Shellfish Growing Area Boundaries
- 14-digit Hydrologic Units
- Shellfish Growing Area Classifications**
- Approved
- Conditionally Approved-Open
- Conditionally Approved-Closed
- Prohibited



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Table 5: Golf Courses

Index	Name	Holes	Comments
817	Jaguar's Liar/Formerly Angels Trace	36	Inland, Abandoned, Closed
818	Sandpiper Bay	18	Inland
819	Thistle Golf Club	18	Inland
820	The Pearl	36	Inland, SW Ponds Discharge to Calabash Creek
821	Sea Trails	54	SW Ponds Discharge to Calabash Creek
822	Tiger eye	18	Inland
823	Lions Paw	18	Inland
824	Panthers Run	18	Inland
825	Brunswick Plantion	18	Inland
826	Crow Creek	18	Inland
827	Farmstead	18	Inland
828	Carolina Shores	18	Inland
829	Oyster Bay	18	Adjacent to AIWW, SW Ponds Drain to AIWW
830	Bricklanding	18	Adjacent to AIWW, Bankruptcy

A-1 Growing Area: Animals

Legend

- Animals**
- GOATS
 - Shellfish Growing Area Boundaries
 - 14-digit Hydrologic Units
- Shellfish Growing Area Classifications**
- Approved
 - Conditionally Approved-Open
 - Conditionally Approved-Closed
 - Prohibited



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Table 6: Animals

SGA Index	Category	Comments
414	Goats	Goat feeding station on spoils island

A-1 Tides Salinities Data Table 7

Date	Tidal Stage	Station ID												
		5	8	9	9B	9D	10A	11	12	15	17A	28A	35	36
12/4/2007	LOW	27	30	32	32	35	36	30	32	36	36	36	36	29
4/30/2008	LOW	26	24	32	34	32	35	26	28	32	34	32	31	26
7/9/2008	1/4 FLD	35	36	36	36	36	36	36	36	36	36	36	36	35
9/22/2008	1/4 FLD	15	24	32	34	36	34	24	32	34	35	32	34	24
10/7/2008	1/4 FLD	18	23	28	30	30	30	24	28	30	30	28	30	24
10/30/2008	HIGH	30	32	36	35	38	38	38	35	36	37	33	35	25
12/11/2008	LAST EBB	20	24	32	35	32	33	26	30	32	32	32	32	24
3/18/2009	LOW	14	15	25	25	27	28	18	21	25	28	22	26	18
4/29/2009	1/2 FLD	22	25	35	34	35	35	25	32	33	35	34	33	30
6/30/2009	LOW	29	31	35	35	35	36	30	35	35	36	35	35	31
7/29/2009	LOW	33	36	35	36	38	38	35	36	37	37	36	37	32
12/14/2009	3/4 EBB	19	20	31	32	32	35	22	26	34	32	32	32	21
12/16/2009	1ST EBB	20	18	28	33	32	32	22	25	35	32	30	32	22
4/14/2010	1/4 EBB	20	25	25	32	32	32	25	26	33	30	31	32	20
6/22/2010	LOW	29	30	32	36	35	36	31	31	32	35	35	32	30
8/30/2010	3/4 FLD	25	30	35	37	36	36	32	35	36	36	35	36	24
11/15/2010	LOW	30	29	35	34	34	35	31	32	33	35	35	34	29
12/2/2010	LAST EBB	31	31	34	35	35	36	32	33	35	36	34	34	29
12/6/2010	1/4 EBB	31	31	35	36	35	35	34	35	35	36	36	34	30
3/14/2011	LAST EBB	25	25	34	35	35	35	22	26	31	35	28	30	24
5/24/2011	1ST FLD	29	29	35	35	35	35	30	31	33	35	32	32	30
6/20/2011	3/4 FLD	30	38	37	37	39	39	38	38	39	39	38	39	35
8/16/2011	1/4 EBB	31	36	36	36	37	37	36	36	37	37	36	36	31
10/6/2011	LOW	32	32	33	39	38	38	32	32	35	37	37	36	32
11/8/2011	1/4 EBB	28	35	32	35	36	36	34	35	35	35	35	35	29
3/12/2012	1/2 EBB	22	31	24	31	31	32	29	31	34	32	32	31	23
5/7/2012	1ST EBB	30	34	32	35	34	34	34	35	35	34	35	35	31
6/26/2012	1/4 FLD	30	31	32	32	34	32	31	31	31	34	31	31	31
7/17/2012	1/2 EBB	21	31	31	34	33	34	31	33	33	32	33	33	29
9/20/2012	3/4 FLD	20	31	32	32	35	35	31	33	35	33	32	33	25

Table 8: A-1 Temporary Openings

Date	Description	Close	Open
12/21/11	<u>Jinks Creek Area</u> - All those waters in Jinks Creek bounded on the north by a straight line beginning at a point on the north shore at 33° 52.8453' N -78° 29.9304' W; running southwesterly to a point on the south shore at 33° 52.7908' N -78° 29.9624' W and bounded on the south by a straight line beginning at a point on the west shore at 33° 52.6729' N -78° 29.6735' W; running northeasterly in a straight line to a point on the east shore at 33° 52.7393' N -78° 29.6339' W		22-Dec
12/28/11	<u>Jinks Creek Area</u> - All those waters in Jinks Creek bounded on the north by a straight line beginning at a point on the north shore at 33° 52.8453' N -78° 29.9304' W; running southwesterly to a point on the south shore at 33° 52.7908' N -78° 29.9624' W and bounded on the south by a straight line beginning at a point on the west shore at 33° 52.6729' N -78° 29.6735' W; running northeasterly in a straight line to a point on the east shore at 33° 52.7393' N -78° 29.6339' W	28-Dec	

