North Carolina Beach Monitoring Project Quality Assurance Project Plan

J.D. Potts

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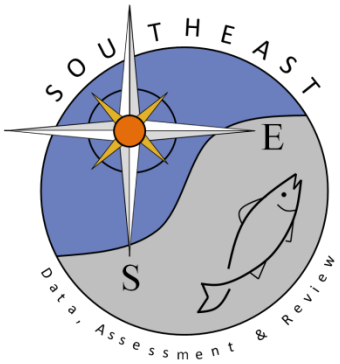

Division of Environmental Health

North Carolina Shellfish Sanitation & Recreational Water Quality Section

North Carolina Beach Monitoring Project
Quality Assurance Project Plan

June 16, 2003
Revised July 28, 2009

Mission

"To protect the public health by monitoring the quality of North Carolina's coastal recreational waters and notifying the public when bacteriological standards for safe bodily contact are exceeded".

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Joel Hansel, Project Manager, EPA

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Distribution List

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Terry Pierce, Director, DEH
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NC Shellfish Sanitation & Recreational Water Quality (Wilmington)
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A4 - Project / Task Organization

Vacant, Section Chief, Shellfish Sanitation and Recreational Water Quality Section Morehead City Office

Patricia Fowler, Acting Section Chief, Shellfish Sanitation and Recreational Water Quality Section Morehead City Office

J. D. Potts, Project Manager, Public Notification, QA

Laura Leonard, Public Information Officer, DEH (Raleigh) Media Notification

The following staff members have responsibilities in both Shellfish and Recreational Programs:

Morehead City Office
Diane Mason, Laboratory
Valerie Wunderly, Laboratory
Erin Bryan-Millush, Gov't, Health Dept., Public Notification, Outreach, Data Management, GPS
Ginger Kelly, Sample Collection, Outreach, Data Entry/Management
Paul Moore, Sample Collection, GPS
Timmy Moore, Sample Collection, Data Entry
Phil Piner, Sample Collection, Data Entry
Mike Millard, Sample Collection, Purchasing, Safety Officer
Shannon Jenkins, Sanitary Surveys
Andrew Haines, Shoreline Survey, GPS
Shawn Nelson, Shoreline Survey, GPS
Brad Pogue, GIS Analysis

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April Alford, Laboratory
Jeremy Humphrey, Shoreline Survey
Stan Sherman, Sample Collection, Data Entry, GPS
Ed Jackson, Shoreline Survey
Matthew Stokely, Sample Collection
Temporary Position (during swimming season), Sample Collection, Data Entry

Nags Head Office
Misty Gower, Laboratory
Kenny Midget, Sample Collection
Jeff Rheubottom, Shoreline Survey, GPS
Bradley Fitzgerald, Sample Collection, Data Entry
Temporary Position (during swimming season), Sample Collection, Data Entry

A5 - Problem Definition / Background

Coastal North Carolina is blessed with surface water resources: 320 miles of Atlantic Ocean shoreline, 4,000 miles of estuarine shoreline and 2 million acres of shellfish growing waters. The beaches, coastal rivers and sounds play a large part in North Carolina's prosperous tourism industry, attracting more than 15 million vacationers each year. The resident population is growing rapidly, as more people find the North Carolina coast a desirable place to live and retire. As the population continues to grow, water quality is expected to decline as a result of increased run-off from land-disturbing activities.

In the mid 1990s, *pfiesteria* emerged in the national media as a possible public health threat, and North Carolina's Neuse River was in the spotlight for harboring the dinoflagellate organism. At that time, *pfiesteria* was found only in the brackish waters of the Neuse River, but the negative publicity carried the underlying possibility that all of North Carolina's coastal waters were unsafe for the consumption of seafood or for swimming. Water quality issues were rekindled in 1996 when a report from the Natural Resources Defense Council (NRDC) labeled North Carolina as a "Beach Bum" state for its lack of beach monitoring and public notification programs. When the legislature assembled the next year, it took very little lobbying to convince lawmakers to fund a recreational water quality program for coastal waters. In June1997 the North Carolina Shellfish Sanitation Section was charged with monitoring coastal waters for two years as a pilot project. Approximately 300 stations were monitored weekly during the

swimming season using fecal coliform as the indicator organism. As a result of the two years of monitoring, the reputation of North Carolina's coastal waters started improving, and public confidence in the health and safety of the coastal resources was being restored. In 1999 the program was funded permanently.

This document will report new program requirements and standards necessary for compliance with the Environmental Protection Agency's (EPA) guidance and will be a guide or protocol for operating the program. One aspect of the program that will not change is the protocol for posting swimming advisories and methods for notifying the public. Advisories will still be based on the exceedance of the bacteriological standard; however, the standard will be enterococci instead of fecal coliform. The posting of advisories for single-sample maximum exceedances is another significant change to the program this year.

A6 - Project/Task Description and Schedule

The coastal counties are divided into three regions: Northern, Central and Southern (see figures 1, 2, 3). The three regions combined have approximately 240 sites that are monitored either weekly or twice monthly during the swimming season. Monitoring stations that are adjacent to resort areas and public accesses are considered high usage (Tier I beaches) and are sampled weekly. Medium usage sites, (Tier II beaches) sampled twice monthly, constitute areas such as those in the ICWW, tidal creeks, summer camps and exposed shoals. People frequent Tier II sites mostly on weekends and they are usually accessed by watercraft. Tier III designations are areas that are used infrequently, where

people have minimal full body contact. Tier III sites are also sampled twice monthly.

The Shellfish Sanitation and Recreational Water Quality Section (SSRWQ) has a State and Food and Drug Administration (FDA)-accredited laboratory in each region. Sample collection, laboratory analysis, and beach monitoring activities are conducted entirely by the SSRWQ staff; however, Dare County Health Department in the northern region has an agreement with the SSRWQ to issue the public notification locally for the Dare County swimming advisories. The state Division of Environmental Health then follows up with public notification to the Associated Press.

The State will continue to fund the Tier II and Tier III monitoring sites, approximately 50% of all the swimming areas, while the EPA grant will be used to fund the monitoring of the Tier I beaches. Appendices 1, 2 and 3 list the monitoring sites that are supported by the state of North Carolina and the EPA grant. Appendix 4 contains the coordinates for each monitoring site or swimming area.

The EPA grant is also used to fund public education and outreach. Appendix 8 contains educational materials used at the public meetings; they are required by the EPA to be grant-eligible.

Figure 1

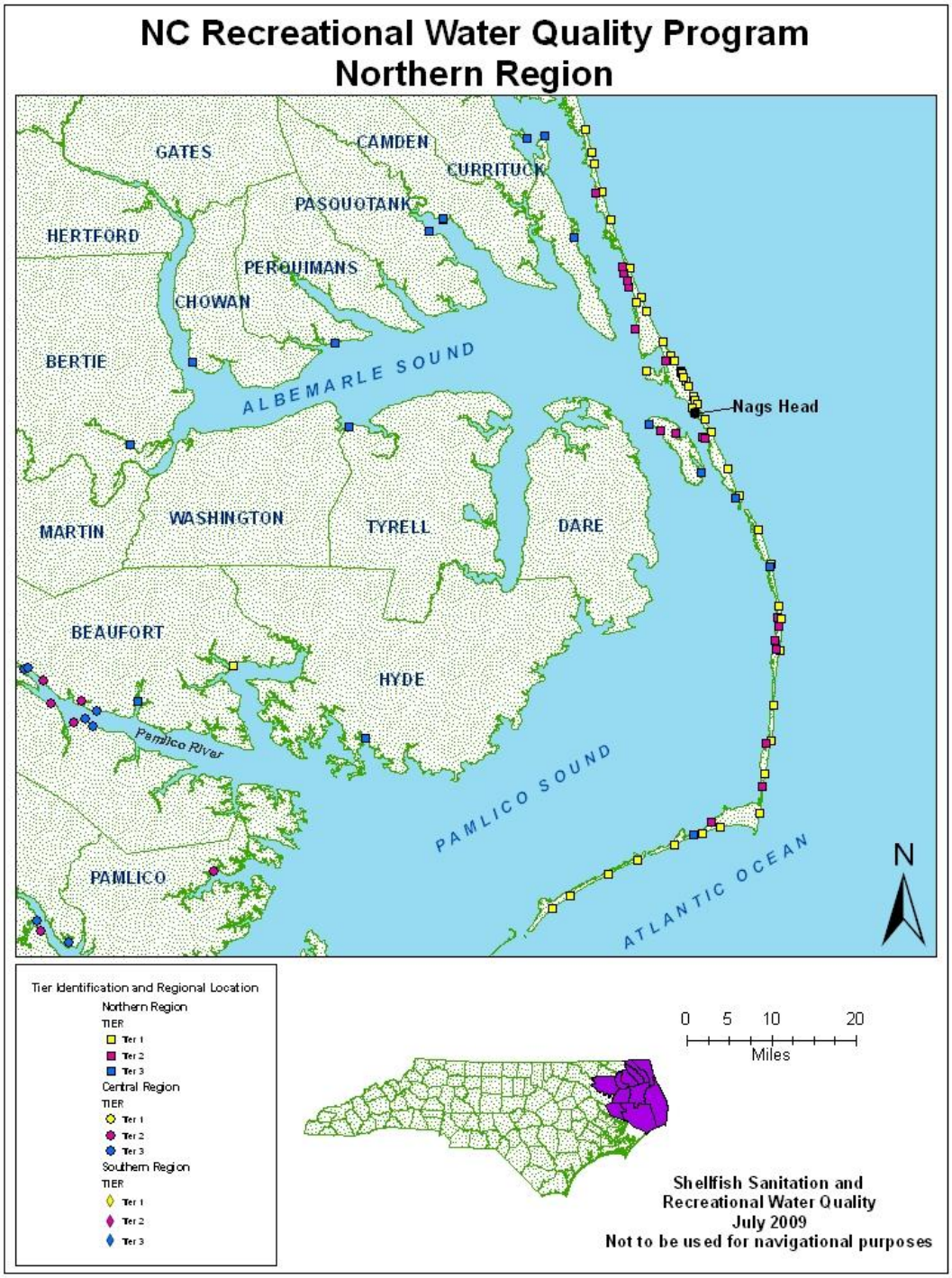
NC Recreational Water Quality Program
Northern Region
GATES
CAMDEN
CURRITUCK
PASQUOTANK
HERTFORD
PERQUIMANS
CHOWAN
BERTIE
ALBEMARLE SOUND
Nags Head
MARTIN
WASHINGTON
TYRELL
DARE
BEAUFORT
HYDE
Pamlico River
PAMLICO SOUND
PAMLICO
ATLANTIC OCEAN
N
Tier Identification and Regional Location
Northern Region
TIER
Tier 1
Tier 2
Tier 3
Central Region
TIER
Tier 1
Tier 2
Tier 3
Southern Region
TIER
Tier 1
Tier 2
Tier 3
0 5 10 20
Miles
Shellfish Sanitation and
Recreational Water Quality
July 2009
Not to be used for navigational purposes

