Marine and Freshwater Beach Testing in Massachusetts

Annual Report: 2008 Season

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PART ONE: THE MDPH/BEH BEACHES PROJECT

I. OVERVIEW

There are over 1,100 public and semi-public bathing beaches in Massachusetts, both freshwater and marine, many of which are used by Massachusetts residents. Depending on weather and a variety of other changing conditions, beach water sometimes contains bacteria at levels that can cause health problems such as sore throat, gastroenteritis, or even meningitis or encephalitis.[1] Therefore, it is critical to ensure that bacteria levels at beaches are monitored, and that such levels are acceptable and within public health standards. In 2008, bacteria levels that exceeded public health standards were detected on 799 different occasions across the state, resulting in temporary beach closures. This represents 5.1% of all samples collected during the 2008 season.

In Massachusetts, bathing beach water quality is regulated by the Massachusetts Department of Public Health (MDPH) under Massachusetts General Law[2] and the Code of Massachusetts Regulations.[3] These require that all public and semi-public bathing beaches (e.g., beaches at camps, campgrounds, hotels, condominiums, country clubs) in the state be monitored for bacterial, and on occasion other environmental contamination during the bathing beach season. The exact dates of a given bathing season vary from beach to beach, and are determined by the operators of each individual beach. Some beaches open as early as Memorial Day, but the majority begin operation when the school year ends in mid-June, and most close for the season in the week of Labor Day.

The vast majority of beach water sampling in Massachusetts is conducted by local boards of health, the Barnstable County Department of Health and the Environment, and the Massachusetts Department of Conservation and Recreation (MDCR). Most marine beach samples are analyzed at laboratories under contract with MDPH's Bureau of Environmental Health (BEH). BEH utilizes federal EPA funds to support these costs. Most freshwater samples are analyzed at private laboratories hired by beach operators or boards of health, while a small number are analyzed at municipal laboratories.

Bathing water samples that are found to contain levels of bacterial contamination in excess of regulatory standards are termed exceedances. If water samples from a beach are found to be in exceedance of regulatory standards, the beach waters must be closed. When this happens signs must be posted at access points to the beach notifying the public that swimming is unsafe due to bacterial contamination. For marine beaches, the public is also notified via the Beach Water Quality Locator, on the MDPH/BEH website, which is operated in collaboration with local health officials and MDPH contract laboratories.[4] Local health officials and MDPH/BEH contract laboratories collect and analyze the samples and perform a majority of the data entry onto the website. MDPH/BEH is notified of exceedances within 24 hours (105 CMR 445.040). Beaches are to remain closed until their bacteria counts decrease to levels below the applicable standard, at which point the postings can be removed and MDPH/BEH is notified of the beach reopening.

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[1] Cabelli, 1983; USEPA, 1986; Cabelli, 1989; Haile, 1996; Pruss, 1998.

[2] MGL Chapter (C) 111, § Section (S) 5. See Appendix A.

[3] 105 CMR 445.000: Minimum Standards for Bathing Beaches (State Sanitary Code, Chapter VII). See Appendix B.

[4] The address of the MDPH/BEH website can be found on the cover of this report.

II. BACKGROUND

A. Beach Water Quality & Health: the need for testing

The health risks associated with both marine and freshwater swimming have been demonstrated in numerous studies. Swimmers may ingest or absorb pathogens (illness-causing microorganisms), and several prospective and retrospective epidemiological studies have demonstrated an increased risk of disease among swimmers relative to non-swimmers in both marine and fresh waters that are polluted with bacteria.[5] One retrospective study found the relative risk of gastrointestinal (GI) illness among swimmers in polluted waters to be 1.0 to 3.0 times that of non-swimmers.[6]

Swimming in polluted marine water can lead to gastrointestinal symptoms (e.g., nausea, vomiting, diarrhea, abdominal pain), respiratory symptoms (e.g., sore throat, cough, chest cold, runny nose, sneezing), eye and ear symptoms (e.g., irritation, earache, itchiness), dermatological symptoms (e.g., skin rash, pruritis), or constitutional symptoms (e.g., fever, chills). Several studies conducted by the United States Environmental Protection Agency (USEPA) and others have associated gastrointestinal symptoms with swimming in polluted fresh waters as well, and more recent studies have reaffirmed that there is a significant association between swimming in contaminated water and gastrointestinal illness.[7]

Pathogens in beach waters typically have a fecal source, and pathogens associated with human fecal matter (e.g., some strains of *Escherichia coli*) may enter beach waters (both marine and fresh) in a variety of ways. Many of these pathways involve sewage: system failures in human sewage treatment facilities, leaking sewer pipes, combined sewer overflows, illegal sewer hookups, leachate from septic systems, or discharge of sewage by boats. Other sources of pathogens in beach waters include (but are not limited to) rainfall and resulting surface water runoff (washing contaminants such as animal wastes from dogs or farms into beach water). Bathers may also contribute significantly to pathogen concentrations in recreational waters,[8] and swimmer-to-swimmer contamination is another potential source for microbiological contamination. All of these factors contribute to elevations in bacteria which can cause illness among swimmers.