Table 9: A-1 Temporary Sampling Results

STATION	36	36A	9
12/18/2011			4.5
12/20/2011	70	4.5	11

Table 10: A-1 Temporary Closures

Date	Description	Close	Open	Reason
1/9/2008	All those waters 100 yards from the dredge spoils effluent pipe located on a spoil island south of the ICWW and east of Beacon #89 near the Ocean Isle Beach canals.	14-Jan		Dredging
3/16/2008	All waters between ICWW marker "89" and the South Carolina State Line.	16-Mar		Rainfall
3/25/2008	Those waters between ICWW #89 and SC line returns to normal boundaries		26-Mar	Sampling
4/20/2008	All those waters between ICWW marker "89" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	20-Apr		Rainfall
4/24/2008	All those waters 100 yards from the dredge spoils effluent pipe located on a spoil island south of the ICWW and east of Beacon #89 near the Ocean Isle Beach canals.		25-Apr	Dredging
4/24/2008	All those waters between ICWW marker "89" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		25-Apr	Sampling
5/12/2008	All those waters between ICWW marker "89" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	12-May		Rainfall
5/16/2008	A-1 returns to normal boundaries.		17-May	Sampling
6/22/2008	All those waters from Intracoastal Waterway Channel Marker #89 near Ocean Isle Beach to the South Carolina state line.	22-Jun		Rainfall
6/25/2008	All those waters from Intracoastal Waterway Channel Marker #89 near Ocean Isle Beach to the South Carolina state line.		26-Jun	Sampling
8/14/2008	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	14-Aug		Rainfall
8/19/2008	A-1 returns to normal boundaries.		20-Aug	Sampling
8/26/2008	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	26-Aug		Rainfall
9/3/2008	A-1 Returns to normal boundaries.		4-Sep	Sampling
9/6/2008	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	6-Sep		Rainfall
9/19/2008	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		20-Sep	Sampling
9/26/2008	All those waters between Southport and the South Carolina state line.	26-Sep		Rainfall
10/1/2008	All those waters between Southport and the South Carolina state line.		2-Oct	Sampling
10/25/2008	All those waters between Southport and the South Carolina state line.	25-Oct		Rainfall
10/31/2008	All those waters between ICWW #84 near Ocean Isle Beach, and the South Carolina State Line, to include Tubbs Inlet area.		1-Nov	Sampling
11/14/2008	All those waters between ICWW marker "84" and the South Carolina State Line.	14-Nov		Rainfall
11/18/2008	All those waters between ICWW marker "84" and the South Carolina State Line returns to normal boundaries.		19-Nov	Sampling
11/30/2008	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.	30-Nov		Rainfall
12/5/2008	All those waters between ICWW marker #84 and the South Carolina State Line, including the Tubbs Inlet area.		6-Dec	Sampling
2/19/2009	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.	19-Feb		Rainfall
2/24/2009	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.		25-Feb	Sampling
05/18/09	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.	18-May		Rainfall
05/28/09	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.		29-May	Sampling
06/15/09	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.	15-Jun		Rainfall
06/24/09	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.		25-Jun	Sampling
09/01/09	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.	1-Sep		Rainfall

Table 10: A-1 Temporary Closures

Date	Description	Close	Open	Reason
09/15/09	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.		16-Sep	Sampling
09/23/09	All those waters between ICWW #84 near Ocean Isle Beach, and the South Carolina State Line, to include Tubbs Inlet area.	23-Sep		Rainfall
10/02/09	A-1 (Tubbs Inlet area) returns to normal boundaries.		3-Oct	Sampling
11/11/09	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.	11-Nov		TS Ida
11/17/09	A-1 (Tubbs Inlet area) returns to normal boundaries.		18-Nov	Sampling
12/03/09	All those waters between Southport and the South Carolina state line.	3-Dec		Rainfall
12/10/09	Tubbs Inlet area returns to normal boundaries.		11-Dec	Sampling
12/19/09	All those waters between Southport and the South Carolina state line.	19-Dec		Rainfall
12/23/09	All those waters in the Tubbs Inlet area returns to normal boundaries.		24-Dec	Sampling
01/25/10	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.	25-Jan		Rainfall
01/29/10	All those waters between ICWW marker #84, near Ocean Isle Beach, and the South Carolina State Line, to include the Tubbs Inlet area.		30-Jan	Sampling
02/06/10	All those waters between ICWW Marker #84 near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	6-Feb		Rainfall
02/17/10	A-1 (Tubbs Inlet area) returns to normal boundaries.		18-Feb	Sampling
03/03/10	All those waters between ICWW Marker #84 near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	3-Mar		Rainfall
03/09/10	All those waters between ICWW Marker #84 near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		10-Mar	Sampling
03/29/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	29-Mar		Rainfall
04/07/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		8-Apr	Sampling
05/18/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	18-May		Rainfall
05/27/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		28-May	Sampling
05/29/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	29-May		Rainfall
06/08/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		9-Jun	Sampling
07/01/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	1-Jul		Rainfall
07/09/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		10-Jul	Sampling
07/30/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	30-Jul		Rainfall
08/19/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		20-Aug	Sampling
08/20/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	20-Aug		Rainfall
08/26/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		27-Aug	Sampling
09/12/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	12-Sep		Rainfall
09/16/10	A-1 (Tubbs Inlet area) returns to normal boundaries.		17-Sep	Sampling