Figure 2

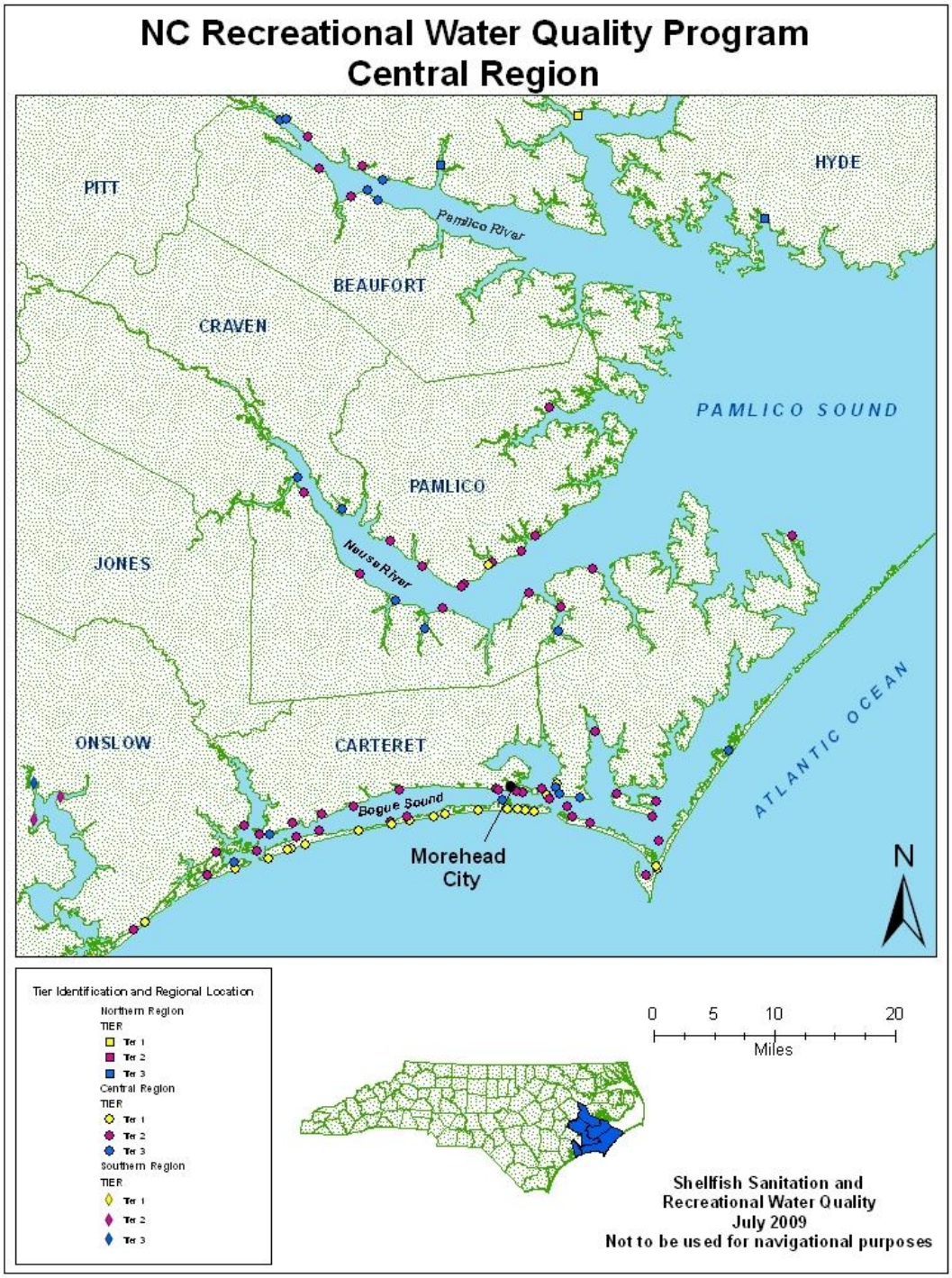
NC Recreational Water Quality Program
Central Region
PITT
HYDE
Pamlico River
BEAUFORT
CRAVEN
PAMLICO SOUND
PAMLICO
Neuse River
JONES
ONSLOW
CARTERET
Bogue Sound
Morehead City
ATLANTIC OCEAN
N
Tier Identification and Regional Location
Northern Region
TIER
Tier 1
Tier 2
Tier 3
Central Region
TIER
Tier 1
Tier 2
Tier 3
Southern Region
TIER
Tier 1
Tier 2
Tier 3
0 5 10 20
Miles
Shellfish Sanitation and
Recreational Water Quality
July 2009
Not to be used for navigational purposes

Figure 3


NC Recreational Water Quality Program
Southern Region
SAMPSON
DUPLIN
ONSLOW
New River
PENDER
BLADEN
COLUMBUS
NEW HANOVER
Wilmington
Cape Fear River
BRUNSWICK
ATLANTIC OCEAN
N
Tier Identification and Regional Location
Northern Region
TIER
Tier 1
Tier 2
Tier 3
Central Region
TIER
Tier 1
Tier 2
Tier 3
Southern Region
TIER
Tier 1
Tier 2
Tier 3
0 5 10 20
Miles
Shellfish Sanitation and
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July 2009
Not to be used for navigational purposes

A7: Quality Objectives and Criteria

Primary Objective:

"To protect the public health by monitoring the quality of North Carolina's coastal recreational waters and notifying the public when bacteriological standards for safe bodily contact are exceeded".

Quality Objectives:

To identify swimming areas/beaches and classify them based on human recreational usage.

To identify monitoring stations that exceed the enterococci geometric mean and single-sample maximum criteria using the Enterolert MPN method for enumeration.

To evaluate the public health significance of approximately twenty (20) ocean storm drains.

To document trends in coastal bacteriological water quality.

Measurement Performance Criteria:

Swimming advisory signs are posted and press releases issued for Tier I swimming areas/beaches when a minimum of five (5) samples are collected, equally spaced over 30 days, exceed a geometric mean of **35 enterococci per 100 ml** or, when a single sample exceeds **500 enterocci per 100 ml**. The public is notified only by press release, without an advisory sign when a single sample exceeds **104 enterococci per 100 ml and is less than 500 enterocci per 100 ml**. for a Tier I site. This is called an alert. A second sample will be collected immediately. If the second sample exceeds **104 enterococci per 100 ml**, the

alert is converted into an advisory and the public will be notified by press release, and a sign will be posted.

A swimming advisory will also be issued when at least two out of three samples collected at a monitoring site exceeds **104 enterococci per 100 ml.** The project manger will determine which Tier I stations, if any, will have triplicate sampling.

Rescinding Tier I Advisories

Once the geometric mean exceeds the standard, the swimming advisory is not lifted until two consecutive weekly samples meet the EPA standard of **35 enterococci per 100 ml**. For a geometric mean advisory to be rescinded, the station must have two consecutive good samples, with 'good' being defined as 35 enterococci per 100 ml or fewer. However, if a situation occurs where two consecutive good samples are recorded, but the geometric mean is still exceeded, the advisory will remain in place until the geometric mean falls below 35 enterococci per 100 ml.

In a case where a station under advisory is subject to triplicate sampling, two of the three triplicate samples must be under the single-sample maximum of 104 enterococci per 100 ml. In a situation where two of the three samples are above the single-sample maximum of 104 enterococci per 100 ml, an advisory will be put into place. The advisory will be rescinded when two of the three re-samples are under the single-sample level, as long as the running geometric mean has not been exceeded.

Beaches that violate the single-sample maximum criteria are re-sampled at the time of the public notification and/or sign posting, depending on the level of

the exceedance. If the re-sample is satisfactory, the advisory may be lifted as soon as 24 hours from the time of the initial advisory notification or posting. If the re-sample is unsatisfactory but the geometric mean is not exceeded, the sign remains posted. If the re-sampling causes the exceedance of the geometric mean, then the geometric mean criteria apply.

The timeframe for posting swimming advisory signs at Tier I beaches, based on the enterococci geometric mean, runs from the beginning of May through the end of September. Weekly sampling of Tier I beaches begins in April of each year so that a "running geometric mean" is established by May. April and October are considered the "shoulder seasons". During the shoulder season, advisories at all Tier 1 monitoring sites are based on the single-sample maximum for Tier II beaches/swimming areas, **276 enterococci per 100 ml.** Seasonal low water temperatures during April and October may prevent people from swimming. The project manager determines whether advisory signs and public notification are initiated during the shoulder seasons.

Tier II and **Tier III** beaches/swimming areas are sampled twice monthly from April to October, with the advisories based entirely on the single sample maximum criteria.

For **Tier II sites**, public notification and a swimming advisory sign are posted when a single sample exceeds **500 enterococci per 100 ml. Tier II** Beaches that violate the single-sample maximum criteria are re-sampled at the time of the public notification and/or sign posting. **.** If the second sample exceeds **276 enterococci per 100 ml,** the site is not sampled until the next week. Weekly

sampling of the site continues until the enterococci counts are **276 enterococci per 100 ml or fewer.**

An alert, that is public notification without the advisory sign, takes place when a single sample exceeds **276 enterococci per 100 ml** but falls under **500 enterococci per 100 ml.** If a second sample exceeds **276 enterococci per 100 ml**, the alert is converted to an advisory and the public is notified and an advisory sign is posted. A third sample is then collected the following week. Weekly sampling of the site continues until the enterococci counts are **276 enterococci per 100 ml or fewer.**

Tier III beaches/swimming areas, because of infrequent use, do not receive public notification or advisory signs until the second sample exceeds **500 enterococci per 100 ml.** If the second sample exceeds **500 enterococci per 100 ml,** an advisory sign and public notification are issued. A third sample is then collected the following week. Weekly sampling of the site will continue until the enterococci counts are **500 enterococci per 100 ml or fewer**.

Other swimming advisories will be posted as precautionary measures when the following activities occur:

- Pumping of floodwaters between the primary dune and the ocean beaches.
- Storm drains with discharges into ocean beaches. Storm drains that have flow that may be able to reach ocean recreational waters are posted with hinged advisory signs. The signs read as follows: "ATTENTION SWIMMING IS NOT RECOMMENDED BETWEEN

SIGNS. WATERS MAY BE CONTAMINATED BY DISCHARGE FROM PIPE. Office of the state health director." When the pipes are not discharging, the signs are folded closed so the wording cannot be read. When the pipes are discharging, the signs are opened to allow the advisory to be visible. The advisory signs remain open until 24 hours after the discharge has ceased. No press release will be issued. The pipes are checked daily while the advisories are in place, as well as after rainfall events. The regional field offices notify the central office when an advisory is placed or lifted in this way. These pipes are also regular sampling stations. When the bacteriological sampling results for these pipes exceed the standards and the pipe is flowing, the hinged sign will also serve as the bacteriological swimming advisory. No press release will be issued. If the pipe is not discharging and the hinged sign is closed so the advisory is not visible, the bacteriological advisory sign will be posted and a press release will be issued.

- Disposal of dredge material from closed shellfishing waters on ocean beaches.

These swimming advisories are lifted 24 hours after visible discharge into the ocean ceases.

Swimming advisories are not posted from November through March; however, all sampling stations are sampled once per month during the non-swimming season.

Public notification and risk communication plan:

The health director or the environmental health supervisor of the local health department is the first to be informed of a swimming advisory. Discussion with the health department determines who the next contact should be, such as a town or county manager. The media are not contacted concerning a swimming advisory before local and state officials are aware of the situation. The North Carolina Division of Environmental Health (NCDEH) then sends out the press release to the Associated Press and local community newspapers at the same time the advisory sign is posted. The press release advisories are aired on TV, radio stations and web sites (see Appendix 5 for press release templates and links to web sites).

Rescinding an advisory follows the same procedures in reverse. The first communication involves the local health department, then the sign is removed and another press release is issued, declaring the waters are within the swimming standard.

If an advisory sign is needed on the ocean beaches, the sign will be placed on a post or posts at the interface of the wet and dry sand area of the beach. For estuarine waters, the sign may be posted by boat just offshore of the beach or on the shoreline. There may be instances where permission will have to be obtained to post signs on private property, such as on bulkheads or at entrances to marinas. Local Environmental Health Specialists or other local officials may be present when the signs are erected (see Appendix 6 for sign descriptions).

A8 - Special Training Requirements/Certification

SSRWQ laboratory personnel have been instructed in specific health and safety needs as required for employment. The laboratory maintains the required United States FDA and State certifications.

Field personnel are trained in small boat handling and navigation in coastal waters. Users of GPS equipment must be trained and certified before collecting field data for boundaries and monitoring sites. Personnel are trained in sample collection, transporting samples, recording field data, keying data into the database and following QA/QC protocols.

A9 - Documentation and Records

SSRWQ performs all sample collections and carries responsibility for handling all data collected in the field (see Appendix 7 for an example of the field sampling sheet). The SSRWQ laboratory is responsible for recording the bacteriological data on the field sheet (see Appendix 7). After laboratory staff records the bacteriological data, the project manager then reviews the bacteriological results and field data before passing the field sheet to the data entry person. Currently, the data is entered into an Excel spread sheet and Oracle database; however, the Oracle database is still developing a data exchange node that will be used to meet reporting requirements to the EPA. Hard copies of the laboratory data, laboratory quality assurance forms, and field sampling data sheets are archived indefinitely at the Morehead City office. Electronic copies of the bacteriological data are backed up and stored on the

server in Morehead City as well as backup copies stored on compact disc. Sanitary survey reports of recreational waters and any other reports or audits are kept on file in the same manner. Documentation of public notification, original press releases, are filed for one year; however, a spread sheet documenting advisories and rescinds will be filed electronically indefinitely.

B1 - Sampling Process Design

The method for monitoring the 240 sites throughout coastal North Carolina began by grouping the sites in each region to create “sampling runs” or routes that the staff would travel for a particular day of sample collection. The northern region has nine sampling runs consisting of 80 monitoring sites, the central region has nine sampling runs consisting of 86 monitoring sites and the southern region has six sampling runs with 75 monitoring sites. It is common for a sampling run to have a combination of Tier I, II and III swimming areas. Half of the sampling runs are accessed by boat and half are reached by car and then wading into water from the beach. Weather conditions and tides have a strong influence on choosing a sampling run; therefore, the person collecting the water samples must plan his/her day accordingly. The sampling runs are close enough to one of the three regional laboratories to have water samples in the testing media before 2:00 p.m. each day (see holding time for samples in laboratory QAP Appendix 9).

Tier I beaches that require a minimum of five (5) samples in 30 days are tested using the following schedule:

Northern Region

Sampling Run	Day
Currituck to Corolla	Monday
Ocracoke to Pea Island Tier 1	Monday
Ocracoke to Pea Island Tiers 2 & 3	Monday
Roanoke Island	Tuesday
Bath to Stumpy Point	Tuesday
Kitty Hawk to Oregon Inlet	Tuesday
Edenton to Camden	Wednesday
Colerain to Mackey's Ferry	Wednesday
Pea Ridge to Alligator River	Wednesday

Central Region

Sampling Run	Day
Core Sound (Truck & Boat)	Monday
East Beach Run	Tuesday
West Beach Run	Tuesday
Dawson Creek to Vandemere	Wednesday
Bogue Sound	Wednesday
Lower Neuse River	Wednesday
Upper Neuse River	Thursday
Pamlico River	Thursday

Southern Region

Sampling Run	Day
New River	Tuesday
Masonboro Island	Wednesday
South Carolina to Holden Beach	Tuesday
Snows Cut to Figure Eight Island	Monday
Topsail Beach to Swan Point	Wednesday
Oak Island to Southport	Monday

If the above schedule cannot be met for a particular week, field staff will be responsible for ensuring that five (5) samples in 30 days are collected. This could involve going back to the same station twice in one week. Tier II and III swimming areas are sampled primarily by boat twice per month and do not

require five (5) samples in 30 days, allowing more flexibility in scheduling the sampling runs.