B. Establishment of the MDPH/BEHP Beaches Project

Responding to these health concerns, state and federal regulatory agencies have worked together to establish a system to protect the public from exposure to swimming-related pathogens.

In 1996, MDPH conducted a state-wide beach survey of all Massachusetts municipalities, thereby establishing an initial inventory of all public marine bathing beaches in the state. Based on information collected from local boards of health, beach managers, and other parties, MDPH compiled a documented inventory which has been updated over time and

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[5] Cabelli et al., 1982; Cabelli, 1983; USEPA, 1986; Cabelli, 1989; Coye and Goldoft,1989; CDC, 1990-2004; Corbett et al., 1993; Haile, 1996; Pruss, 1998.

[6] Pruss, 1998.

[7] Wade et al., 2003; Wade et al., 2006

[8] California, 1997; Gerba, 2000

currently includes over 500 marine and 600 freshwater beaches. The inventory is updated continually to reflect changes in beach names, boundaries, etc.

In 2000, the U.S. Congress enacted the Beaches Environmental Assessment and Coastal Health (BEACH) Act (Appendix C). The BEACH Act, which amends the Federal Water Pollution Control Act (often referred to as the Clean Water Act, or CWA) is intended to improve the quality of the nation's coastal recreational waters. It seeks to reduce the risk of illness to users of these waters through the identification of high-risk beaches, identification and mitigation of sources of pollution, and notification/ risk communication to the public. It also authorizes grants to eligible states to support these objectives.

Also in 2000, the Massachusetts legislature passed An Act Relative to Minimum Standards for Public Bathing Waters, often referred to as the Massachusetts Beaches Act (Appendix D). The Act directed MDPH and local health officials:

(1) to adopt bathing water standards protective of public health to apply to all public and semi-public bathing beaches across the state;
(2) to require regular bacteria testing at all public and semi-public beaches; and
(3) to notify the public when bathing standards are violated.

The Act mandated that all beaches be tested weekly except where MDPH and the local board of health stipulated a greater or lesser frequency for a specific beach. It also mandated MDPH to publish an annual report analyzing statewide bacteria testing results.

Since late 2001, the program has received funding from the USEPA. This funding partially supports MDPH efforts

(1) to develop and maintain an inventory of marine bathing beaches;
(2) to compile and analyze monitoring data; and
(3) to conduct assessments of those beaches identified as high-risk.

With the help of these funds, and building upon such groundwork as the beaches inventory, the web-based reporting system, and mapping layer, MDPH/BEH has established a system of routine beach monitoring oversight that has been in place 2002. The elements of this system are described below.

In 2001, MDPH initiated the development of its web-based system for public notification of marine beach closures and water quality monitoring data. Developed by MDPH in conjunction with Garrison Enterprises, with funding support from the USEPA BEACH grant, the site went online in 2003. It provides a mechanism for marine beach water testing data results to be uploaded into a central database immediately after laboratory analysis is complete. Violations are identified by the system automatically, and this information is made available to the public on the Beach Water Quality Locator, a website that is updated twice each day. By visiting the Locator, the public can quickly learn which beaches are open or closed and the reason behind any closure. [9]

This system was enhanced in 2006 to more clearly explain and illustrate the sampling results, for example by providing easy viewing of historical monitoring data, and to speed the entry and quality of data by laboratories that use the system. These improvements allow

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[9] The Beach Water Quality Locator can be accessed through the main MDPH/BEH website (see cover) and clicking on "Bathing Beaches." It can also be accessed directly at http://mass.digitalhealthdepartment.com/public_21/index.cfm.

the public to quickly find the locations of all beaches through the use of the new GIS maps and provide for easy viewing of graphical and tabular historical monitoring data.

In 2002, the MDPH/BEH Environmental Toxicology and Community Sanitation Programs collaborated and released the first annual beaches report, summarizing beach water sampling and results from the 2001 beach season. Since that time, an annual report has been prepared and publicly released for each subsequent bathing season.

In 2003, MDPH worked with local health officials to gather key information on all Massachusetts marine bathing beaches, then validated that information by performing site visits to each beach and taking in-field GPS readings. With the help of Applied Geographics, Inc., MDPH converted the GPS coordinates into a detailed geographic information system (GIS) layer. For every beach, the GIS layer contains the following information:

- location and specific boundaries of the beach itself
- locations of normal access points and parking lots
- public or semi-public designation (or private, if known)
- sampling location(s) for routine water monitoring
- location at each beach where posting signs will be placed in the event that the beach is closed

All information was validated by MDPH staff.

That year, MDPH/BEH also developed the *Public Health-Based Beach Evaluation, Classification, and Tiered Monitoring Plan.* The plan sets forth a three-tiered system for categorizing every marine beach according to the severity of its pollution. Based on this information, a testing frequency is determined which is tailored to the specific needs of the beach, with greater resources being devoted to testing the most polluted beaches. A full description of this system can be found on page 14.

Also in 2003, MDPH finalized its *Quality Management Plan* (QMP) for all beaches activities under the USEPA BEACH grant, as well as for other activities specific to bathing beach regulations. The QMP described how the program would develop, implement, and determine the effectiveness of, its quality assurance and quality control policies and procedures.