Table 10: A-1 Temporary Closures

Date	Description	Close	Open	Reason
09/27/10	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	27-Sep		Rainfall
09/28/10	All those waters between IWW Marker #65A, near Salliers Bay and the South Carolina state line, to include Tubbs Inlet, Shallotte River, Lockwoods Folly River, Cape Fear River, Myrtle Grove Sound, Stump Sound, New River and all other tributaries within said boundaries.	28-Sep		Nicole Remnants
10/07/10	A-1 (Tubbs Inlet area) returns to normal boundaries.		8-Oct	Sampling
03/31/11	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	31-Mar		Rainfall
04/05/11	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		6-Apr	Sampling
05/11/11	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	11-May		Rainfall
05/19/11	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		20-May	Sampling
07/26/11	All those waters between Southport and the South Carolina Line.	26-Jul		Rainfall
08/11/11	A-1 returns to normal boundaries.		12-Aug	Sampling
08/29/11	All Coastal waters close.	29-Aug		Hurricane Irene
09/02/11	The IWW between Beacon #89 and Shallotte Inlet returns to status prior to 8/27/11 Hurricane Irene.		3-Sep	Sampling
09/22/11	A-1 returns to status prior to 8/27/11 Hurricane Irene		23-Sep	Sampling
01/12/12	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	12-Jan		Rainfall
01/18/12	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		19-Jan	Sampling
03/04/12	All those waters between Southport and the South Carolina State line	4-Mar		Rainfall
03/08/12	All those waters between IWW #84, near Ocean Isle, and the SC, to include the Tubbs Inlet area, returns to normal boundaries		9-Mar	Sampling
05/15/12	All those waters between Southport and the South Carolina state line, to include Lockwoods Folly River and Shallotte River.	15-May		Rainfall
05/22/12	All those waters between Southport and the South Carolina state line, to include Lockwoods Folly River and Shallotte River.		23-May	Sampling
05/30/12	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	30-May		TD Beryl
06/07/12	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		8-Jun	Sampling
06/13/12	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	13-Jun		Rainfall
06/19/12	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.		20-Jun	Sampling
08/07/12	All those waters between ICWW marker "84" near Ocean Isle and the South Carolina State Line, to include the Tubbs Inlet area.	7-Aug		Rainfall
08/14/12	Tubbs Inlet area ONLY opens.		15-Aug	Sampling
08/16/12	All those waters between ICWW marker "84" near Ocean Isle and the permanent closure line near ICWW marker "89".		17-Aug	Sampling
08/20/12	All those waters between IWW Beacon #47 near Lockwoods Folly Inlet and the South Carolina State Line, to include Shallotte River and Tubbs Inlet.	20-Aug		Rainfall
08/23/12	A-1 returns to normal boundaries.		24-Aug	Sampling

Table 11: A-1 Conditional (Rainfall) Sampling Results

	9	9D	9B	10A	15
3/24/2008		1.7			
4/23/2008		1.7			
5/15/2008		4.5			
6/24/2008		1.7			
8/18/2008		2			
9/3/2008		7.8			
9/9/2008		33			
9/11/2008		49			
9/18/2008		1.7			
9/30/2008		2			
10/28/2008		33			
10/30/2008	1.7	1.7	7.8	1.7	
11/17/2008		6.8			
12/4/2008		1.7			
2/23/2009		7.8			
5/27/2009		4.5			
6/23/2009		11			
9/8/2009		49			
9/14/2009		11			
10/1/2009		7.8			
11/16/2009		7.8			
11/18/2009					2
12/7/2009		6.8			
12/22/2009		2			
1/28/2010		4.5			
2/11/2010		23			
2/16/2010		1.7			
3/8/2010		4.5			
4/6/2010		13			
5/26/2010		13			
6/7/2010		4.5			
7/8/2010		7.8			
8/3/2010		33			
8/11/2010		79			
8/18/2010		14			
8/25/2010		14			
9/15/2010		13			
10/6/2010		13			
4/4/2011		4			
5/16/2011		240			
5/18/2011		4.5			
7/28/2011		31			
8/1/2011		23			
8/3/2011		23			
8/8/2011		33			33
8/10/2011		4			7.8
8/31/2011		33			
9/1/2011					1.7
9/7/2011		33			
9/14/2011		23			
9/21/2011		7.8			
1/17/2012		4.5			7.8
3/7/2012		7.8			6.1
5/16/2012		13			22
5/21/2012		2			17
6/6/2012		4.5			7.8
6/19/2012		6.1			13
8/13/2012		8.2			33
8/15/2012					9.2
8/22/2012		2			4.5

Table 12: A-1 Rainfall Monitoring Results

Shalotte River - Rainfall 2012												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1												
2		0.15						0.92				
3												
4			2.10	0.24								
5			0.35									
6				0.44	0.10	0.26						
7				0.40				0.50				
8								1.55	0.40			
9								0.30	0.52			
10					0.38							
11		0.12					0.18					
12	1.05						0.22	1.55				
13						1.40						
14												
15					4.40				1.65			
16												
17					0.22				0.60			
18	0.15				0.05							
19		0.80						1.35	0.56			
20		0.62	1.00					2.65				
21								1.55				
22				0.72				0.34				
23								0.16				
24								0.40				
25		0.10	0.15					0.50				
26			0.30		0.74	0.72						
27	0.10											
28				0.58								
29								1.20				
30					1.05		0.24	0.70				
31					0.50			0.12				
TOTAL	1.30	1.79	3.90	2.38	7.44	2.38	0.64	13.79	3.73	0.00	0.00	0.00

Table 12: A-1 Rainfall Monitoring Results

Sunset Beach Area - Rainfall 2009													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1			0.70	0.05	out of town - total 2.75				1.10				
2			0.60	0.40				0.50					0.30
3				0.90									2.40
4													
5							0.30	0.10			0.20		0.90
6													
7													
8													
9													
10							0.90						
11	0.50									0.90	2.50		
12	0.40									0.20	1.50		
13	0.20										0.10	0.50	
14						1.00				0.20			
15						1.50				0.30			
16			0.15			1.00						0.30	
17						0.80				0.15	0.10		
18													
19	0.20	1.26										3.25	
20	0.50												
21	0.20												
22					0.20								
23							1.7 total	0.40	1.75		0.40		
24													
25			0.40					out of town			0.40		
26			0.20						1.30				
27								0.30	2.75	0.30			
28	0.20		0.40										
29	0.40		0.70		0.60			0.30		0.60			
30													
31							0.10			0.10		0.70	
TOTAL	2.60	1.26	3.15	1.35	0.80	5.50	1.00	0.70	6.90	2.95	5.00	8.35	