There are several parameters of interest that are measured at each monitoring site that influence the transport and survival of microorganisms. Data is collected for rainfall, air and water temperature, water depth/sample depth, wind speed and direction, current direction, tidal stage, time of sample collection and salinity. Time of sample collection is critical for determining holding times. The other parameters are for information only and do not affect management decisions concerning public health. Rainfall data are collected from rain gages scattered throughout the watersheds. Tidal stage and wind speed is determined by personal observation and verified by NOAA weather service. The presence of waterfowl and wildlife in proximity of the monitoring site is also recorded on the field data sheet.

B2 - Sampling Methods

Water samples are collected in autoclaved borosilicate glass bottles with the station identification on the lid. Once the water sample is collected, the bottle is tipped to give one (1) inch of air space in the bottle. The water samples are stored immediately on ice in a cooler until all the samples are returned to the laboratory. The six-hour holding time for enterococci samples is not an issue because of the relative proximity of the sampling runs to one of the three laboratories. Quanti-trays with positive wells for enterococci are disposed of by placing them in orange biohazard bags and then autoclaving. The autoclaved bags are then taken to the landfill.

Approximately half of the beach monitoring will be accomplished by wading into the surf to collect the sample. When wading, the sampler will use a telescopic golf ball retriever, modified to hold the sample bottle, to reach out approximately 16 feet from the body in knee-deep water to collect the sample. Many of the camps on the coastal rivers and sounds have long piers that extend out over the water. The sample should be taken 6 – 12 inches below the surface of the water at a location along the pier that receives the most use, e.g., ladders, etc. Sampling by boat takes place in approximately three feet of water with the sample collected 12 inches below the surface. A stainless steel rod with a sample holder will be used to collect the sample from the boat. Sampling personnel should avoid disturbing bottom sediment in either approach, to collecting the sample.

Dare County has nine ocean storm drains that extend to the water's edge at low tide. The mouths of these storm drains are partially or completely submerged at high tide. Samples are to be collected approximately 10 feet to either side of the Dare County drains when practical. At times, surf conditions may not be safe to be within 10 feet of the pipe. The water sample collected at the Hanby Beach storm drain in New Hanover County will be sampled in the same manner. The remaining storm drains in New Hanover, Brunswick and Carteret counties do not extend to the water's edge. These drains are sampled where the swash enters the surf. The water depth for sample collection at all storm drains is the same as the other monitor sites in the surf, just below the surface in approximately "knee- deep water".

The Dare County storm drains that are discharging after rainfall will be sampled temporarily 100 feet on each side of the pipe to help determine the extent of the plume. The project manager will determine the timeframe for conducting the lateral sampling of storm drains.

It may be necessary at some sites that exceed the geometric mean protocol to conduct additional sampling to define the extent of the pollution. Once the advisory sign is posted, sampling may be initiated at a point 200 feet on either side of the sign. The program manager determines when, if any, additional sampling will be conducted.

Personal watercraft rental sites in most cases are classified as Tier II sites. The samples are collected in the area of the sound where the renters are allowed to ride. This is usually a sectioned-off area marked by buoys. If an advisory is needed, the sign will be posted near shore where watercraft users can see the sign before entering the riding area.

B3 – Sample Handling and Custody

The sample collectors are responsible for ensuring the samples are stored and handled properly while in the field. The samples are stored immediately on ice in a cooler to chill the sample and to limit the exposure to UV light. The time is recorded on the field-sampling sheet for each sample collected. The six-hour holding limit for enterococci is not a factor because each sampling run can be completed with samples back to one of the three laboratories within 3 – 4 hours. Laboratory personnel are responsible for recording the time on data sheets when samples are planted into the media and the times samples can be analyzed after

incubation (see appendix 9 for laboratory QA). Both laboratory and field personnel are responsible for signing off on the chain of custody checklist on the backside of the field-sampling sheet (see appendix 7 page 2).

B4 - Analytical Methods

Using the Idexx enterolert method is a simple procedure involving three steps that are discussed in the laboratory quality assurance plan. A failure in any part of the laboratory procedure results in the collection of another sample. Laboratory staff members are responsible for ensuring that the project manager receives the bacteriological results immediately upon completion of the analysis, and correcting any laboratory procedures that may occur. The laboratory staff members are: Misty Gower in Nags Head, Diane Mason and Valerie Wunderly in Morehead City, and April Alford in Wilmington.

B5 - Quality Control

A sample is collected in the field and labeled “temperature control” that is measured upon arrival to the laboratory. The laboratory refuses samples that are above 10 degrees Celsius and samples that exceed holding time. Split samples are also taken at different frequencies and shared among the three labs to compare results. During laboratory analysis, a pure culture of *Enterococcus faecium* is used as a positive control and *Serratia marcescens* is used as the negative control.

The acceptance criteria for enterococci are based upon the MPN table provided by Idexx Laboratories. The smallest number of enterococci that can be analyzed is 9 organisms per 100 ml. The highest density of enterococci that can

be analyzed is 2005 organisms per 100 ml. Higher densities can be analyzed by further diluting the sample. The critical values of enterococci, 104, 276, and 500 organisms per 100 ml for single samples exceedances, are well within the capabilities of the Enterolert method. Idexx reports that Enterolert has a false negative rate 0.4% and a false positive rate of 5.1 %.

Other analytical controls are detailed in the laboratory QAP in appendix 9. Technicians at each regional office review each other's data entry for mistakes.

B6 – Instrument /Equipment Testing, Inspection, and Maintenance

The two major equipment items needed to do the Enterolert method are an autoclave and an air incubator. A maintenance contract with the autoclave manufacturer requires that the autoclave have preventive maintenance once every two months by authorized technicians. Laboratory personnel check the autoclave monthly for sterility. Air incubators are checked twice daily for proper temperatures using a certified thermometer.

B7- Instrumentation Calibration and Frequency

Laboratory equipment is routinely inspected and calibrated at different times of the year to meet FDA and State certification requirements. The only field instruments that need calibrating are refractometers and thermometers. These two instruments are calibrated against known standards.

B8 - Inspection/acceptance of Supplies and Consumables

Lab supplies are ordered through major scientific supply companies and inspected upon receipt by the project manager. All of the Idexx items are sterilized with ethylene oxide and received in sealed packaging. Each package has a certificate of sterility by the manufacturer. The supplies will be returned to Idexx if a seal is broken on any of the packaging. Field personnel inspect field supplies before leaving the office each day.

B9 – Non-direct Measurements

Tide tables are the only non-direct measurements that will be used in the project. Tide tables are often used when planning sampling runs by boat. Storms and wind can cause delays or early arrival in the actual tidal stage but are not a critical issue to the project.

B10 – Data Management

The data is currently being entered into an Excel spread sheet and it is also entered into an IBEAM database in which the public interface is still under development. The IBEAM database is web-enabled and has both numerical and **Pr**ogram tracking, beach **A**dvisories, **W**ater quality standards, and **N**utrients (PRAWN) data.

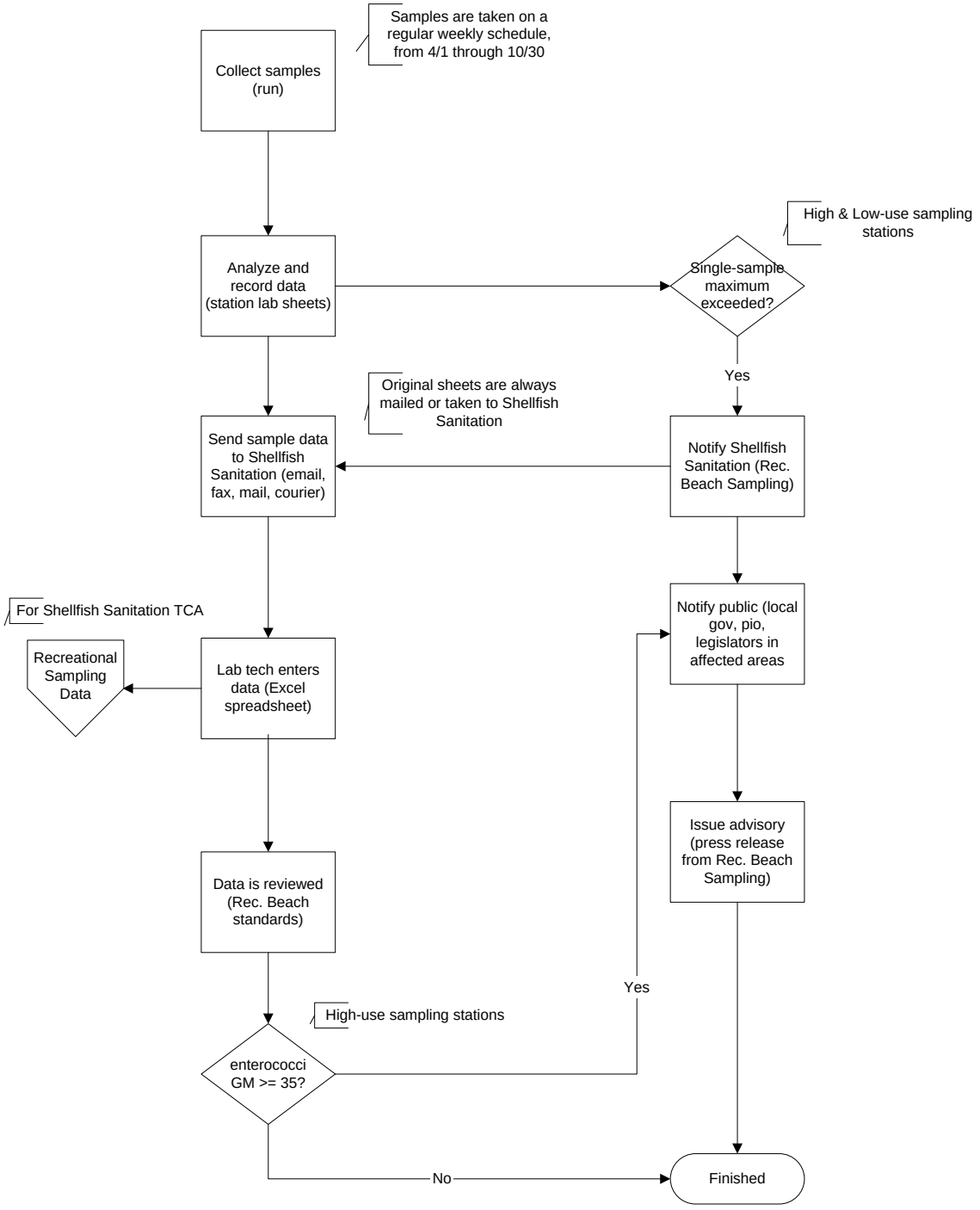
Data is entered into the IBEAM database at each regional office and is stored in an ORACLE database housed in Raleigh, NC which is backed up nightly. All of the data from each region is entered into the Excel spread sheet from staff at the Morehead City Office for redundancy. Entries from the spreadsheet and the IBEAM database are compared to one another as a check (see appendix 7). When data entered into IBEAM from the Northern Region and

Southern Region does not match with the Central Region spread sheet, the data entry staff are required to find and correct the mistake. Advisories are not posted until both databases can verify the geometric mean. The project manager reviews the database daily to look at the geometric mean data and orders the posting of advisory signs and the issue of press releases accordingly.

All of the data on the server have timed backups that are stored on tape. Redundancy in data entry prevents incorrect data from being stored on the tapes. Current copies of the data are also available on employees' desktop computers.

The following flow chart shows the process by which the data is generated and how the data is used.

Data Generation
Routine Beach Sampling



Group C: Assessment and Oversight

C1 Assessments and Response Actions

As Acting Section Chief, Patti Fowler has oversight for the shellfish and beach monitoring programs. JD Potts is the Beach Monitoring Project Manager and is responsible for regularly reviewing the progress of the project, compiling data and supervising employees. The project manager is responsible for posting swimming advisory signs, directing public notification activities, and visiting the field offices regularly to assure adherence to the quality assurance project plan. Performance reviews are scheduled every six months for individual employee assessments. The project manager is responsible for any corrective action needed to ensure that the staff in the recreational water quality program is adhering to the QAPP and program objectives. Erin Bryan-Millush, the Environmental Specialist, is responsible for notification of health departments, local, state and federal governments as well as interest groups and the public; analyzing and preparing data for submittal to the Environmental Protection Agency and public outreach and education about the program.