In the same year, MDPH completed its *Quality Assurance Project Plan* (QAPP), which was approved by USEPA. In 2007, the QAPP was revised to reflect changes in the Beaches Project. This update was approved by USEPA and distributed to MDPH/BEH's contract laboratories before the 2007 beach season. The QAPP describes quality assurance, quality control, and related steps (including enforcement measures) taken to ensure that the results of the project will meet USEPA's published performance criteria. It also updates details on approved laboratory methods, MDPH/BEH contacts, and website information.

III. BEACH WATER QUALITY MONITORING

A. Sample collection

The water quality samples for most public bathing beaches in Massachusetts are collected by local boards of health; on Cape Cod a number of beaches are sampled by the Barnstable County Department of Health and the Environment. The Massachusetts

Department of Conservation and Recreation (MDCR), which operates beaches, performs its own sampling. Samples for semi-public beaches are usually collected by the beach operator, although there are some communities that collect semi-public beach samples in the course of their routine sampling of public beaches.

Sample collection is required to be in compliance with the *Standard Methods for the Examination of Water and Waste Water* of the American Public Health Association or as approved by the USEPA. Sample collectors are to record a variety of field data at the time of sample collection, using the current Beach Sampling Field Data Form developed by MDPH/BEH (Appendix E). The information collected includes:

- Community where beach is located
- Name of beach
- Beach type (marine or freshwater)
- Date of sample collection
- Sample collector
- Sample identification number
- Time of sample collection
- Weather condition at time of sample collection
- Air temperature
- Wind direction
- Time of last high tide (if applicable)
- Number of days since last rainfall
- Bather density (i.e., number of people in the water)
- Water temperature
- Water clarity (i.e., is the sample clear or cloudy/murky?)
- Observations (e.g., trash, sludge deposits, oils, algae, fish die-off, jellyfish, birds)
- Comments

Water samples, with field data form attached, are submitted to a certified laboratory for analysis. The field data are later included with the corresponding laboratory results when they are submitted to MDPH/BEH (see the Reporting section, below).

B. Sample analysis

1. THE MDPH CONTRACT LABORATORY PROGRAM

All beach water samples are required to be analyzed within six hours of collection. The laboratories who perform this analysis are generally hired by either the city or town the beach is in (most often by its board of health, but sometimes by another municipal department, e.g. recreation) or by the operator of that beach. As mentioned earlier, MDPH/BEH uses part of its federal funding to set up contracts with a number of laboratories to analyze qualifying communities' public marine beach samples. Since 2003, MDPH/BEH has reimbursed communities over $250,000 for the analysis of over 30,000 marine samples from over 50 communities that have taken part in the contract laboratory program. The contract laboratories were successfully audited by MDPH/BEH staff in 2005 to ensure compliance with the QAPP and Standard Operating Procedures.

2. THE USE OF INDICATORS

In the United States, most swimming-associated diseases are caused by a wide variety of pathogens associated with fecal contamination (Cabelli, 1983). Most of these pathogens are

very difficult to measure directly, but water samples that contain them also contain other microorganisms which are easier to measure. These “indicator organisms” provide a reliable indication of the pathogens’ presence and quantity. By measuring these other microorganisms, which live in the same microbiologic conditions, follow the same life cycles, and occur at levels proportionate to those of the pathogens, public health officials are able to estimate the level of the pathogens in beach water samples. When the presence of one microorganism is used to indicate the presence of another, it is referred to as an “indicator.”

The most accurate indicators of fecal contamination (and thus of risk to swimmers) are specific microorganisms that are predominantly present in human and animal feces, such as *Streptococcus faecalis* or *Clostridium perfringens* (Cabelli, 1983). However, testing for a single indicator species can fail to detect the presence of fecal pathogens if that indicator species does not survive in the natural environment for as long as the fecal pathogens themselves (NAS, 1977). Therefore, it is preferable to test for groups of microorganisms, such as total coliforms, fecal coliforms, or Enterococci, instead (Cabelli, 1983). These analyses are usually easier and faster to perform than those that test for only one indicator species, although a disadvantage of using groups of microorganisms as indicators is that this method can also detect organisms not associated with fecal contamination, thus falsely predicting the presence of fecal contamination (NAS, 1977; Cabelli, 1983; Barrell et al., 2000). However, in the case of Enterococci, results do correlate strongly with swimming-associated illnesses (USEPA, 1986; Pruss, 1998).

3. ENTEROCOCCI

In its *Ambient Water Quality for Bacteria – 1986,* USEPA recommended that Enterococci rather than fecal or total coliforms be used as the indicator species in marine water quality testing. This recommendation was based on studies performed at three locations (New York, NY; Boston, MA; and Lake Pontchartrain, LA) that demonstrated that gastrointestinal symptoms reported by swimmers were strongly correlated with Enterococci levels, but not with levels of total or fecal coliforms (Cabelli,1983). In the late 1990s, rapid laboratory methods became available to allow for the adoption of this indicator. Since 2000, Enterococci has been the required indicator for routine marine beach testing in Massachusetts (105 CMR 445.000). All marine beaches submitting data have used this method since 2004.