Sunset Beach Area - Rainfall 2008												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1				0.10								
2				0.30				out of town from 7/29 - 8/6				
3												
4					0.20							
5			0.70								2.40	
6				0.10								
7			0.70	0.10			0.30	.90				
8			0.30									
9												
10							0.80		0.10			
11	0.30				0.30		0.30				0.70	
12	1.25				0.80		1.20		0.70	0.20		
13	0.20	2.00						0.90				
14					0.80			1.10				
15						0.44						
16			1.20			0.94						
17	0.30											
18	1.20	0.90				0.70		0.10		0.20		
19	0.20									0.20		
20	0.60		0.30	2.90			1.20					
21						0.40						
22		1.25				0.40						
23		0.15						0.50				
24						1.50	1.00					
25				0.20	0.20					0.30	2.50	
26	0.05			0.10				1.30	2.00			
27		0.60										
28												
29				0.10	0.70							
30			0.10									
31												
TOTAL	4.10	4.90	3.50	3.90	3.00	4.38	4.80	3.90	5.50	3.80	0.00	0.00

no rainfall data submitted/ used A-2

Table 12: A-1 Rainfall Monitoring Results

Sunset Beach Area - Rainfall 2011														
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
1		0.60		0.20			out of town							
2														
3														
4		0.90												
5		1.35**			.55 ?									
6														
7														
8		0.80	0.20											
9														
10				0.95										
11					1.70									
12					out of town									
13														
14		0.60												
15														
16														
17														
18	0.50													
19					0.90									
20														
21														
22														
23														
24						0.40								
25		0.40						* See note						
26	0.80			0.20										
27			0.90											
28			0.50											
29				0.20										
30						out of town								
31			1.50											
TOTAL	1.30	3.30	3.10	1.55	2.60	0.40	0.00	0.00	0.00	0.00	0.00	0.00		

Sunset Beach Area - Rainfall 2010												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1							1.50			0.40		
2		0.30				0.50						
3		0.60	1.20			0.40		0.10				
4						0.10		0.20				
5					0.65						0.60	0.80
6		1.75										
7								2.20				
8												
9						0.20						
10						0.70						
11												
12			0.20						6.00			0.40
13			0.70				0.15					
14								0.70				
15						0.60	0.10					
16						0.20	0.20					
17	0.90				1.20							0.20
18					1.00							0.35
19					0.10							
20								1.25				
21				0.30				0.40				
22	0.90		0.20									
23	0.30							0.15				
24					1.50							
25	1.00			0.20				0.50				
26					0.20							
27							0.30		2.25			
28						0.20	1.20		3.70	0.90		0.70
29			1.20		2.00			0.30	0.60			
30	0.30		0.70	0.30			2.75		3.70			
31												
TOTAL	3.40	2.65	4.20	0.80	6.65	2.00	7.10	5.50	15.95	1.90	0.60	2.45

* effective 7/25/11 - resigning position of rain reporting
 ** Greater than 24 hour total

A-1 Formatted Data Table 13

Station ID: 5

# Samples:	30	Log Avg:	1.5528
# > 43 MPN:	14	Log Std Dev:	0.5684
# > 260 MPN:	3	Geomean:	35.7149
Median:	33	Estimated 90th:	190

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	27	17.0	1.2304
4/30/2008	LOW	26	23.0	1.3617
7/9/2008	1/4 FLD	35	1.8	0.2553
9/22/2008	1/4 FLD	15	70.0	1.8451
10/7/2008	1/4 FLD	18	79.0	1.8976
10/30/2008	HIGH	30	49.0	1.6902
12/11/2008	LAST EBB	20	920.0	2.9638
3/18/2009	LOW	14	79.0	1.8976
4/29/2009	1/2 FLD	22	130.0	2.1139
6/30/2009	LOW	29	33.0	1.5185
7/29/2009	LOW	33	4.5	0.6532
12/14/2009	3/4 EBB	19	350.0	2.5441
12/16/2009	1ST EBB	20	350.0	2.5441
4/14/2010	1/4 EBB	20	110.0	2.0414
6/22/2010	LOW	29	17.0	1.2304
8/30/2010	3/4 FLD	25	33.0	1.5185
11/15/2010	LOW	30	7.8	0.8921
12/2/2010	LAST EBB	31	49.0	1.6902
12/6/2010	1/4 EBB	31	14.0	1.1461
3/14/2011	LAST EBB	25	11.0	1.0414
5/24/2011	1ST FLD	29	33.0	1.5185
6/20/2011	3/4 FLD	30	49.0	1.6902
8/16/2011	1/4 EBB	31	13.0	1.1139
10/6/2011	LOW	32	11.0	1.0414
11/8/2011	1/4 EBB	28	79.0	1.8976
3/12/2012	1/2 EBB	22	33.0	1.5185
5/7/2012	1ST EBB	30	46.0	1.6628
6/26/2012	1/4 FLD	30	14.0	1.1461
7/17/2012	1/2 EBB	21	17.0	1.2304
9/20/2012	3/4 FLD	20	49.0	1.6902

Station ID: 8

# Samples:	30	Log Avg:	1.1146
# > 43 MPN:	5	Log Std Dev:	0.5182
# > 260 MPN:	0	Geomean:	13.0182
Median:	15	Estimated 90th:	59

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	30	33.0	1.5185
4/30/2008	LOW	24	23.0	1.3617
7/9/2008	1/4 FLD	36	2.0	0.301
9/22/2008	1/4 FLD	24	79.0	1.8976
10/7/2008	1/4 FLD	23	23.0	1.3617
10/30/2008	HIGH	32	4.5	0.6532
12/11/2008	LAST EBB	24	79.0	1.8976
3/18/2009	LOW	15	33.0	1.5185
4/29/2009	1/2 FLD	25	23.0	1.3617
6/30/2009	LOW	31	4.5	0.6532
7/29/2009	LOW	36	11.0	1.0414
12/14/2009	3/4 EBB	20	49.0	1.6902
12/16/2009	1ST EBB	18	79.0	1.8976
4/14/2010	1/4 EBB	25	17.0	1.2304
6/22/2010	LOW	30	33.0	1.5185
8/30/2010	3/4 FLD	30	4.0	0.6021
11/15/2010	LOW	29	22.0	1.3424
12/2/2010	LAST EBB	31	70.0	1.8451
12/6/2010	1/4 EBB	31	2.0	0.301
3/14/2011	LAST EBB	25	13.0	1.1139
5/24/2011	1ST FLD	29	7.8	0.8921
6/20/2011	3/4 FLD	38	2.0	0.301
8/16/2011	1/4 EBB	36	1.7	0.2304
10/6/2011	LOW	32	13.0	1.1139
11/8/2011	1/4 EBB	35	2.0	0.301
3/12/2012	1/2 EBB	31	23.0	1.3617
5/7/2012	1ST EBB	34	7.8	0.8921
6/26/2012	1/4 FLD	31	17.0	1.2304
7/17/2012	1/2 EBB	31	7.8	0.8921
9/20/2012	3/4 FLD	31	13.0	1.1139