The SSRWQ staff monitors the documentation of laboratory/field procedures and data analysis for their specific region throughout the beach-monitoring project.

C2 – Reports to Management

Data entry personnel are responsible for submitting data summaries to the project manager daily. Field and lab staff members are responsible for reporting quality assurance issues as they occur to the project manager. Individual reports

for daily objectives and accomplishments are available for management at anytime. The project manager reports to the EPA all swimming advisories as they are issued. An in-depth survey of the beach monitoring is reported to the EPA in January of each year.

Group D: Data Validation and Usability

D1 – Data Review, Verification, and Validation

Each region has standardized field and laboratory procedures. Sample collection, handling of samples and lab analysis are all conducted in the same manner. Splitting samples and sharing them with each of the three labs to analyze helps verify that protocols are followed properly. Bacteriological data that is derived from samples where quality assurance is questionable will be rejected. All three regional laboratories are state- and FDA- certified.

D2 – Verification and Validation Methods

Verification and validation are conducted by the staff members who record and enter the data. At least two people are involved in the laboratory analysis to ensure that samples are read and recorded correctly on to the field/lab form. The laboratory staff responsible for resolving laboratory issues are: Misty Gower and a field technician in Nags Head, Diane Mason and Valerie Wunderly in Morehead City, April Alford and a field technician in Wilmington.

Controls are setup to verify that samples are being read properly (see Sect. B-5 Quality Control). The laboratory results are entered into the database by technicians. Two technicians at each regional office are responsible for

ensuring the data is entered into the system free of mistakes. Each technician's work is reviewed by the other technician for 100% verification. The project manager performs random spot checks on 5% of each office's data handling. The database is set up so that data summaries are verified by having the program to automatically calculate geometric means.

D3 – Reconciliation with User Requirements

The geometric means and single sample maximums are compared to the standards in the EPA's Beach Guidance manual for posting swimming advisories.

Appendix 1: List of Tier One Monitoring Sites Funded by EPA Grant with sampling frequency and the single sample maximum.

STATION	COUNTY	TIER	LOCATION	SSMax	EPA ID	SEASON	SEASON FREQUENCY	SHOULDER SEASON FREQUENCY	OFF SEASON FREQUENCY
S1	BRUNSWICK	1	ocean	104	NC499745	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S10	BRUNSWICK	1	ocean	104	NC698990	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S10A	BRUNSWICK	1	ocean	104	NC998441	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S10B	BRUNSWICK	1	ocean	104	NC642326	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S11A	BRUNSWICK	1	ocean	104		4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S13	BRUNSWICK	1	ocean	104	NC873506	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S13A	BRUNSWICK	1	ocean	104	NC894449	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S13B	BRUNSWICK	1	ocean	104	NC384247	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S14A	BRUNSWICK	1	ocean	104	NC742373	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S15	BRUNSWICK	1	ocean	104	NC449749	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S15A	BRUNSWICK	1	ocean	104	NC497594	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S16A	BRUNSWICK	1	ocean	104	NC569455	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S16B	BRUNSWICK	1	ocean	104	NC191050	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S16C	BRUNSWICK	1	ocean	104	NC895384	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S2	BRUNSWICK	1	ocean	104	NC758778	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S3	BRUNSWICK	1	ocean	104	NC848108	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S5	BRUNSWICK	1	ocean	104	NC175823	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S5A	BRUNSWICK	1	ocean	104	NC379310	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S5B	BRUNSWICK	1	ocean	104	NC442815	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S6	BRUNSWICK	1	ocean	104	NC463026	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S6A	BRUNSWICK	1	ocean	104	NC971811	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S9	BRUNSWICK	1	ocean	104	NC576773	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S9A	BRUNSWICK	1	ocean	104	NC975034	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S9B	BRUNSWICK	1	ocean	104	NC345154	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S9C	BRUNSWICK	1	ocean	104	NC140790	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C10A	CARTERET	1	ocean	104	NC952661	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C10B	CARTERET	1	ocean	104	NC511988	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C2	CARTERET	1	ocean	104	NC643293	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C3	CARTERET	1	ocean	104	NC895537	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C3A	CARTERET	1	ocean	104	NC345060	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C4	CARTERET	1	ocean	104	NC714613	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C4A	CARTERET	1	ocean	104	NC343007	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C5	CARTERET	1	ocean	104	NC115357	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C55A	CARTERET	1	sound	104	NC189579	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C57	CARTERET	1	sound	104	NC101248	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C5A	CARTERET	1	ocean	104	NC152475	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C6	CARTERET	1	ocean	104	NC120547	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C69A	CARTERET	1	sound	104	NC888920	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C69C	CARTERET	1	ocean	104	NC106127	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C6A	CARTERET	1	ocean	104	NC102958	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month

C7	CARTERET	1	ocean	104	NC244236	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C8	CARTERET	1	ocean	104	NC147416	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C9	CARTERET	1	ocean	104	NC475791	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N1	CURRITUCK	1	ocean	104	NC790915	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N1A	CURRITUCK	1	ocean	104	NC109355	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N2	CURRITUCK	1	ocean	104	NC856780	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N3	CURRITUCK	1	ocean	104	NC542433	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N4	CURRITUCK	1	ocean	104	NC846710	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N12	DARE	1	ocean	104	NC933106	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N12A	DARE	1	ocean	104	NC992884	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N12B	DARE	1	ocean	104	NC879514	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N14	DARE	1	ocean	104	NC196750	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N14A	DARE	1	ocean	104	NC148512	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N15	DARE	1	ocean	104	NC701853	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N16	DARE	1	ocean	104	NC952496	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N16A	DARE	1	ocean	104	NC297658	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N17	DARE	1	ocean	104	NC675298	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N17A	DARE	1	ocean	104	NC703962	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N18	DARE	1	ocean	104	NC888506	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N19A	DARE	1	ocean	104	NC325364	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N22	DARE	1	ocean	104	NC239137	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N23	DARE	1	ocean	104	NC570729	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N25	DARE	1	ocean	104	NC944159	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N26	DARE	1	ocean	104	NC289380	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N26B	DARE	1	ocean	104	NC144418	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N27	DARE	1	ocean	104	NC566464	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N29	DARE	1	ocean	104	NC995992	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N29B	DARE	1	ocean	104	NC991015	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N30	DARE	1	ocean	104	NC440580	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N32	DARE	1	ocean	104	NC927135	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N34	DARE	1	ocean	104	NC422633	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N37	DARE	1	ocean	104	NC189209	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N39	DARE	1	ocean	104	NC380367	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N40	DARE	1	ocean	104	NC560974	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N5A	DARE	1	ocean	104	NC995692	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N7	DARE	1	ocean	104	NC653898	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N7A	DARE	1	ocean	104	NC658738	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N85	DARE	1	ocean	104	NC524248	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N85A	DARE	1	ocean	104	NC635010	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N88	DARE	1	sound	104	NC981058	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N89	DARE	1	sound	104	NC620572	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N91	DARE	1	sound	104	NC952532	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N41	HYDE	1	ocean	104	NC368134	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N41A	HYDE	1	ocean	104	NC709868	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N42	HYDE	1	ocean	104	NC562881	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
N43	HYDE	1	ocean	104	NC318235	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month

S18	NEW HANOVER	1	ocean	104	NC593669	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S19	NEW HANOVER	1	ocean	104	NC530102	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S19B	NEW HANOVER	1	ocean	104	NC765666	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S19C	NEW HANOVER	1	ocean	104	NC796965	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S20A	NEW HANOVER	1	ocean	104		4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S21B	NEW HANOVER	1	ocean	104		4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S22A	NEW HANOVER	1	ocean	104	NC375708	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S22B	NEW HANOVER	1	ocean	104	NC748601	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S22C	NEW HANOVER	1	ocean	104	NC252230	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S22E	NEW HANOVER	1	sound	104	NC230511	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S22F	NEW HANOVER	1	ocean	104	NC349062	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S22G	NEW HANOVER	1	ocean	104		4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S23	NEW HANOVER	1	ocean	104	NC294779	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S23A	NEW HANOVER	1	ocean	104	NC773758	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C11	ONSLOW	1	ocean	104	NC264856	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C13	ONSLOW	1	ocean	104	NC577316	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S29A	ONSLOW	1	ocean	104	NC266219	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S30	ONSLOW	1	ocean	104	NC865785	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S30A	ONSLOW	1	ocean	104	NC741107	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S30C	ONSLOW	1	ocean	104	NC645929	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
C92A	PAMLICO	1	sound	104	NC155524	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S25A	PENDER	1	sound	104	NC467377	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S28	PENDER	1	ocean	104	NC098150	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S28A	PENDER	1	ocean	104	NC138569	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S29	PENDER	1	ocean	104	NC526485	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month
S29B	PENDER	1	ocean	104	NC594897	4/1-9/30	5 in 30 Days	10/1-10/31 - Twice per month	11/1-3/3 - Once per month

Appendix 2: List of Tier II Monitoring Sites Funded by State of North Carolina with sampling frequency and the single sample maximum.

STATION	COUNTY	TIER	LOCATION	SSMax	EPA ID	SEASON	SEASON FREQUENCY	OFF SEASON FREQUENCY
C112A	BEAUFORT	2	sound	276	NC482470	4/1-9/30	2x Monthly	11/1-3/3 - Once per month
C119A	BEAUFORT	2	sound	276	NC575571	4/1-9/30	2x Monthly	11/1-3/3 - Once per month
C120A	BEAUFORT	2	sound	276	NC808817	4/1-9/30	2x Monthly	11/1-3/3 - Once per month
C126A	BEAUFORT	2	sound	276	NC635491	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S32A	BRUNSWICK	2	sound	276	NC986806	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S35A	BRUNSWICK	2	sound	276	NC451008	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S36	BRUNSWICK	2	sound	276	NC153015	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S37	BRUNSWICK	2	sound	276	NC803771	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S40A	BRUNSWICK	2	sound	276	NC336677	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S40B	BRUNSWICK	2	sound	276	NC826921	4/1-10/31	2x Monthly	11/1-3/3 - Once per month

S41A	BRUNSWICK	2	sound	276		4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S42B	BRUNSWICK	2	sound	276	NC184657	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S43A	BRUNSWICK	2	sound	276	NC642348	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C30	CARTERET	2	sound	276	NC254979	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C30A	CARTERET	2	sound	276	NC377628	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C31	CARTERET	2	sound	276	NC968903	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C33	CARTERET	2	sound	276	NC722020	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C34	CARTERET	2	sound	276	NC991171	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C35A	CARTERET	2	sound	276	NC722475	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C36	CARTERET	2	sound	276	NC623291	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C39A	CARTERET	2	sound	276	NC272309	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C40	CARTERET	2	sound	276	NC320933	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C41B	CARTERET	2	sound	276	NC231160	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C47A	CARTERET	2	sound	276	NC411851	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C48B	CARTERET	2	sound	276	NC135340	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C48C	CARTERET	2	sound	276	NC727802	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C51	CARTERET	2	sound	276	NC659044	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C51B	CARTERET	2	sound	276	NC958671	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C53A	CARTERET	2	sound	276	NC852484	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C54A	CARTERET	2	sound	276		4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C58	CARTERET	2	sound	276	NC997135	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C59A	CARTERET	2	sound	276	NC380630	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C60A	CARTERET	2	sound	276	NC935797	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C62	CARTERET	2	sound	276	NC951761	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C64	CARTERET	2	sound	276	NC341418	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C65A	CARTERET	2	sound	276	NC852895	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C66	CARTERET	2	sound	276	NC626501	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C68	CARTERET	2	sound	276	NC672893	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C69B	CARTERET	2	sound	276	NC533984	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C7B	CARTERET	2	sound	276	NC429821	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C81A	CARTERET	2	sound	276	NC434812	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C84	CARTERET	2	sound	276	NC444349	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C85	CARTERET	2	sound	276	NC586930	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C102A	CRAVEN	2	sound	276	NC363155	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C104	CRAVEN	2	sound	276	NC193701	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C107	CRAVEN	2	sound	276	NC619539	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C110	CRAVEN	2	sound	276	NC482921	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N84A	CURRITUCK	2	sound	276	NC830155	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N13A	DARE	2	sound	276	NC946128	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N20A	DARE	2	sound	276	NC175966	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N21B	DARE	2	sound	276	NC918417	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N26C	DARE	2	sound	276	NC993056	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N28	DARE	2	sound	276	NC613341	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N28A	DARE	2	sound	276	NC436610	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N29A	DARE	2	sound	276	NC347842	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N31	DARE	2	sound	276	NC305162	4/1-10/31	2x Monthly	11/1-3/3 - Once per month

N33	DARE	2	sound	276	NC868201	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N33A	DARE	2	sound	276	NC983069	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N5B	DARE	2	sound	276	NC993118	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N5C	DARE	2	sound	276	NC551874	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N69	DARE	2	sound	276	NC672006	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N6A	DARE	2	sound	276	NC355044	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N82A	DARE	2	sound	276	NC678856	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N86	DARE	2	sound	276	NC742980	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N88A	DARE	2	sound	276	NC615471	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N9A	DARE	2	sound	276	NC600637	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S18A	NEW HANOVER	2	sound	276	NC465274	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S45A	NEW HANOVER	2	sound	276	NC853733	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S46A	NEW HANOVER	2	sound	276	NC790795	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S48	NEW HANOVER	2	sound	276	NC519384	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S48A	NEW HANOVER	2	sound	276	NC547001	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C21A	ONSLOW	2	sound	276	NC949376	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C22A	ONSLOW	2	sound	276	NC930678	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C23A	ONSLOW	2	sound	276	NC730782	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C27A	ONSLOW	2	sound	276	NC892318	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S61B	ONSLOW	2	sound	276	NC314179	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C114	PAMLICO	2	sound	276	NC659798	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C89A	PAMLICO	2	sound	276	NC624353	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C90A	PAMLICO	2	sound	276	NC990224	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C92	PAMLICO	2	sound	276	NC174861	4/1-9/30	2x Monthly	11/1-3/3 - Once per month
C93	PAMLICO	2	sound	276	NC854048	4/1-9/30	2x Monthly	11/1-3/3 - Once per month
C94	PAMLICO	2	sound	276	NC490467	4/1-9/30	2x Monthly	11/1-3/3 - Once per month
C95	PAMLICO	2	sound	276	NC902753	4/1-9/30	2x Monthly	11/1-3/3 - Once per month
C96A	PAMLICO	2	sound	276	NC589816	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S54	PENDER	2	sound	276	NC215656	4/1-9/30	2x Monthly	11/1-3/3 - Once per month
S54A	PENDER	2	sound	276	NC431213	4/1-10/31	2x Monthly	11/1-3/3 - Once per month

Appendix 3: List of Tier III Monitoring Sites Funded by State of North Carolina with sampling frequency and the single sample maximum.