The Enterococci method detects the number of bacteria that grow under certain laboratory conditions (USEPA, 1985). It measures the concentration of bacteria from a group of species within the *Streptococcus* genus, some of which (e.g., *Streptococcus faecalis*) are typically found in human and animal intestines (USEPA, 1985). Although not all of the species detected by this method are associated with fecal contamination (USEPA, 1985), leading to false-positive results, it is prudent, for public health purposes, to treat all exceedances in indicator level as possible public health risks. Moreover, the Enterococci method does not detect as many non-fecal species as older methods do (e.g., fecal or the total coliform), and is therefore more accurate. Having said that, all viruses and some bacterial pathogens are not detected by this method.

4. *E. COLI*

Escherichia coli, usually referred to as *E. coli*, is a species of bacteria that originates in human and animal intestines (USEPA, 1985). Certain strains of this species are enteric (i.e., intestinal) pathogens (NAS, 1977). While both the total and fecal coliform methods can detect *E. coli* as part of a group of organisms, the *E. coli* method tests specifically for the presence or absence of this one particular species. Because *E. coli* originates in human and animal intestines, this method is a very sensitive indicator of fecal contamination for freshwater beaches (USEPA, 1985).

5. LABORATORY METHODS

Enterococci and *E. coli* are currently the preferred indicators for beach water quality testing, and the only ones accepted in Massachusetts. The laboratory methods required for beach water analysis in Massachusetts are those specified in the most recent edition of the American Public Health Association's *Standard Methods for Examination of Water and Waste Water* or as approved by the USEPA.

Currently, the required methods for Enterococcus are either Method 1600: Membrane Filter Test Method for Enterococci in Water, or Enterolert. Method 1600, which was approved and adopted by USEPA in 1997, enables a faster turnaround time for testing of Enterococci, making it practical for local use. Laboratories contracted by MDPH to perform public, marine beach sample analysis are required to utilize the Modified Enterococci Method (Method 1600) or Enterolert as approved by the USEPA and the MDPH/BEH Beach Project QAPP. Both are culture-enzyme-substrate methods, approved and adopted by USEPA in 2003 for testing ambient water (Jagals et al., 2000; Federal Register, 2003).

6. BACTERIAL STANDARDS

Water quality standards are guidance concentrations used by public health officials to make decisions regarding the health risks associated with swimming. These criteria are typically expressed as the concentration of an indicator in the water above which there is an unacceptable risk for adverse health effects in swimmers.

Because the correlation between indicator levels and the levels of the actual pathogens posing health concerns is strong, indicator levels allow public health officials to estimate the health risk related to swimming at a particular beach. But other site-specific factors are taken into consideration to supplement these estimates, such as recent rainfall patterns and the number of people who use the beach.

The concentration of a microorganism in water is usually reported as the number of colony forming units (CFU) of indicators present per 100 milliliters (ml) of water. Massachusetts has specific water quality standards for marine water and freshwater.

<u>Marine</u>

USEPA (1986) used the relationship between the number of cases of swimming-associated disease and the Enterococci concentration in bathing water to establish the criteria for Enterococci in marine waters at 104 CFU per 100 ml for a single sample and 35 CFU per 100 ml for the geometric mean of at least five samples over a 30-day period. These standards were set such that the expected incidence of gastrointestinal illness among swimmers would be the same as it had been for the previous USEPA water quality criteria

for fecal coliform (i.e., 19 illnesses per 1,000 swimmers at marine beaches). MDPH/BEH adopted this standard by regulation beginning with the 2000 bathing season.

Freshwater

As indicated in the regulations (105 CMR 445.031) (see Appendix B), the indicator organisms for freshwater bathing beaches are *E. coli* and Enterococcus. This is based on research conducted by USEPA (Dufour, 1984; USEPA, 1986). Each freshwater beach is required to test for one of these two indicators.

For Enterococcus, no sample shall exceed 61 CFU per 100 ml, and the geometric mean of the most recent five Enterococci samples within the same bathing season shall not exceed 33 CFU per 100 ml. For *E. coli*, no sample shall exceed 235 CFU per 100 ml, and the geometric mean of the most recent five *E. coli* samples within the same bathing season shall not exceed 126 CFU per 100 ml. These are the standard criteria established in MDPH/BEH regulations (105 CMR 445.031).

Both the *E. coli* and the Enterococcus standards are based on studies (Dufour, 1984; USEPA, 1986) that showed that levels of *E. coli* and Enterococci correlated strongly with rates of swimmer-associated gastrointestinal disease in freshwaters. The values are set to a level of risk of no more than eight cases of acute gastrointestinal illness per 1,000 swimmers in freshwater beaches.

C. Reporting

The laboratories performing these analyses report their results to the beach operator or board of health that has hired them. Beach operators report their results to the local board of health. Boards of health report them to MDPH/BEH.

For communities having public, marine beaches, the MDPH contract laboratories report the results directly to the MDPH/BEH Beaches Website via a secure Internet connection as soon as they are generated. Data are then displayed on the Beaches website in near real-time for public notification of beach closures and test results. Some boards of health that do not use MDPH/BEH contract laboratories fax their marine sampling results to MDPH/BEH staff who either enter the data onto the beaches website or have other laboratories perform this input for them.