A-1 Formatted Data Table - 2012

Station ID: 9

# Samples:	30	Log Avg:	0.9748
# > 43 MPN:	1	Log Std Dev:	0.4540
# > 260 MPN:	0	Geomean:	9.4356
Median:	11	Estimated 90th:	35

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	32	13.0	1.1139
4/30/2008	LOW	32	17.0	1.2304
7/9/2008	1/4 FLD	36	7.8	0.8921
9/22/2008	1/4 FLD	32	17.0	1.2304
10/7/2008	1/4 FLD	28	13.0	1.1139
10/30/2008	HIGH	36	1.7	0.2304
12/11/2008	LAST EBB	32	33.0	1.5185
3/18/2009	LOW	25	14.0	1.1461
4/29/2009	1/2 FLD	35	1.7	0.2304
6/30/2009	LOW	35	7.8	0.8921
7/29/2009	LOW	35	4.5	0.6532
12/14/2009	3/4 EBB	31	11.0	1.0414
12/16/2009	1ST EBB	28	33.0	1.5185
4/14/2010	1/4 EBB	25	7.8	0.8921
6/22/2010	LOW	32	4.5	0.6532
8/30/2010	3/4 FLD	35	1.7	0.2304
11/15/2010	LOW	35	13.0	1.1139
12/2/2010	LAST EBB	34	11.0	1.0414
12/6/2010	1/4 EBB	35	4.5	0.6532
3/14/2011	LAST EBB	34	7.8	0.8921
5/24/2011	1ST FLD	35	31.0	1.4914
6/20/2011	3/4 FLD	37	2.0	0.301
8/16/2011	1/4 EBB	36	4.5	0.6532
10/6/2011	LOW	33	170.0	2.2304
11/8/2011	1/4 EBB	32	17.0	1.2304
3/12/2012	1/2 EBB	24	13.0	1.1139
5/7/2012	1ST EBB	32	17.0	1.2304
6/26/2012	1/4 FLD	32	23.0	1.3617
7/17/2012	1/2 EBB	31	2.0	0.301
9/20/2012	3/4 FLD	32	11.0	1.0414

Station ID: 9B

# Samples:	30	Log Avg:	0.9236
# > 43 MPN:	3	Log Std Dev:	0.4529
# > 260 MPN:	0	Geomean:	8.3878
Median:	9.4	Estimated 90th:	31

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	32	7.8	0.8921
4/30/2008	LOW	34	7.8	0.8921
7/9/2008	1/4 FLD	36	17.0	1.2304
9/22/2008	1/4 FLD	34	22.0	1.3424
10/7/2008	1/4 FLD	30	11.0	1.0414
10/30/2008	HIGH	35	7.8	0.8921
12/11/2008	LAST EBB	35	70.0	1.8451
3/18/2009	LOW	25	7.8	0.8921
4/29/2009	1/2 FLD	34	1.7	0.2304
6/30/2009	LOW	35	17.0	1.2304
7/29/2009	LOW	36	4.5	0.6532
12/14/2009	3/4 EBB	32	13.0	1.1139
12/16/2009	1ST EBB	33	7.8	0.8921
4/14/2010	1/4 EBB	32	11.0	1.0414
6/22/2010	LOW	36	1.7	0.2304
8/30/2010	3/4 FLD	37	46.0	1.6628
11/15/2010	LOW	34	14.0	1.1461
12/2/2010	LAST EBB	35	13.0	1.1139
12/6/2010	1/4 EBB	36	2.0	0.301
3/14/2011	LAST EBB	35	4.5	0.6532
5/24/2011	1ST FLD	35	11.0	1.0414
6/20/2011	3/4 FLD	37	11.0	1.0414
8/16/2011	1/4 EBB	36	79.0	1.8976
10/6/2011	LOW	39	4.0	0.6021
11/8/2011	1/4 EBB	35	1.7	0.2304
3/12/2012	1/2 EBB	31	2.0	0.301
5/7/2012	1ST EBB	35	17.0	1.2304
6/26/2012	1/4 FLD	32	4.5	0.6532
7/17/2012	1/2 EBB	34	2.0	0.301
9/20/2012	3/4 FLD	32	13.0	1.1139

A-1 Formatted Data Table - 2012

Station ID: 9D

# Samples:	30	Log Avg:	0.8550
# > 43 MPN:	1	Log Std Dev:	0.4211
# > 260 MPN:	0	Geomean:	7.1618
Median:	7.3	Estimated 90th:	24

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	35	4.5	0.6532
4/30/2008	LOW	32	2.0	0.301
7/9/2008	1/4 FLD	36	6.8	0.8325
9/22/2008	1/4 FLD	36	2.0	0.301
10/7/2008	1/4 FLD	30	11.0	1.0414
10/30/2008	HIGH	38	1.7	0.2304
12/11/2008	LAST EBB	32	49.0	1.6902
3/18/2009	LOW	27	6.8	0.8325
4/29/2009	1/2 FLD	35	2.0	0.301
6/30/2009	LOW	35	9.3	0.9685
7/29/2009	LOW	38	23.0	1.3617
12/14/2009	3/4 EBB	32	23.0	1.3617
12/16/2009	1ST EBB	32	22.0	1.3424
4/14/2010	1/4 EBB	32	23.0	1.3617
6/22/2010	LOW	35	7.8	0.8921
8/30/2010	3/4 FLD	36	13.0	1.1139
11/15/2010	LOW	34	4.5	0.6532
12/2/2010	LAST EBB	35	27.0	1.4314
12/6/2010	1/4 EBB	35	4.5	0.6532
3/14/2011	LAST EBB	35	6.8	0.8325
5/24/2011	1ST FLD	35	11.0	1.0414
6/20/2011	3/4 FLD	39	1.7	0.2304
8/16/2011	1/4 EBB	37	13.0	1.1139
10/6/2011	LOW	38	4.5	0.6532
11/8/2011	1/4 EBB	36	4.5	0.6532
3/12/2012	1/2 EBB	31	1.7	0.2304
5/7/2012	1ST EBB	34	13.0	1.1139
6/26/2012	1/4 FLD	34	13.0	1.1139
7/17/2012	1/2 EBB	33	1.7	0.2304
9/20/2012	3/4 FLD	35	13.0	1.1139