STATION	COUNTY	TIER	LOCATION	SSMax	EPA ID	SEASON	SEASON FREQUENCY	OFF SEASON FREQUENCY
C111	BEAUFORT	3	sound	500	NC556462	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C111A	BEAUFORT	3	sound	500	NC105938	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C115A	BEAUFORT	3	sound	500	NC442154	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C117A	BEAUFORT	3	sound	500	NC968346	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C118	BEAUFORT	3	sound	500	NC778708	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N83	BEAUFORT	3	sound	500	NC258672	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N87	BEAUFORT	3	sound	500	NC483929	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N61	BERTIE	3	sound	500	NC574492	4/1-10/31	2x Monthly	11/1-3/3 - Once per month

S1A	BRUNSWICK	3	sound	500	NC271860	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S36B	BRUNSWICK	3	sound	500	NC302675	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S42C	BRUNSWICK	3	sound	500	NC545708	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S42D	BRUNSWICK	3	sound	500	NC376660	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S42E	BRUNSWICK	3	sound	500	NC288973	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N49	CAMDEN	3	sound	500	NC256595	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N49A	CAMDEN	3	sound	500	NC999058	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C55B	CARTERET	3	sound	500	NC381539	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C56	CARTERET	3	sound	500	NC179171	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C56A	CARTERET	3	sound	500	NC730320	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C75A	CARTERET	3	sound	500	NC861560	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C83A	CARTERET	3	sound	500	NC204538	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N59A	CHOWAN	3	sound	500	NC444218	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C100A	CRAVEN	3	sound	500	NC558811	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C105B	CRAVEN	3	sound	500	NC821771	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C106A	CRAVEN	3	sound	500	NC905913	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C99	CRAVEN	3	sound	500	NC461235	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N44A	CURRITUCK	3	sound	500	NC209017	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N46	CURRITUCK	3	sound	500	NC810571	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N47	CURRITUCK	3	sound	500	NC664652	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N24	DARE	3	sound	500	NC266902	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N26A	DARE	3	sound	500	NC917233	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N38	DARE	3	sound	500	NC485125	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N67	DARE	3	sound	500	NC124738	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N68	DARE	3	sound	500	NC728192	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N74	HYDE	3	sound	500	NC904964	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S45	NEW HANOVER	3	sound	500	NC813450	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S46B	NEW HANOVER	3	sound	500		4/1-10/31	2x Monthly	11/1-3/3 - Once per month
C25	ONSLOW	3	sound	500	NC499511	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S30D	ONSLOW	3	sound	500	NC187979	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S61C	ONSLOW	3	sound	500	NC809576	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
S66	ONSLOW	3	sound	500	NC687283	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N51	PASQUOTANK	3	sound	500	NC871843	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N54	PERQUIMANS	3	sound	500	NC325991	4/1-10/31	2x Monthly	11/1-3/3 - Once per month
N65B	TYRELL	3	sound	500	NC162664	4/1-10/31	2x Monthly	11/1-3/3 - Once per month

APPENDIX 4 : Station Locations

STATION	LATITUDE	LONGITUDE	STATION	LATITUDE	LONGITUDE	STATION	LATITUDE	LONGITUDE
Central Region			**Southern Region**			**Northern Region**		
C100A	35.10307527	-77.03494406	S1	33.86356188	-78.51527162	N1	36.3966357	-75.82791646
C102A	35.08535654	-77.02549604	S10	33.91393669	-78.2605221	N12	36.0668216	-75.68917936
C104	34.98458069	-76.94728472	S10A	33.91370788	-78.19015525	N12A	36.044178	-75.67403845

C105B	34.95276437	-76.89564438	S10B	33.91385405	-78.15849676	N12B	36.0350551	-75.66822592
C106A	34.91765438	-76.85336357	S11A	33.9134154	-78.26723028	N13A	36.0354879	-75.68711748
C107	34.94159687	-76.82645276	S13	33.91272275	-78.14684113	N14	36.0156615	-75.65553878
C10A	34.65419598	-77.06031474	S13A	33.90945097	-78.11682515	N14A	36.0142047	-75.65463709
C10B	34.64475863	-77.08942269	S13B	33.9080251	-78.10693851	N15	35.9984826	-75.64574377
C11	34.57013688	-77.27011915	S14A	33.90324283	-78.08117223	N16	35.9890492	-75.64023789
C110	34.95798013	-76.69965717	S15	33.89616568	-78.05453433	N16A	35.9713192	-75.63000341
C111	35.53510588	-77.05028196	S15A	33.89165045	-78.03533021	N17	35.9654407	-75.62690244
C111A	35.53559212	-77.04134147	S16A	33.88092603	-77.9978067	N17A	35.9588089	-75.62327886
C112A	35.51387771	-77.00994522	S16B	33.85655697	-77.99993404	N18	35.9315153	-75.60799394
C114	35.18037399	-76.66325786	S16C	33.84994935	-77.95970035	N19A	35.9103628	-75.59617157
C115A	35.45970011	-76.90123053	S18	33.96407925	-77.92111895	N1A	36.4358588	-75.83968249
C117A	35.43516185	-76.90837622	S18A	33.95887953	-77.9424383	N2	36.3764404	-75.82329652
C118	35.44854314	-76.92409325	S19	33.99806545	-77.90506805	N20A	35.9029667	-75.61446286
C119A	35.44135996	-76.9490002	S19B	34.0119747	-77.89960854	N21B	35.8989353	-75.60964113
C120A	35.4754323	-76.99484537	S19C	34.03131962	-77.89204232	N22	35.846914	-75.56304911
C126A	35.47781425	-76.93127503	S1A	33.87669657	-78.54060159	N23	35.7986653	-75.54036219
C13	34.63316855	-77.13784688	S2	33.86657985	-78.50650485	N24	35.794903	-75.54871026
C2	34.69438742	-76.69887251	S20A	34.05247005	-77.88310913	N25	35.7402991	-75.50219232
C21A	34.56133578	-77.28715507	S21B	34.06373015	-77.87869288	N26	35.6802679	-75.47987822
C22A	34.65263906	-77.16531317	S22A	34.19308497	-77.80444986	N26A	35.6750749	-75.48131583
C23A	34.62555967	-77.17857165	S22B	34.19639699	-77.80541608	N26B	35.6086426	-75.46491865
C25	34.63982813	-77.13963815	S22C	34.20391228	-77.79942986	N26C	35.588368	-75.47052409
C27A	34.68483268	-77.12323518	S22E	34.20169548	-77.80127128	N27	35.5849912	-75.46100908
C3	34.69583086	-76.71178281	S22F	34.20732533	-77.79409262	N28	35.5735587	-75.46871617
C30	34.67275548	-77.10026206	S22G	34.1942071	-77.8074981	N28A	35.5486069	-75.47785843
C30A	34.65426541	-77.10478749	S23	34.21386241	-77.78829205	N29	35.531457	-75.4680156
C31	34.67274854	-77.0855132	S23A	34.23375944	-77.77398669	N29A	35.5336657	-75.47583433
C33	34.66979199	-77.04656455	S25A	34.35025327	-77.65349171	N29B	35.4384418	-75.48355779
C34	34.67678536	-77.01342002	S28	34.36481114	-77.62854856	N3	36.3284483	-75.8094266
C35A	34.68632258	-77.05177323	S28A	34.38093762	-77.60881158	N30	35.377056	-75.49214639
C36	34.69660735	-77.00918628	S29	34.42419862	-77.54583075	N31	35.3726259	-75.50281043
C39A	34.70469152	-76.96295099	S29A	34.46037931	-77.48462902	N32	35.3218983	-75.50682384
C3A	34.69700737	-76.72403037	S29B	34.44117942	-77.51882273	N33	35.298664	-75.51470241
C4	34.69731061	-76.73911912	S3	33.87140195	-78.48822958	N33A	35.2419944	-75.62269075
C40	34.72365189	-76.89543785	S30	34.52886483	-77.34504197	N34	35.2540418	-75.52084915
C41B	34.69144922	-76.88590459	S30A	34.49577289	-77.41161113	N37	35.2321385	-75.60439615
C47A	34.70909932	-76.74541518	S30C	34.49169917	-77.42103306	N38	35.22019	-75.66075063
C48B	34.7223024	-76.75529379	S30D	34.49782312	-77.42804885	N39	35.223528	-75.64332968
C48C	34.71897278	-76.72443861	S32A	33.89512193	-78.44024981	N4	36.2787749	-75.79195055
C4A	34.69664188	-76.7809633	S35A	33.91338647	-78.33582797	N40	35.2043966	-75.70266471
C5	34.69293202	-76.82888335	S36	33.91607648	-78.30823073	N41	35.1807729	-75.77833293
C51	34.72189453	-76.75116269	S36B	33.91624848	-78.26778945	N41A	35.1578687	-75.84206461
C51B	34.71779444	-76.71602039	S37	33.90414143	-78.39403253	N42	35.1232354	-75.92108097
C53A	34.72161621	-76.68715455	S40A	33.9207336	-78.19735256	N43	35.1023641	-75.95907669
C54A	34.70926372	-76.67636051	S40B	33.92225401	-78.21277492	N44A	36.2499379	-75.87040938

C55A	34.72729352	-76.665769	S41A	33.92528224	-78.06056897	N46	36.4266706	-75.92641107
C55B	34.72273139	-76.66801969	S42B	33.9269068	-78.05936681	N47	36.4227184	-75.9649826
C56	34.71488538	-76.6626949	S42C	33.92172982	-78.10906835	N49	36.2891381	-76.14704891
C56A	34.70972225	-76.63204321	S42D	33.92327536	-78.19280321	N49A	36.2896997	-76.14623834
C57	34.71368384	-76.68021494	S42E	33.92576282	-78.14556295	N51	36.2697698	-76.17753326
C58	34.68723685	-76.64406304	S43A	33.91731846	-78.01610671	N54	36.0818244	-76.38216954
C59A	34.67938603	-76.61910806	S45	34.05201506	-77.91788558	N59A	36.0551249	-76.68405244
C5A	34.69084475	-76.84535789	S45A	34.05787965	-77.88872179	N5A	36.1961353	-75.75606546
C6	34.68690932	-76.88116866	S46A	34.07809828	-77.87734741	N5B	36.1881471	-75.76770616
C60A	34.69922408	-76.65151301	S46B	34.1562508	-77.85669825	N5C	36.1993274	-75.77131156
C62	34.78922414	-76.60785984	S48	34.18308545	-77.81912255	N61	35.916769	-76.81860719
C64	34.71390843	-76.5788927	S48A	34.18760111	-77.81363808	N65B	35.936857	-76.35755063
C65A	34.70213019	-76.52039585	S5	33.88626276	-78.43631643	N67	35.8409244	-75.62024563
C66	34.68410914	-76.52649038	S54	34.43076997	-77.55032884	N68	35.9264605	-75.72474337
C68	34.65580146	-76.51845946	S54A	34.46869471	-77.50860189	N69	35.9153442	-75.703056
C69A	34.62503984	-76.52390852	S5A	33.87876782	-78.46523232	N6A	36.162302	-75.75973887
C69B	34.61371303	-76.53816129	S5B	33.88302916	-78.44991014	N7	36.1453623	-75.73410635
C69C	34.62126555	-76.52076971	S6	33.89277787	-78.41128612	N74	35.4031765	-76.34038144
C6A	34.68284924	-76.9069427	S61B	34.6973936	-77.42925785	N7A	36.1216684	-75.72180795
C7	34.67524399	-76.95655585	S61C	34.7232852	-77.39048872	N82A	36.1744925	-75.76073535
C75A	34.76136856	-76.41306228	S66	34.74171953	-77.42733425	N83	35.4771893	-76.81584771
C7B	34.68640917	-76.9098865	S6A	33.89445128	-78.40493636	N84A	36.3256076	-75.82258674
C8	34.66073634	-77.03419145	S9	33.91058882	-78.29699199	N85	36.011518	-75.6530312
C81A	35.0183845	-76.31227876	S9A	33.90618264	-78.34359023	N85A	36.005944	-75.64988082
C83A	34.91097877	-76.65850154	S9B	33.90753083	-78.33264435	N86	35.908896	-75.66761307
C84	34.93958287	-76.65323118	S9C	33.91440851	-78.24638171	N87	35.533051	-76.61257371
C85	34.98566483	-76.60595508				N88	35.9522874	-75.63296435
C89A	35.02698691	-76.68830774				N88A	35.9434136	-75.62714836
C9	34.65548359	-77.05547456				N89	36.136243	-75.74437222
C90A	35.00897073	-76.70949719				N91	36.0183707	-75.72686409
C92	34.99526013	-76.7524396				N9A	36.0904657	-75.74909264
C92A	34.99274117	-76.75734228						
C93	34.97097118	-76.79361553						
C94	34.96662672	-76.79839251						
C95	34.99261474	-76.85546497						
C96A	35.02378442	-76.90118418						
C99	35.0646135	-76.97017789						