1. THE BEACHES WEBSITE

In 2003, using funding provided as part of the USEPA BEACH Grant, MDPH established a web-based system designed to make up-to-date water quality information on all public, marine beaches available to the public as quickly as possible. This system has two components:

(1) A series of password-protected data-entry pages through which MDPH/BEH contract laboratories enter all water quality data (along with corresponding field data) directly into one centralized database. The laboratories are required under the MDPH/BEH contract to enter these data as soon as they become available. Local boards of health also have access to this portion of the website to review laboratory and associated field data in order to most efficiently take public health action.

(2) The Beach Water Quality Locator, a public website that allows users to select a beach via a series of interactive maps of the Massachusetts coast to see if it is

currently open and to view its most recent test results. Historical data for each beach are available as well.[10]

In 2004, MDPH developed its *Data Submission Plan for Routine Monitoring*, which was then submitted to and approved by USEPA. The procedures outlined in this document are used for data submission under the USEPA BEACH grant, as well as for other activities specific to bathing beach regulations. The Plan is a required document that describes Massachusetts' plan for submitting the beach data it collects from coastal municipalities to USEPA. USEPA then compiles data from all states to develop a national picture of marine bathing water quality.

2. EXCEEDANCES: BEACH CLOSURES & PUBLIC NOTIFICATION

When a water sample from a beach exceeds bacterial standards (either single sample or geometric mean), Massachusetts law requires that the beach be closed. MDPH/BEH contract laboratories are required to report exceedances of bacterial water quality standards to MDPH/BEH and local boards of health as soon as analyses are completed and results available. Beach operators are required to report exceedances to their local boards of health immediately.

Under Massachusetts law (MGL C 111, § 5S), the local board of health is required to post standard signs at the key access points to a beach immediately after, or within 24 hours of, being notified that the beach did not meet water quality standards. In addition, the board of health is required to notify MDPH/BEH within 24 hours of the exceedance and the closure by faxing both the laboratory results and a standard beach closure form provided to them by MDPH/BEH. The closure form affirms that that the beach waters have been closed and that signs have been put up at to that beach. MDCR is responsible for the closure and posting of its own beaches, in the event of an exceedance.

For public marine beaches, up-to-date closure information can also be accessed on MDPH/BEH's Beach Water Quality Locator website. MDPH contract laboratories enter these results into the Beaches Website as soon as they become available. When the results for a given beach exceed water quality standards for either a single-sample or geometric mean, the website automatically generates a notification of that beach's closure. These closure notifications (or "postings") are added to the Beach Water Quality Locator webpage twice each day, at 9:30 AM and 12:30 PM. This means the web-based system allows for public notification that is as near to real-time as possible. Local health officials can view postings shortly before public notification, which gives them an opportunity to place closure signs at the beaches and to prepare for public inquiries that may result, depending on the most recent data. MDPH/BEH staff have provided training to local health officials on how to use the website.

3. DATA MANAGEMENT

Marine data, already entered via the website, are uploaded to USEPA by MDPH/BEH in fulfillment of USEPA reporting requirements under the USEPA BEACH Grant, which

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[10] The Beach Water Quality Locator can be accessed through the main MDPH/BEH website (see cover) and clicking on "Bathing Beaches." It can also be accessed directly at http://mass.digitalhealthdepartment.com/public_21/index.cfm.

mandates that MDPH must electronically report to USEPA all routine marine monitoring sampling data and laboratory results, as well as beach postings, on an annual basis.

The marine data are also kept in an in-house database at MDPH/BEH for analysis and inclusion in this report. Freshwater data (including field data) are entered into the same database.

All data are validated and checked for completeness by MDPH/BEH personnel. Local boards of health and laboratories are contacted directly, as necessary, to resolve questions and discrepancies in the data.

D. Quality Assurance

As previously mentioned, MDPH/BEH's *Quality Assurance Project Plan* was revised in 2007. This document, approved by USEPA, describes the quality assurance/quality control mechanisms MDPH/BEH has developed to ensure that the state's beach monitoring activities and the resulting data meet USEPA's published performance criteria. Copies of the revised QAPP were distributed to all MDPH contract laboratories in 2007. MDPH/BEH uses the same standards for its freshwater monitoring activities.

There are four main parts of the QAPP: project management, data generation and acquisition, assessment and oversight, and data validation and usability. The project management section describes the project's organization, planning, schedule, and performance criteria. The data generation and acquisition section discusses the sampling and analytical methods, chain-of-custody, and instrument/equipment quality control. The section on assessment and oversight outlines the audits and assessments that will be performed to ensure compliance with the QAPP and Standard Operating Procedure (SOP). The final section, data validation and usability, describes the process for reviewing, verifying, and validating data.

E. The Tier System and frequency of testing

The Massachusetts and federal beach Acts require that all public and semi-public marine bathing beaches be tested weekly. However, some beaches have a history of severe pollution problems, while others have proven over time to be exceptionally clean. The former require more frequent monitoring, and the latter less frequent monitoring. For a beach that has gone two years without a single violation and where a sanitary survey has been completed to ensure there is a low risk of future violations, weekly testing may result in unnecessarily burdening local health officials' resources that could be more effectively used (e.g., providing increased testing at those beaches which, due to greater pollution, are known to pose a greater health risk to swimmers).