Station ID: 10A

# Samples:	30	Log Avg:	0.7882
# > 43 MPN:	1	Log Std Dev:	0.4383
# > 260 MPN:	0	Geomean:	6.1410
Median:	6.8	Estimated 90th:	22

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	36	23.0	1.3617
4/30/2008	LOW	35	7.8	0.8921
7/9/2008	1/4 FLD	36	11.0	1.0414
9/22/2008	1/4 FLD	34	17.0	1.2304
10/7/2008	1/4 FLD	30	2.0	0.301
10/30/2008	HIGH	38	1.7	0.2304
12/11/2008	LAST EBB	33	70.0	1.8451
3/18/2009	LOW	28	4.5	0.6532
4/29/2009	1/2 FLD	35	1.7	0.2304
6/30/2009	LOW	36	2.0	0.301
7/29/2009	LOW	38	7.8	0.8921
12/14/2009	3/4 EBB	35	14.0	1.1461
12/16/2009	1ST EBB	32	13.0	1.1139
4/14/2010	1/4 EBB	32	13.0	1.1139
6/22/2010	LOW	36	2.0	0.301
8/30/2010	3/4 FLD	36	2.0	0.301
11/15/2010	LOW	35	11.0	1.0414
12/2/2010	LAST EBB	36	17.0	1.2304
12/6/2010	1/4 EBB	35	11.0	1.0414
3/14/2011	LAST EBB	35	4.5	0.6532
5/24/2011	1ST FLD	35	1.7	0.2304
6/20/2011	3/4 FLD	39	1.7	0.2304
8/16/2011	1/4 EBB	37	1.7	0.2304
10/6/2011	LOW	38	6.8	0.8325
11/8/2011	1/4 EBB	36	6.8	0.8325
3/12/2012	1/2 EBB	32	2.0	0.301
5/7/2012	1ST EBB	34	11.0	1.0414
6/26/2012	1/4 FLD	32	6.8	0.8325
7/17/2012	1/2 EBB	34	23.0	1.3617
9/20/2012	3/4 FLD	35	6.8	0.8325

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Station ID: 11

# Samples:	30	Log Avg:	1.0962
# > 43 MPN:	6	Log Std Dev:	0.4907
# > 260 MPN:	0	Geomean:	12.4785
Median:	13	Estimated 90th:	52

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	30	49.0	1.6902
4/30/2008	LOW	26	13.0	1.1139
7/9/2008	1/4 FLD	36	1.7	0.2304
9/22/2008	1/4 FLD	24	11.0	1.0414
10/7/2008	1/4 FLD	24	13.0	1.1139
10/30/2008	HIGH	38	14.0	1.1461
12/11/2008	LAST EBB	26	79.0	1.8976
3/18/2009	LOW	18	7.8	0.8921
4/29/2009	1/2 FLD	25	22.0	1.3424
6/30/2009	LOW	30	13.0	1.1139
7/29/2009	LOW	35	4.5	0.6532
12/14/2009	3/4 EBB	22	110.0	2.0414
12/16/2009	1ST EBB	22	33.0	1.5185
4/14/2010	1/4 EBB	25	49.0	1.6902
6/22/2010	LOW	31	7.8	0.8921
8/30/2010	3/4 FLD	32	1.7	0.2304
11/15/2010	LOW	31	33.0	1.5185
12/2/2010	LAST EBB	32	49.0	1.6902
12/6/2010	1/4 EBB	34	9.3	0.9685
3/14/2011	LAST EBB	22	64.0	1.8062
5/24/2011	1ST FLD	30	4.5	0.6532
6/20/2011	3/4 FLD	38	2.0	0.301
8/16/2011	1/4 EBB	36	4.0	0.6021
10/6/2011	LOW	32	23.0	1.3617
11/8/2011	1/4 EBB	34	4.5	0.6532
3/12/2012	1/2 EBB	29	6.8	0.8325
5/7/2012	1ST EBB	34	17.0	1.2304
6/26/2012	1/4 FLD	31	13.0	1.1139
7/17/2012	1/2 EBB	31	4.5	0.6532
9/20/2012	3/4 FLD	31	7.8	0.8921

Station ID: 12

# Samples:	30	Log Avg:	1.1378
# > 43 MPN:	5	Log Std Dev:	0.5064
# > 260 MPN:	0	Geomean:	13.7344
Median:	13	Estimated 90th:	61