APPENDIX: 5 Press release templates

Beverly Eaves Perdue, Governor

Dee Freeman, Secretary

N.C. Department of Environment and Natural Resources

Release: Immediate
Date:

Contact: J.D. Potts or Erin Bryan-Millush
Phone: (252) 726-6827 exts. 8154/8153

BEACH WATER QUALITY SWIMMING ADVISORY ISSUED FOR (sound-side/ocean-side) SITE IN X COUNTY

MOREHEAD CITY – An advisory against swimming was posted today at a **(sound-side/ocean-side)** site in **X** County, where state environmental health officials found bacteria levels in the water that exceed the state and Environmental Protection Agency's recreational water quality standards.

The advisory affects **PUBLIC DESCRIPTION**. **(Triplicate)** test results of **(X, X and X)** enterococci per 100 milliliters, taken on **DATE** indicate levels that exceed the state and federal action levels of **(104, 276 or 500)** enterococci per 100 milliliters for Tier **(1, 2 or 3) (high/low usage)** sites. Swimming areas are classified based on recreational use and are referred to as tiers.

The N.C. Division of Environmental Health tests water quality at ocean and sound beaches in accordance with federal and state laws. Enterococci, the bacteria group used for testing, are found in the intestines of warm-blooded animals. While the bacteria group does not cause illness itself, scientific studies indicate that enterococci may indicate the presence of other disease-causing organisms. People swimming or playing in waters with bacteria levels higher than the action level have an increased risk of developing gastrointestinal illness or skin infections.

This advisory is not a beach closing, and the advisory does not affect the entire **X** area. Swimming advisories affect water within 200 feet of the sign. The sign posted reads as follows:

ATTENTION
SWIMMING IN THIS AREA NOT RECOMMENDED. BACTERIA TESTING INDICATES LEVELS OF CONTAMINATION THAT MAY BE HAZARDOUS TO YOUR HEALTH. THIS ADVISORY AFFECTS WATERS WITHIN 200' OF THIS SIGN.
OFFICE OF THE STATE HEALTH DIRECTOR

State officials will test the site again today, and they will remove the sign and notify the public again when the bacteria levels decrease to levels below the standards. Environmental health officials sample 240 sites throughout the coastal region, most of them on a weekly basis, from April to October. Testing continues on a reduced schedule during the rest of the year, when the waters are colder.

To find out more about North Carolina's beach water quality, visit the N.C. Recreational Water Quality Program's Web site at:
http://www.deh.enr.state.nc.us/shellfish/Water_Monitoring/RWQweb/home.

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Beverly Eaves Perdue, Governor

Dee Freeman, Secretary

N.C. Department of Environment and Natural Resources

Release: Immediate
Date:

Contact: Erin Bryan-Millush or JD Potts
Phone: (252) 726-6827 exts. 8153/8154

WATER QUALITY SWIMMING ALERT FOR (ocean/sound/locality) SITE IN X COUNTY

MOREHEAD CITY – State environmental health officials today are notifying the public that initial testing at a **(ocean/sound-side)** site in **X** County showed levels of bacteria exceeding the state and Environmental Protection Agency's recreational water quality swimming standards.

State officials will test the site again today, and the results of the sampling will dictate further action. If the new samples also show elevated bacteria counts, state officials will post a swimming advisory sign and issue a swimming advisory.

The alert affects waters at the **public description + town**. Samples collected **date or 'yesterday'** show test results of **X** enterococci per 100 milliliters of water, which exceeds the state and federal single-sample standard of **104 or 276** enterococci per 100 milliliters for Tier **(1,2)** sites **(low/high usage)**. Swimming areas are classified based on recreational use and are referred to as tiers.

The N.C. Division of Environmental Health tests water quality at ocean and sound beaches in accordance with federal and state laws.

Enterococci, the bacteria group used for testing, are found in the intestines of warm-blooded animals. While enterococci does not cause illness itself, scientific studies indicate that its presence is closely correlated to the presence of other disease-causing organisms. People swimming or playing in waters with bacteria levels higher than the standards have an increased risk of developing gastrointestinal illness or skin infections.

Environmental health officials sample 240 sites throughout the coastal region, most of them on a weekly basis from April to October. Testing continues on a reduced schedule during the rest of the year, when the waters are colder.

To find out more about North Carolina's beach water quality, visit the N.C. Recreational Water Quality Program Web site at:
http://www.deh.enr.state.nc.us/shellfish/Water_Monitoring/RWQweb/home.htm.

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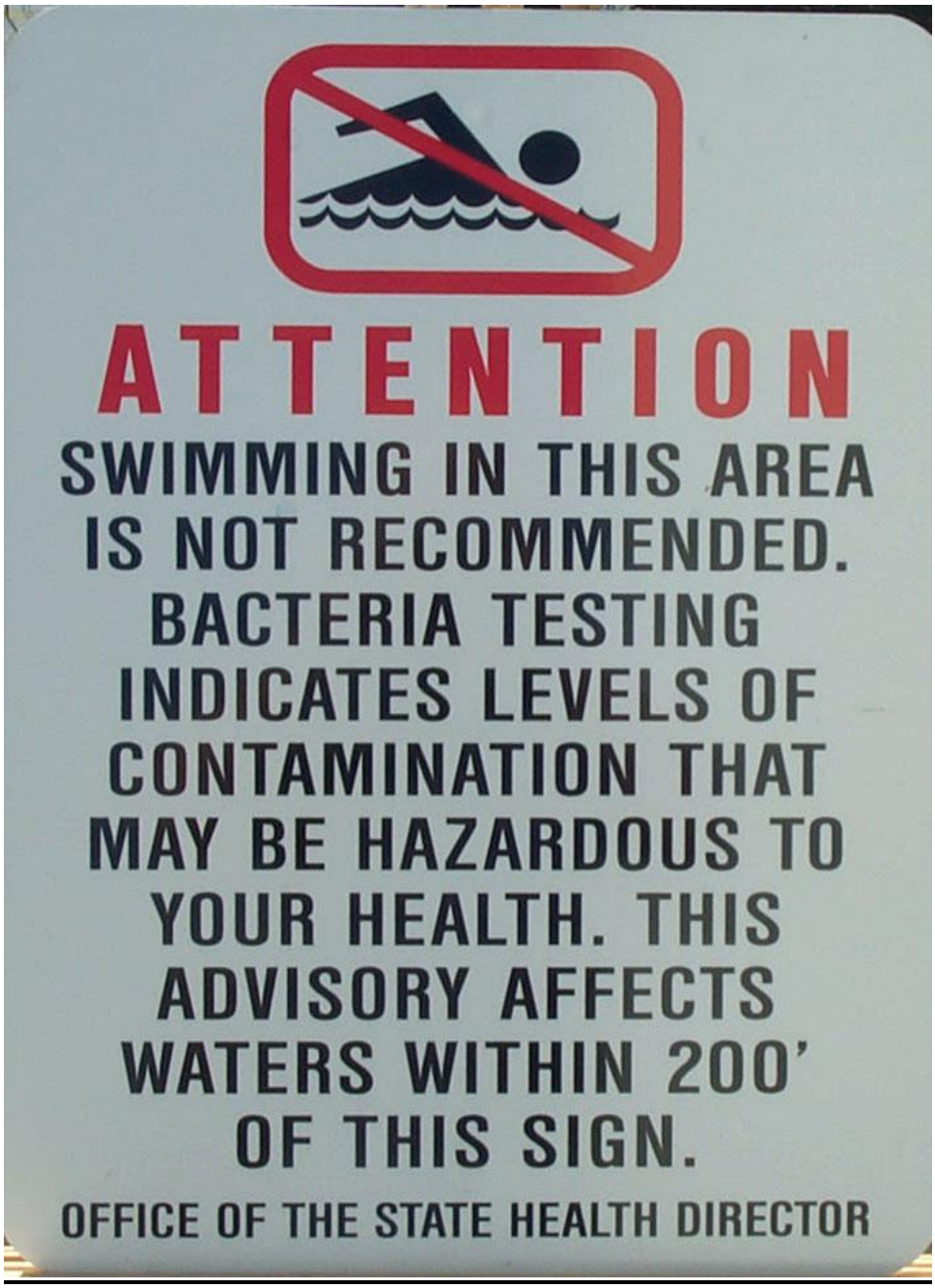
Appendix: 6 Advisories Signs