1. THE THREE TIERS

To address this, the USEPA BEACH Grant required the development of a tiered monitoring approach to sampling, and in 2003 MDPH/BEH developed the *Public Health-Based Beach Evaluation, Classification, and Tiered Monitoring Plan*. The purpose of the *Plan* is to facilitate the identification and clean-up of pollution problems, while allowing those beaches with more pristine records to be monitored less often than weekly. The Plan is based on a three-tier system that classifies all beaches according to the severity of their pollution:

> **Tier One** includes heavily used beaches which have pollution problems. USEPA believes that these beaches should be tested at least twice per week. Because of

the ongoing pollution concerns/violations, those beaches are generally sampled more than once a week. There are currently seven Tier One beaches in Massachusetts. All seven are marine beaches and are tested daily.

Tier Two includes higher-use beaches with some pollution. These beaches must be tested once per week. The majority of beaches (437 of the 528 marine and 544 of the 549 freshwater beaches) are categorized as Tier Two beaches.

Tier Three beaches are those with no known pollution problems. They are required to be tested once every two weeks or sometimes less frequently, as determined by the local board of health and MDPH/BEH through the variance process. There are 91 marine beaches and 5 freshwater beaches currently listed as Tier Three beaches.

Because the frequency of monitoring mandated by both federal and state law is weekly, Tier Two functions as the default, or baseline classification. If monitoring data indicate severe pollution, a beach is reclassified as Tier One and monitored more frequently. If the data show that a beach has maintained exceptionally clean water quality, it is reclassified as Tier Three, allowing for less frequent than weekly testing, usually one to two times a month.

2. SANITARY SURVEYS AND VARIANCES

For a beach to upgrade to Tier Three status, its operator must apply to the local board of health for a variance; beaches operated by State agencies must apply to MDPH. Pursuant to Massachusetts regulations (105 CMR 445.100), two requirements must be met for the variance to be issued: (1) the beach must have a proven track record of “clean” sampling; and (2) MDPH/BEH’s Sanitary Survey must be completed for the beach by a registered sanitarian. The Survey is a tool health officials can use to assess the level of pollution at a given beach and to identify all possible sources of contamination (e.g. sewage discharge, stormwater overflows, bird and animal populations). Local health officials must review sanitary surveys before approving variance applications for final approval by MDPH.

F. Forms

The various standardized forms involved in the monitoring process have been periodically updated to reflect changes to the monitoring system or improved based on field experience or feedback from laboratories and local health officials. Electronic versions of these forms can be obtained by clicking the “Publications and Reports” hyperlink on the MDPH/BEH beaches webpage.

IV. HISTORICAL ACTIVITIES

A. Training

MDPH/BEH has held numerous training sessions for local health officials during the life of the BEACH Grant. Topics discussed have included: health concerns related to polluted bathing water, sampling methodology and use of standardized field sampling forms, administration of sanitary surveys, current federal and state regulations, MDPH/BEH’s Beaches website and an overview of the GPS survey of marine beaches in Massachusetts. MDPH/BEH trainings have also presented information on identifying actual and/or potential sources of contamination. Additional technical guidance is frequently provided through mailings and personal communications with local health officials. Each year, MDPH/BEH

ETP contacts boards of health to discuss any reporting deficiencies and then MDPH updates its internal database based on these conversations.

B. Emergency Response

MDPH/BEH staff have also provided assistance in investigating potential outbreaks of water-borne parasites and illnesses. In past years, incidents requiring emergency response have included cases of *E. coli* O157:H7, giardiasis, and Vibrio vulnificus infections. These response actions can involve reviewing sampling results and/or medical records, or the preparation of educational materials, often in collaboration with local boards of health, other programs within MDPH/BEH (e.g. Food Protection, Community Sanitation) or other state agencies (e.g. MDPH's Bureau of Infectious Disease Prevention, Response and Services; MA Division of Marine Fisheries).

MDPH/BEH has also responded to numerous incidents involving algal blooms whose proximity to bathing beaches posed a potential health risk to swimmers. MDPH/BEH has provided technical support to local health officials in response to algal blooms across the state. Typically, this involves performing a site visit and providing educational materials. In 2007, MDPH/BEH developed a protocol for responding to harmful algae blooms at freshwater bodies. The algae protocol includes testing methodology, public notification guidelines, and algal concentration guidelines. The document benefited from the collaboration and input of MDCR and the Massachusetts Department of Environmental Protection (MDEP).

V. LIMITATIONS

The ability of MDPH/BEH to provide prompt public notification of beach water quality monitoring results is limited by both the completeness and accuracy of the data reported; the use of indicator organism criteria which, although strongly supported in the recent literature, has some uncertainties; and analytical techniques that require 24 hours to generate results, thereby potentially leaving beach users at risk.

Although data completeness and accuracy are inevitably reliant upon the multiplicity of parties and individuals involved in data collection and reporting, the electronic reporting system and public beaches website have vastly improved the accuracy and quality of marine data submitted. Another stabilizing factor is the nearly 100% compliance Massachusetts has achieved in recent years in the use of Enterococci, the state and federally mandated indicator organism, for testing by public marine beaches reporting routine monitoring results.