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	32	13.0	1.1139
4/30/2008	LOW	28	11.0	1.0414
7/9/2008	1/4 FLD	36	23.0	1.3617
9/22/2008	1/4 FLD	32	11.0	1.0414
10/7/2008	1/4 FLD	28	7.8	0.8921
10/30/2008	HIGH	35	4.5	0.6532
12/11/2008	LAST EBB	30	110.0	2.0414
3/18/2009	LOW	21	110.0	2.0414
4/29/2009	1/2 FLD	32	13.0	1.1139
6/30/2009	LOW	35	6.8	0.8325
7/29/2009	LOW	36	4.5	0.6532
12/14/2009	3/4 EBB	26	33.0	1.5185
12/16/2009	1ST EBB	25	33.0	1.5185
4/14/2010	1/4 EBB	26	23.0	1.3617
6/22/2010	LOW	31	2.0	0.301
8/30/2010	3/4 FLD	35	1.7	0.2304
11/15/2010	LOW	32	17.0	1.2304
12/2/2010	LAST EBB	33	49.0	1.6902
12/6/2010	1/4 EBB	35	4.0	0.6021
3/14/2011	LAST EBB	26	7.8	0.8921
5/24/2011	1ST FLD	31	23.0	1.3617
6/20/2011	3/4 FLD	38	13.0	1.1139
8/16/2011	1/4 EBB	36	1.7	0.2304
10/6/2011	LOW	32	130.0	2.1139
11/8/2011	1/4 EBB	35	7.8	0.8921
3/12/2012	1/2 EBB	31	46.0	1.6628
5/7/2012	1ST EBB	35	33.0	1.5185
6/26/2012	1/4 FLD	31	13.0	1.1139
7/17/2012	1/2 EBB	33	4.5	0.6532
9/20/2012	3/4 FLD	33	22.0	1.3424

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Station ID: 15

# Samples:	30	Log Avg:	0.7810
# > 43 MPN:	3	Log Std Dev:	0.5028
# > 260 MPN:	0	Geomean:	6.0389
Median:	5.3	Estimated 90th:	26

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	36	4.5	0.6532
4/30/2008	LOW	32	7.8	0.8921
7/9/2008	1/4 FLD	36	6.8	0.8325
9/22/2008	1/4 FLD	34	4.5	0.6532
10/7/2008	1/4 FLD	30	11.0	1.0414
10/30/2008	HIGH	36	1.7	0.2304
12/11/2008	LAST EBB	32	79.0	1.8976
3/18/2009	LOW	25	46.0	1.6628
4/29/2009	1/2 FLD	33	2.0	0.301
6/30/2009	LOW	35	6.1	0.7853
7/29/2009	LOW	37	4.0	0.6021
12/14/2009	3/4 EBB	34	13.0	1.1139
12/16/2009	1ST EBB	35	14.0	1.1461
4/14/2010	1/4 EBB	33	1.7	0.2304
6/22/2010	LOW	32	2.0	0.301
8/30/2010	3/4 FLD	36	2.0	0.301
11/15/2010	LOW	33	49.0	1.6902
12/2/2010	LAST EBB	35	23.0	1.3617
12/6/2010	1/4 EBB	35	1.7	0.2304
3/14/2011	LAST EBB	31	1.8	0.2553
5/24/2011	1ST FLD	33	13.0	1.1139
6/20/2011	3/4 FLD	39	1.7	0.2304
8/16/2011	1/4 EBB	37	1.7	0.2304
10/6/2011	LOW	35	7.8	0.8921
11/8/2011	1/4 EBB	35	2.0	0.301
3/12/2012	1/2 EBB	34	2.0	0.301
5/7/2012	1ST EBB	35	7.8	0.8921
6/26/2012	1/4 FLD	31	33.0	1.5185
7/17/2012	1/2 EBB	33	13.0	1.1139
9/20/2012	3/4 FLD	35	4.5	0.6532

Station ID: 17A

# Samples:	30	Log Avg:	0.8215
# > 43 MPN:	1	Log Std Dev:	0.4420
# > 260 MPN:	0	Geomean:	6.6300
Median:	7.3	Estimated 90th:	24

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	36	27.0	1.4314
4/30/2008	LOW	34	14.0	1.1461
7/9/2008	1/4 FLD	36	13.0	1.1139
9/22/2008	1/4 FLD	35	13.0	1.1139
10/7/2008	1/4 FLD	30	2.0	0.301
10/30/2008	HIGH	37	1.7	0.2304
12/11/2008	LAST EBB	32	22.0	1.3424
3/18/2009	LOW	28	27.0	1.4314
4/29/2009	1/2 FLD	35	1.8	0.2553
6/30/2009	LOW	36	4.5	0.6532
7/29/2009	LOW	37	49.0	1.6902
12/14/2009	3/4 EBB	32	7.8	0.8921
12/16/2009	1ST EBB	32	13.0	1.1139
4/14/2010	1/4 EBB	30	22.0	1.3424
6/22/2010	LOW	35	2.0	0.301
8/30/2010	3/4 FLD	36	1.7	0.2304
11/15/2010	LOW	35	4.5	0.6532
12/2/2010	LAST EBB	36	33.0	1.5185
12/6/2010	1/4 EBB	36	1.7	0.2304
3/14/2011	LAST EBB	35	6.8	0.8325
5/24/2011	1ST FLD	35	7.8	0.8921
6/20/2011	3/4 FLD	39	1.7	0.2304
8/16/2011	1/4 EBB	37	7.8	0.8921
10/6/2011	LOW	37	7.8	0.8921
11/8/2011	1/4 EBB	35	1.7	0.2304
3/12/2012	1/2 EBB	32	6.8	0.8325
5/7/2012	1ST EBB	34	4.5	0.6532
6/26/2012	1/4 FLD	34	4.5	0.6532
7/17/2012	1/2 EBB	32	7.8	0.8921
9/20/2012	3/4 FLD	33	4.5	0.6532

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Station ID: 28A

# Samples:	30	Log Avg:	0.9637
# > 43 MPN:	3	Log Std Dev:	0.4217
# > 260 MPN:	0	Geomean:	9.1978
Median:	7.8	Estimated 90th:	31