Appendix: 6 Advisories Signs Continued

Appendix: 6 Advisories Signs Continued

Appendix 7: Example of Field Sampling Sheet with Lab results

SOUTHERN AREA
DIVISION OF ENVIRONMENTAL HEALTH

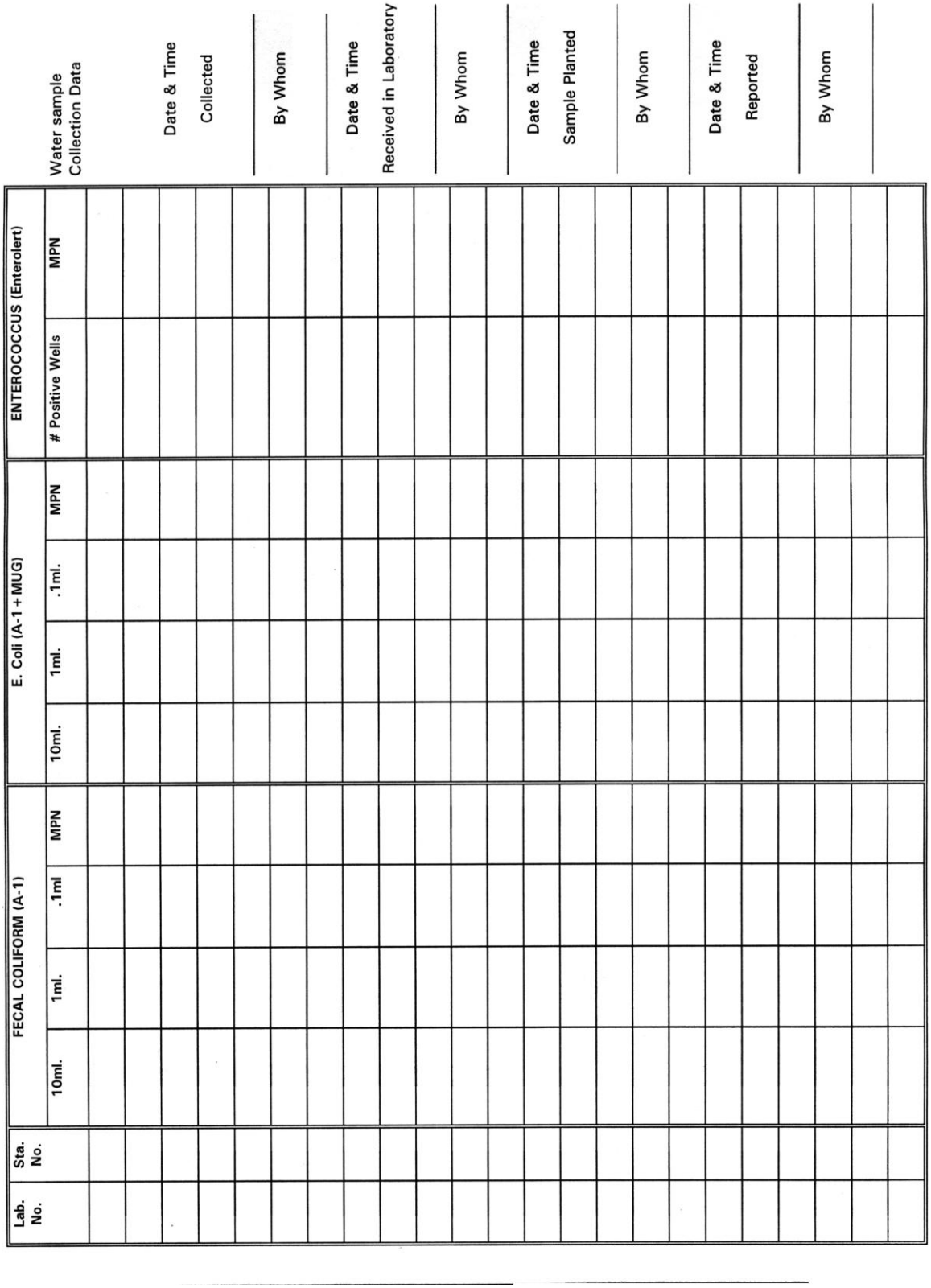
RECREATIONAL BEACH SAMPLING

AREA MIDDLE SOUND TO NEW RIVER COUNTY NEW HANOVER/PENDER/ONSLOW STATE NC DATE COLLECTED 10-22-02

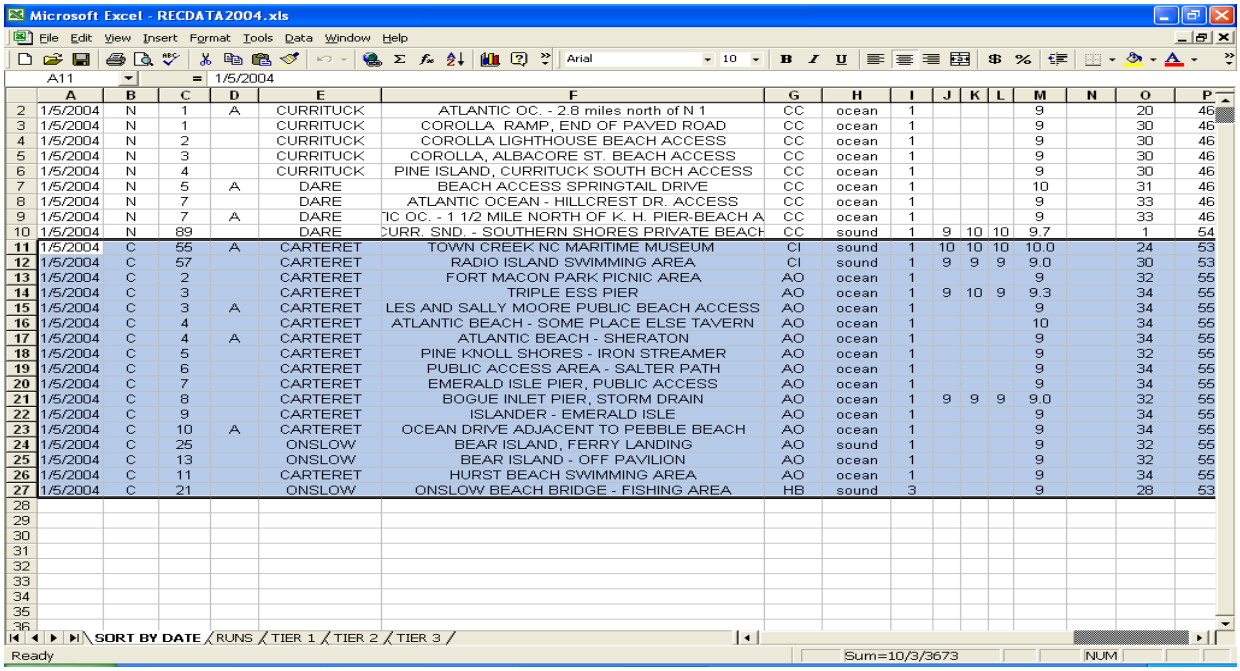
AIR TEMPERATURE F. PRECIPITATION, LAST 24 HOURS 1.55" @ W.B. INCHES

Sta. No.	Lab. No.	LOCATION OF STATION	TIME	DO	CURRENT		TIDE	WIND		WATER		DEPTH		MPN		
					Dir.	Vel.		Dir.	Vel.	Temp	%Salt	Water	Samp	FECAL	E.COLI	ENTERO
S50	15	Middle Sound, off Johnsons Marina (B-7/20)	1059	-	-	-	1/4 Ebb	NE	15	73°	37	-	1.5			<10
S51	16	Middle Snd, ICWW Mkr. #110, Scotts Hill Mar., (B-8/38)	1052	-	-	-					37	-	1.5			<10
S52	17	Topsail Sound, ICWW Marker #98 (B-8/10)	1042	-	-	-					37	-	1.5			10
S53	18	Topsail Sound, ICWW Marker #92 (B-8/44)	1035	-	-	-					37	-	1.5			<10
S54	19	Stump Sound, Hwy 210 Bridge, Surf City (B-9/32)	1025	-	-	-					36	-	1.5			<10
S55	20	Stump Sound, near Swartzenberg Lease (B-9/23)	1016	-	-	-					32	-	1.5			<10
S56	21	Alligator Bay (C-1/20)	1010	-	-	-					33	-	1.5			<10
S57	22	Off Swan Point (C-2/40)	1002	-	-	-					38	-	1.5			<10
S58	23	New River, off Cedar Point (C-2/12)	0957	-	-	-					35	-	1.5			<10
S59	24	New River, NC Hwy 172 Bridge (C-3/1)	0951	-	-	-					30	-	1.5			<10
S60	25	New River, Marker #35 (C-3/15) (Birds)	0941	-	-	-					27	-	1.5			<10
S61	26	New River, Marker #46 near Hadnot Point (C-3/29)	0933	-	-	-	Slack Flood				23	-	1.5			<10
S63	27	New River, Hwy 24 Bridge, Jacksonville (C-3)	0913	-	-	-					10	-	1.5			42
S66	28	New River, Wilson Park	0923	-	-	-					20	-	1.5			10
S67	29	New River, middle of Wilson Bay	0922	-	-	-	V	V	V	V	20	-	1.5			42

Appendix 7 continued. Flip Side of Sampling Sheet and Chain of Custody



Appendix 7: Continued. Example of IBEAM and Excel Databases



Microsoft Excel - RECDATA2004.xls

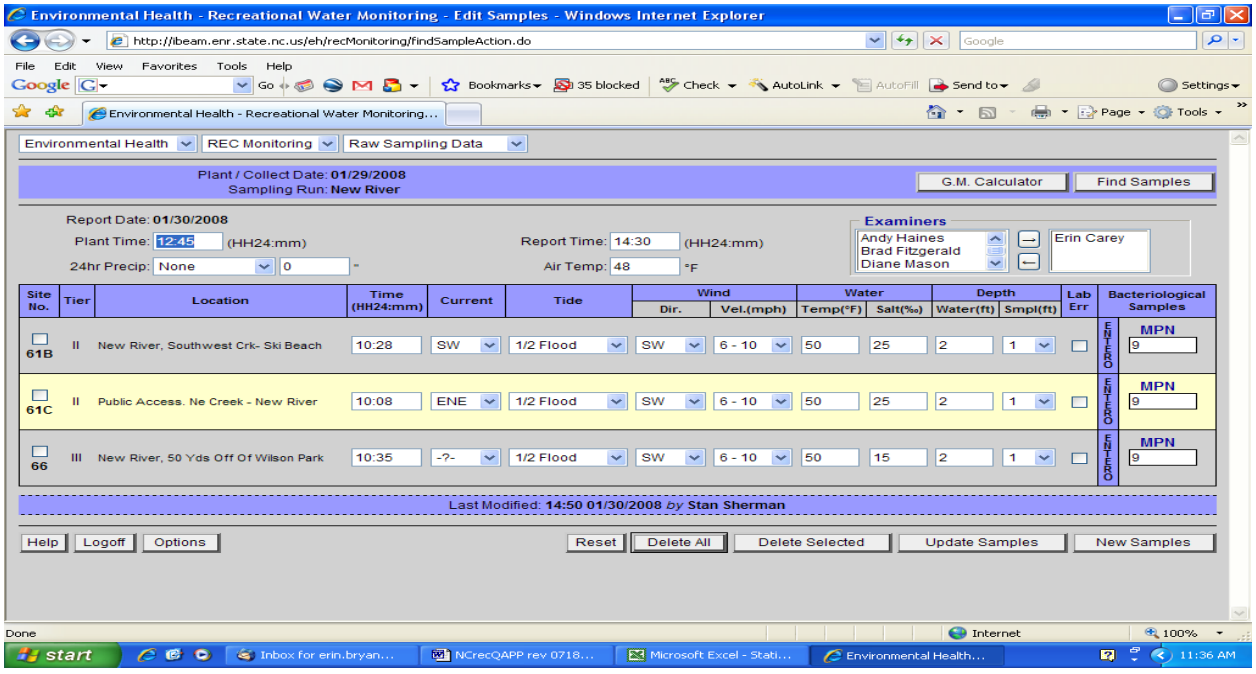
File Edit View Insert Format Tools Data Window Help

A11 = 1/5/2004

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
2	1/5/2004	N	1	A	CURRITUCK	ATLANTIC OC. - 2.8 miles north of N 1	CC	ocean	1				9		20	46
3	1/5/2004	N	1		CURRITUCK	COROLLA RAMP, END OF PAVED ROAD	CC	ocean	1				9		30	46
4	1/5/2004	N	2		CURRITUCK	COROLLA LIGHTHOUSE BEACH ACCESS	CC	ocean	1				9		30	46
5	1/5/2004	N	3		CURRITUCK	COROLLA, ALBACORE ST. BEACH ACCESS	CC	ocean	1				9		30	46
6	1/5/2004	N	4		CURRITUCK	PINE ISLAND, CURRITUCK SOUTH BCH ACCESS	CC	ocean	1				9		30	46
7	1/5/2004	N	5	A	DARE	BEACH ACCESS SPRINGTAIL DRIVE	CC	ocean	1				10		31	46
8	1/5/2004	N	7		DARE	ATLANTIC OCEAN - HILLCREST DR. ACCESS	CC	ocean	1				9		33	46
9	1/5/2004	N	7	A	DARE	IC OC. - 1 1/2 MILE NORTH OF K. H. PIER-BEACH A	CC	ocean	1				9		33	46
10	1/5/2004	N	89		DARE	URR. SND. - SOUTHERN SHORES PRIVATE BEACH	CC	sound	1	9	10	10	9.7		1	54
11	1/5/2004	C	55	A	CARTERET	TOWN CREEK NC MARITIME MUSEUM	CI	sound	1	10	10	10	10.0		24	53
12	1/5/2004	C	57		CARTERET	RADIO ISLAND SWIMMING AREA	CI	sound	1	9	9	9	9.0		30	53
13	1/5/2004	C	2		CARTERET	FORT MACON PARK PICNIC AREA	AO	ocean	1				9		32	55
14	1/5/2004	C	3		CARTERET	TRIPLE ESS PIER	AO	ocean	1	9	10	9	9.3		34	55
15	1/5/2004	C	3	A	CARTERET	LES AND SALLY MOORE PUBLIC BEACH ACCESS	AO	ocean	1				9		34	55
16	1/5/2004	C	4		CARTERET	ATLANTIC BEACH - SOME PLACE ELSE TAVERN	AO	ocean	1				10		34	55
17	1/5/2004	C	4	A	CARTERET	ATLANTIC BEACH - SHERATON	AO	ocean	1				9		34	55
18	1/5/2004	C	5		CARTERET	PINE KNOLL SHORES - IRON STREAMER	AO	ocean	1				9		32	55
19	1/5/2004	C	6		CARTERET	PUBLIC ACCESS AREA - SALTER PATH	AO	ocean	1				9		34	55
20	1/5/2004	C	7		CARTERET	EMERALD ISLE PIER, PUBLIC ACCESS	AO	ocean	1				9		34	55
21	1/5/2004	C	8		CARTERET	BOGUE INLET PIER, STORM DRAIN	AO	ocean	1	9	9	9	9.0		32	55
22	1/5/2004	C	9		CARTERET	ISLANDER - EMERALD ISLE	AO	ocean	1				9		34	55
23	1/5/2004	C	10	A	CARTERET	OCEAN DRIVE ADJACENT TO PEBBLE BEACH	AO	ocean	1				9		34	55
24	1/5/2004	C	25		ONSLOW	BEAR ISLAND, FERRY LANDING	AO	sound	1				9		32	55
25	1/5/2004	C	13		ONSLOW	BEAR ISLAND - OFF PAVILION	AO	ocean	1				9		32	55
26	1/5/2004	C	11		CARTERET	HURST BEACH SWIMMING AREA	AO	ocean	1				9		34	55
27	1/5/2004	C	21		ONSLOW	ONSLOW BEACH BRIDGE - FISHING AREA	HB	sound	3				9		28	53

SORT BY DATE / RUNS / TIER 1 / TIER 2 / TIER 3 /

Ready Sum=10/3/3673 NUM



Environmental Health - Recreational Water Monitoring - Edit Samples - Windows Internet Explorer

http://ibeam.enr.state.nc.us/eh/recMonitoring/findSampleAction.do

Environmental Health - Recreational Water Monitoring...