The use of proper and consistent sampling procedures is an important step in ensuring the quality of data reported. As a result of training, the use of standardized field sampling forms and the participation of contracted laboratories, consistency in the format and completeness of data reported continues to improve.

In recent years, MDPH/BEH was provided data from approximately 99% of the communities with open freshwater beaches. The amount and quality of data submitted from each community, however, varied greatly. During the beach season, communities often use different monitoring techniques. Therefore, the comprehensiveness of data varies among communities. Currently, with the exception of exceedances, which are required to be reported to the MDPH/BEH within 24 hours, freshwater beach data are normally reported

once during the year, after the end of the beach season. As a result, MDPH/BEH ETP personnel can only review the data for proper sample collecting and testing techniques after the sampling season has ended. MDPH/BEH continues to work individually with local boards of health to reduce issues related to quality control and variability by providing guidance and resources as necessary.

Another limitation, related to the specificity of analytical methods, is that the data are indicator-, not pathogen-, specific. As a result, the data only suggest a potential for the presence of pathogens that can cause human disease. The presence or absence of specific pathogens is not directly assayed. The use of indicators implies that water meeting the criteria may harbor disease-causing microorganisms and also that water considered unsafe may not carry any disease-causing microorganisms (e.g., Polo et al., 1998; Moore et al., 2001; Prieto et al., 2001; Schindler, 2001). This is an inherent limitation of using indicators as a test of water quality, in Massachusetts and elsewhere. However, it does need to be emphasized that a substantial body of scientific research generally supports the use of these indicators as described earlier in this document (Cabelli, 1983; USEPA, 1986).

The criteria developed for each indicator are set at a specific level of risk of an adverse health effect, in this case gastrointestinal illness, rather than at a no-risk level. The indicator limits recommended by USEPA for Enterococci in marine waters are associated with a risk level of 19 GI illnesses per 1,000 swimmers (USEPA, 1986). Therefore, levels of indicators considered in compliance by the Massachusetts and national requirements do not imply freedom from risk of adverse health effects for the total population at risk.

Using current indicators, it takes 24 hours to receive the results of a bathing beach water sample analysis (Wade et al., 2005). This delay can lead to the exposure of bathers to unsafe bacterial levels, as well as unnecessary closings (Wade et al., 2006) (e.g., beach closed on day of results, but by then the bacterial criteria may not be exceeded). This delay also makes it very difficult for investigators to track the contamination back to its sources, as it may dissipate before an investigation begins (Evaluation of New Methods, SCCWRP).

Development of a reliable rapid testing method continues. This new method would expedite obtaining results in the laboratory, in turn expediting the transmission of results to beach managers. Ideally, beach managers would be able to sample in the morning and receive results that same day, minimizing both exposures and unwarranted closures. A modified method of polymerase chain reaction (PCR), quantitative PCR (QPCR), detects in real time specific DNA sequences that originate from a particular organism, like fecal indicator bacteria such as Enterococcus (Haugland, 2005). QPCR can measure indicator bacteria levels in recreational water samples and give results in two hours or less (Wade et al., 2006). In freshwater studies, a significant correlation was shown between water quality as measured by QPCR and swimming-related gastroenteritis (Wade et al., 2005). Because the rapid indicator method has been shown to accurately predict health effects in much less time, its use may reduce instances of illness and erroneous beach closings (Wade et al., 2006). More studies will need to be completed before QPCR can be considered to replace the current indicator methods. USEPA plans to conduct epidemiology studies using QPCR methods through 2009, after which new test methods will be developed, refined, validated, and published (USEPA, 2007).

Finally, acceptable levels of risk are typically determined by the incidence of GI symptoms among swimmers compared to that for non-swimmers. While research has shown that GI is the most sensitive outcome, it should be noted that pathogens found in marine and

freshwater can cause other symptoms, including respiratory, dermatologic, ophthalmologic, and constitutional.

PART TWO: THE 2008 BATHING SEASON

I. MDPH ACCOMPLISHMENTS

In addition to its routine monitoring activities (outlined above), MDPH/BEH performed a variety of more specific activities, unique to the 2008 season.

A. Beaches Website/Data Management

Links to all MDPH/BEH standardized forms were checked and made available for download via the Publications and Reports hyperlink on the bathing beaches website. These forms included the Field Sampling Form, Posting Fax Form, Posting Sign Form, and the Tier III Sanitary Survey Form. Both local communities and laboratories were notified and given newly updated field data forms that made it easier for samplers to record conditions while in the field.

New forms were distributed to local boards of health in 2008

Guidance and training were provided to the New Bedford Health Department Laboratory in the operation of the beaches website. Additional guidance was provided to local boards of health, when necessary, to ensure quality assurance for data entry provided outside of the contract laboratory program.

The beach program's database was again updated for the 2008 beach season. Beach locations were revised as sampling points were combined at continuous, uninterrupted beaches; non-swim beaches were identified and reassigned; and new swim beaches were identified. New information, such as waterbody information, latitude/longitude information, and potential pollution sources, was added to the database to provide added clarity when analyzing bacterial results and also help identify potential exposure points when potential waterborne public health emergencies occur. Significant efforts were also made to update database programming which exports data to USEPA. These changes were required by USEPA to comply with the conditions of the BEACH Grant.