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	36	1.8	0.2553
4/30/2008	LOW	32	23.0	1.3617
7/9/2008	1/4 FLD	36	11.0	1.0414
9/22/2008	1/4 FLD	32	49.0	1.6902
10/7/2008	1/4 FLD	28	7.8	0.8921
10/30/2008	HIGH	33	7.8	0.8921
12/11/2008	LAST EBB	32	33.0	1.5185
3/18/2009	LOW	22	17.0	1.2304
4/29/2009	1/2 FLD	34	2.0	0.301
6/30/2009	LOW	35	4.0	0.6021
7/29/2009	LOW	36	13.0	1.1139
12/14/2009	3/4 EBB	32	6.8	0.8325
12/16/2009	1ST EBB	30	21.0	1.3222
4/14/2010	1/4 EBB	31	23.0	1.3617
6/22/2010	LOW	35	2.0	0.301
8/30/2010	3/4 FLD	35	4.5	0.6532
11/15/2010	LOW	35	4.0	0.6021
12/2/2010	LAST EBB	34	7.8	0.8921
12/6/2010	1/4 EBB	36	4.5	0.6532
3/14/2011	LAST EBB	28	4.0	0.6021
5/24/2011	1ST FLD	32	4.5	0.6532
6/20/2011	3/4 FLD	38	13.0	1.1139
8/16/2011	1/4 EBB	36	4.5	0.6532
10/6/2011	LOW	37	12.0	1.0792
11/8/2011	1/4 EBB	35	4.5	0.6532
3/12/2012	1/2 EBB	32	49.0	1.6902
5/7/2012	1ST EBB	35	49.0	1.6902
6/26/2012	1/4 FLD	31	13.0	1.1139
7/17/2012	1/2 EBB	33	4.5	0.6532
9/20/2012	3/4 FLD	32	31.0	1.4914

Station ID: 35

# Samples:	30	Log Avg:	0.8879
# > 43 MPN:	1	Log Std Dev:	0.4491
# > 260 MPN:	0	Geomean:	7.7242
Median:	8.05	Estimated 90th:	29

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	36	7.8	0.8921
4/30/2008	LOW	31	4.5	0.6532
7/9/2008	1/4 FLD	36	4.0	0.6021
9/22/2008	1/4 FLD	34	11.0	1.0414
10/7/2008	1/4 FLD	30	17.0	1.2304
10/30/2008	HIGH	35	11.0	1.0414
12/11/2008	LAST EBB	32	70.0	1.8451
3/18/2009	LOW	26	33.0	1.5185
4/29/2009	1/2 FLD	33	4.5	0.6532
6/30/2009	LOW	35	2.0	0.301
7/29/2009	LOW	37	6.8	0.8325
12/14/2009	3/4 EBB	32	17.0	1.2304
12/16/2009	1ST EBB	32	17.0	1.2304
4/14/2010	1/4 EBB	32	13.0	1.1139
6/22/2010	LOW	32	4.5	0.6532
8/30/2010	3/4 FLD	36	1.8	0.2553
11/15/2010	LOW	34	22.0	1.3424
12/2/2010	LAST EBB	34	32.0	1.5051
12/6/2010	1/4 EBB	34	2.0	0.301
3/14/2011	LAST EBB	30	23.0	1.3617
5/24/2011	1ST FLD	32	11.0	1.0414
6/20/2011	3/4 FLD	39	2.0	0.301
8/16/2011	1/4 EBB	36	2.0	0.301
10/6/2011	LOW	36	4.5	0.6532
11/8/2011	1/4 EBB	35	11.0	1.0414
3/12/2012	1/2 EBB	31	2.0	0.301
5/7/2012	1ST EBB	35	2.0	0.301
6/26/2012	1/4 FLD	31	33.0	1.5185
7/17/2012	1/2 EBB	33	4.5	0.6532
9/20/2012	3/4 FLD	33	8.3	0.9191

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Station ID: 36

# Samples:	30	Log Avg:	1.1354
# > 43 MPN:	5	Log Std Dev:	0.5569
# > 260 MPN:	0	Geomean:	13.6598
Median:	17	Estimated 90th:	70

Date	Tidal Stage	Salinity	FC	Log FC
12/4/2007	LOW	29	22.0	1.3424
4/30/2008	LOW	26	170.0	2.2304
7/9/2008	1/4 FLD	35	1.7	0.2304
9/22/2008	1/4 FLD	24	23.0	1.3617
10/7/2008	1/4 FLD	24	23.0	1.3617
10/30/2008	HIGH	25	17.0	1.2304
12/11/2008	LAST EBB	24	130.0	2.1139
3/18/2009	LOW	18	33.0	1.5185
4/29/2009	1/2 FLD	30	17.0	1.2304
6/30/2009	LOW	31	2.0	0.301
7/29/2009	LOW	32	11.0	1.0414
12/14/2009	3/4 EBB	21	33.0	1.5185
12/16/2009	1ST EBB	22	49.0	1.6902
4/14/2010	1/4 EBB	20	33.0	1.5185
6/22/2010	LOW	30	4.5	0.6532
8/30/2010	3/4 FLD	24	17.0	1.2304
11/15/2010	LOW	29	13.0	1.1139
12/2/2010	LAST EBB	29	79.0	1.8976
12/6/2010	1/4 EBB	30	4.0	0.6021
3/14/2011	LAST EBB	24	17.0	1.2304
5/24/2011	1ST FLD	30	2.0	0.301
6/20/2011	3/4 FLD	35	4.5	0.6532
8/16/2011	1/4 EBB	31	2.0	0.301
10/6/2011	LOW	32	23.0	1.3617
11/8/2011	1/4 EBB	29	2.0	0.301
3/12/2012	1/2 EBB	23	13.0	1.1139
5/7/2012	1ST EBB	31	79.0	1.8976
6/26/2012	1/4 FLD	31	4.5	0.6532
7/17/2012	1/2 EBB	29	6.8	0.8325
9/20/2012	3/4 FLD	25	17.0	1.2304

A-1 Station Summary Table 14

Summary of sampling data through 9/20/2012. Shaded cells indicate stations in waters closed to shellfish harvest.

Station ID:	# Samples:	Median:	Geomean:	Estimated 90th:
5	30	33	35.7149	190
8	30	15	13.0182	59
9	30	11	9.4356	35
9B	30	9.4	8.3878	31
9D	30	7.3	7.1618	24
10A	30	6.8	6.1410	22
11	30	13	12.4785	52
12	30	13	13.7344	61
15	30	5.3	6.0389	26
17A	30	7.3	6.6300	24
28A	30	7.8	9.1978	31
35	30	8.05	7.7242	29
36	30	17	13.6598	70