Environmental Health | REC Monitoring | Raw Sampling Data

Plant / Collect Date: **01/29/2008**
Sampling Run: **New River**

G.M. Calculator | Find Samples

Report Date: **01/30/2008**
Plant Time: 12:45 (HH24:mm) Report Time: 14:30 (HH24:mm)
24hr Precip: None 0 " Air Temp: 48 °F

Examiners: Andy Haines, Brad Fitzgerald, Diane Mason — Erin Carey

Site No.	Tier	Location	Time (HH24:mm)	Current	Tide	Wind Dir.	Wind Vel.(mph)	Water Temp(°F)	Water Salt(‰)	Depth Water(ft)	Depth Smpl(ft)	Lab Err	Bacteriological Samples
61B	II	New River, Southwest Crk- Ski Beach	10:28	SW	1/2 Flood	SW	6 - 10	50	25	2	1		ENTS MPN 9
61C	II	Public Access, Ne Creek - New River	10:08	ENE	1/2 Flood	SW	6 - 10	50	25	2	1		ENTS MPN 9
66	III	New River, 50 Yds Off Of Wilson Park	10:35	-?-	1/2 Flood	SW	6 - 10	50	15	2	1		ENTS MPN 9

Last Modified: **14:50 01/30/2008** *by* **Stan Sherman**

Help | Logoff | Options | Reset | Delete All | Delete Selected | Update Samples | New Samples

Done Internet 100%

start | Inbox for erin.bryan... | NCrecQAPP rev 0718... | Microsoft Excel - Stati... | Environmental Health... | 11:36 AM

Appendix 8: Educational Materials

Recreational Water Quality Program—an overview of the new standard

Does anyone check the waters on the coast to see if it's safe to swim and play in them? Yes, the Recreational Water Quality Program operated by the Shellfish Sanitation Section of the Division of Environmental Health monitors coastal waters on a year-round basis.

Since its inception in 1997, the program has fulfilled its purpose: "To protect the public health by monitoring the quality of North Carolina's coastal recreational waters and notifying the public when bacteriological standards for safe bodily contact are exceeded".

The program has identified 240 specific locations where the public swims and plays in coastal waters and has sorted the areas into three tiers, determined by use patterns and the resultant risks of someone becoming ill from contaminated water. Approximately 47 percent of these sites are Tier I sites, those with the most use.

Examples of these areas include oceanfront beaches, summer camp swimming areas and jet-ski rental facilities. Approximately 35 percent of the sites are Tier II areas. These areas have less usage and are generally accessible only via watercraft. Examples of these sites include public access areas, boat ramps, and other places where smaller numbers of people use the water. The remaining 18 percent of the sites are classified as Tier III areas; those have only occasional use and fewer people at risk.

The ocean beaches and other high usage areas are sampled once per week from the beginning of April to the end of September. All stations are sampled twice per month during October, and then once per month in the winter and spring, November through March.

The program uses enterococci as the indicator organism for contamination, based on current US EPA recommendations. Enterococci are the organisms most consistently present in the intestinal tracts of animals and are most closely associated with incidents of human illness. The program uses an EPA-mandated standard of 35 enterococci per 100ml of water, based on a geometric mean (logarithmic average) using the most recent five sample results collected over the previous 30 days. It also uses a single-sample maximum of 104 enterococci per 100 ml of water to indicate that the water in question exceeds that standard. Exceeding either of these standards will result in public notification procedures being activated.

When the standards are exceeded, local officials are notified, a press release is issued, and a sign is posted at the affected area, warning the public of the risks associated with swimming or playing in the water at this site. The program will continue to sample the area repeatedly. When the area ceases to exceed the standard, the sign is removed, local officials are notified again and another press release is issued.

Point-source contamination sources are also the sites of sign postings. Sources such as sewage treatment plant outfall pipes are permanently posted to warn swimmers not to swim or play in such areas. More problematic are pipes with stormwater discharges. These discharges are heavily contaminated but discharge only intermittently, during and after rainfall events. Currently the program posts these pipes when they begin discharging during a storm and removes the posting 24 hours after the discharge stops.

In an effort to raise awareness of the program and to solicit input from the public, several public meetings have been scheduled in the past years and are currently scheduled on a needed basis. These meetings will be held primarily in beach communities along the coast and will involve local officials, travel/tourism representatives, property owners and members of the general public. Media packages will be developed to publicize the meetings.

J.D. Potts leads the program from the Morehead City office and is assisted by Environmental Specialist Erin Bryan-Millush. The recreational water quality program consists of seven water samplers stationed in Nags Head (2), Morehead City (3), and Wilmington (2).

We hope to keep North Carolinian residents and visitors protected when swimming in theses coastal waters for generations to come!

Appendix 8: Educational Materials continued.

THE FACTS: RECREATIONAL WATER QUALITY MONITORING IN NORTH CAROLINA

ATTENTION
SWIMMING IN THIS AREA IS NOT RECOMMENDED.
BACTERIA TESTING INDICATES LEVELS OF
CONTAMINATION THAT MAY BE HAZARDOUS TO YOUR HEALTH.
THIS ADVISORY AFFECTS WATERS WITHIN 200 FT. OF THIS SIGN.

OFFICE OF STATE HEALTH DIRECTOR

I saw this sign at the beach. Who put it there, and what does it mean?

It means testing shows that state and federal bacteria levels for swimming water quality were exceeded. Therefore, state environmental health officials recommend that you do not swim within 200 feet on either side of the sign. The main goal of the Shellfish Sanitation and Recreational Water Quality Section is to protect the public health by monitoring the quality of North Carolina's coastal recreational waters and notifying the public when bacteriological levels for safe bodily contact are exceeded.

The section started monitoring coastal recreational water quality in 1997. The coastal waters monitored include the ocean beaches, sounds, bays and estuarine rivers. Unfortunately North Carolina does not have a statewide monitoring program for inland recreational waters. The public should avoid fresh water swimming after heavy rain, especially near storm drains.

Are North Carolina's beaches safe for swimming?

Yes. North Carolina has miles of beaches with excellent water quality, and the state has an extensive monitoring program to test the waters and identify any temporary problems that might arise. The data that has been collected since the program began show that our swimming beaches have been under advisory for an average of less than 1 percent of the swimming season for each year. While the waters of North Carolina are generally very clean, it is important to monitor them continually, so the public can be informed of any localized problems.

How many stations do you monitor and how often do you monitor them?

The Recreational Water Quality staff tests 240 sites throughout the coastal area at different frequencies, depending on the time of year and use patterns of the site. Ocean beaches and other high usage areas are sampled once per week between April 1 and Sept. 30; lower usage areas are sampled twice per month. All stations are sampled twice per month during October, and then once per month in the winter, November through March. Staff members collect approximately 6,000 samples per year. To view a map of our sampling locations please visit either of the two Web sites – http://xapps.enr.state.nc.us/eh/beaches/viewSiteMap.do

What are the recreational water quality levels?

The section's staff tests for a type of bacteria called enterococci, which are found in the intestines of warm-blooded animals such as birds, dogs, raccoons and people. Enterococci will not make you sick; however, it is often associated with other bacteria and viruses that can cause water-borne illness. The U.S. Environmental Protection Agency found that enterococcus closely correlates with incidence of human illness.

To comply with the swimming water quality levels set by the EPA and the state, water test results have to fall below a set average as well as a single-sample level. The average is the geometric mean of five weekly samples taken within a 30- day period. The geometric mean cannot exceed 35 enterococci per 100 milliliters of water. In addition, swimming advisories may be posted if a single sample exceeds the level set for it based on usage. Advisories based on single sample results are retested at the time of the posting.

What happens if the swimming water quality levels are exceeded?

If the swimming water quality level is exceeded at a site, the staff sends out a press release to inform the public and an advisory sign is posted at the swimming site. Discharges of stormwater and floodwater into the swimming area also trigger swimming advisories that last for 24 hours after the discharge has ended.

Where are the disease-causing organisms coming from?

Disease-causing organisms, or pathogens, can come from both human and animals. Stormwater runoff from agricultural and urban areas delivers pathogens from humans, livestock, wildlife and pets into recreational waters. Poorly treated wastewater from treatment plants, malfunctioning septic systems and boat discharges are sources of human fecal contamination. Bacteria can also be introduced directly into the bathing area from swimmers.

Will I get sick if I swim in waters under a swimming advisory?

Not necessarily, but you are at an increased risk.

What kind of illnesses can I contract from swimming in polluted waters?

The most common are diarrheal diseases that can be caused by bacteria, viruses and parasitic protozoa. Ear, nose, throat, skin and respiratory infections are also commonly associated with swimming in contaminated water.

What should I do if I become ill after swimming?

If you develop diarrhea or an infection after swimming in North Carolina's coastal waters, seek medical treatment and then please contact the Shellfish Sanitation and Recreational Water Quality Section of the Division of Environmental Health at (252) 726-6827. The Recreational Water Quality Program's staff would like to know about any possible water-borne illness outbreaks as soon as possible to prevent more people from becoming ill.

How long does a swimming advisory stay posted?

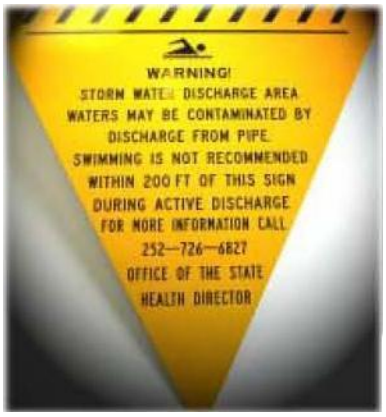
If the advisory is issued due to the single sample maximum level, it will be re-sampled daily. The sign will remain posted as long as the standard is exceeded. This means the result of the immediate resample may lift the advisory as quickly as 24 hours after posting. Once the geometric mean exceeds the standard, the swimming advisory is not lifted until two consecutive weekly samples meet the EPA standard of 35 enterococci per 100 milliliters.

I have more questions- where can I go for answers?

If you have further questions about the Recreational Water Quality Program, you can call J.D. Potts or Erin Bryan-Millush with the Program at (252) 726-6827 or view the Program's Web site at http://www.deh.enr.state.nc.us/shellfish/Water_Monitoring/RWQweb/home.htm

Printing of this document was funded entirely through a grant from the U.S. EPA.

STORMWATER DRAINPIPE SIGNS IN NORTH CAROLINA



What do these signs mean?

These signs are posted where stormwater pipes are discharging water into coastal swimming areas. They recommend that people do not swim within 200 feet on either side of the sign. You may see these signs at drainpipes in Carteret, Dare and New Hanover counties. The flow may not be visible if the mouth of the pipe is in the surf. If so, the sign on the top left will be posted.

People are advised not to swim in the area when the pipe has stormwater coming from it. The Recreational Water Quality Program's tests have shown that after rainfall, the runoff coming out of the pipe often exceeds state and federal standards for bacteria. Swimming in the waters near the pipe can cause an increased risk of illness.

What is stormwater runoff?

When rain falls, the water that isn't able to sink into the ground washes everything lying on hard surfaces (roads, driveways, roofs and parking lots) into pipes, some of which empty into coastal waters. The contaminants on the ground can include pet and wildlife waste, gas and petroleum products, pesticides and fertilizers. The state's Recreational Water Quality program tests for bacteria found in the intestines of warm-blooded animals, including people. If it is present in the water at high enough levels, people swimming or playing in the water run an increased risk of developing a gastrointestinal illness (diarrhea and/or vomiting) or a skin infection, particularly people with compromised immune systems. It is important to note that unlike some states, North Carolina does not have sanitary sewer outfalls discharging from pipes to our ocean beaches. Our stormwater collection systems are separate from the wastewater treatment systems and do not connect with those pipes.

Why are these signs displayed?

Past data show that stormwater tends to have high bacteria counts. Therefore, people are warned to swim away from the signs, so they don't expose themselves to an increased risk of illness. This way, if people see discharge coming from the pipe, they can play it safe and avoid swimming near it.

Is it okay for my children to play in the ponds and streams created by these pipes?

Some pipes discharge onto the beach sand, creating a pond or stream. Some parents like their children to play in these puddles or ponds because they think the children are safer away from the waves and current, but this is not a good idea. These ponds are different from natural tidal pools in that they contain all the pollutants of stormwater without the dilution effect of the ocean. allowing children to play in them, particularly small children who may swallow water, exposes them to an increased risk of getting sick.

Will I get sick if I swim in waters under a swimming advisory? What kind of illnesses could I get from swimming in polluted waters?

Not necessarily, but you are at an increased risk. The most common illnesses are gastrointestinal diseases with symptoms such as diarrhea and vomiting. Ear, nose, throat, skin and respiratory infections are also commonly associated with swimming in contaminated water. If you become ill after swimming in North Carolina's coastal waters, seek medical treatment and then please contact us at the phone number below. We would like to know about any possible waterborne illnesses as soon as possible to prevent others from becoming ill. You may contact our office at (252) 726-6827 or by e-mail at **erin.bryan@ncdenr.gov** or **j.d.potts@ncdenr.gov**, or visit us online at **http:// www.deh.enr.state.nc.us/shellfish/Water_Monitoring/RWQweb/home.htm**.

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