New information such as waterbody and pollution sources has been added to MDPH's database to help quick responses to public health emergencies

B. Public Education

During 2008, MDPH/BEH staff conducted several public outreach events regarding beach water quality in Massachusetts. On March 8th, 2008, MDPH staff participated in the 13th Annual Cape Cod Natural History Conference. A poster presentation was prepared giving the general public an overview of the Sanitary Survey conducted at Ryder Street Beach in Provincetown as part of the MDPH/BEH Flagship Beach Program. The information presented identified the main sources of bacterial pollution and their pathways to the beach. MDPH staff also participated in the first annual Dog Run Dog event in Provincetown on June 21st, 2008. Educational pet waste brochures were distributed to the public, as well as other educational materials related to bathing beach water quality. The pet waste brochure was designed to educate pet owners on the types of illnesses that can occur when pet waste is not properly disposed and included information on environmentally sound waste disposal practices to protect recreational waters in Massachusetts.

MDPH participated in two public education events to help emphasize ways to reduce beach closures and reduce illnesses related to bacterial contamination at beaches

MDPH/BEH also distributed the pet waste brochure throughout the season. The brochure is available for download via the MDPH/BEH Beaches Website.

On August 4, 2008, MDPH and USEPA sponsored a press event at Ryder Street Beach in Provincetown, MA. At this event, the USEPA spoke about its Clean New England Beaches initiative and announced the award of an additional grant, under the authority of the Federal BEACH Act, to MDPH to continue its bathing beach project. MDPH spoke about its accomplishments, including announcing the release of its annual beach monitoring data report. Speakers included Ken Moraff, Deputy Director of the Office of Ecosystem Protection, USEPA; Suzanne Condon, Associate Commissioner, MDPH and Director, BEH; and Michele Couture, chair of the Provincetown Board of Selectmen.

MDPH was awarded the USEPA BEACH Grant worth over $250,000. These monies support monitoring and other activities in Massachusetts.

C. Trainings

In April 2008, MDPH gave presentations to local health officials at five seminars held by the Massachusetts Health Officers Association (MHOA) and MDPH BEH Community Sanitation Program at locations throughout the state. MDPH beaches staff presented an update on proposed changes to the current beach regulations that would help clarify definitions, improve information for beach-goers, and empower local health authorities with additional enforcement options including a funding mechanism. Informational packets were provided containing the bathing beach regulations, beach sampling field data forms, sanitary survey forms, posting forms, and fact sheets. MDPH staff also discussed MDPH's new algae protocol including testing methodology, algal concentration and public notification guidelines, and potential sources of algae within a watershed. Importantly, time was allocated for health agents to provide feedback and pose any questions they had regarding forms and procedures.

Five trainings for local health officials were conducted prior to the beach season in 2008.

MDPH staff reviewed key points of the Tiered Monitoring Plan at the Cape and Islands Health Agents Coalition Meeting in April 2008. Topics included timelines for enacting variance, approved sampling schedules, and how to apply for a sanitary survey. Reminders were also made highlighting the fact that day and summer camps operating a bathing beach were required to sample on a weekly basis during their operational season.

As part of USEPA's ongoing Beach Strategy to reduce beach closures, meetings were held in the communities of Dartmouth, Marblehead, Provincetown, Quincy, and Salem. MDPH participated in each of these meetings and provided historical beach water quality data and background information. The goal of these meetings and the overall Beach Strategy was to bring USEPA New England and state agencies together to work with communities in reducing chronic closures. Areas vulnerable to bacterial exceedances were identified, techniques to diagnose water quality and source tracking were discussed, and the potential to remediate sources of pollution was recognized.

MDPH is working with USEPA and other state and local agencies to target high risk beaches to reduce closures.

In preparation for the 2008 beach season, MDPH staff personally communicated with bathing beach communities while collecting 2007 beach data. Local health officials were reminded of their responsibilities under the bathing beach regulations and provided with any technical assistance or forms needed. MDPH staff also discussed deficiencies in reporting and updated the internal database based on these conversations. These efforts help enhance reporting, as nearly all communities in the state now report beach testing results on a yearly basis.

D. Quality Assurance

Throughout the beach season MDPH staff conduct numerous inspections at selected beaches identified as having an exceedance to ensure proper signage is present. On two occasions MDPH staff determined insufficient or no signage being placed at these beaches. Local boards of health were contacted to ensure compliance with the beach regulations and the proper signage was placed at the beach. MDPH staff also assisted local health officials and laboratories in developing their weekly sampling schedules for the 2008 beach season. MDPH helped analyze the locations and logistics with local health officials, and staff standardized field forms with beach names and the weeks when they were to be sampled so that appropriate sampling schedules were maintained (either weekly, bi-weekly or monthly).

MDPH staff conducted numerous site visits to ensure proper public notification of bacterial contamination.

MDPH staff conducted sampling audits at eleven marine communities in 2008. These audits are required to ensure corresponding sampling techniques and methodologies are used by separate beach water samplers across the state. Regular sampling audits are required for compliance with the USEPA BEACH Grant and the Beach Program Quality Assurance Project Plan. Three communities did not adequately use trip blanks during their sample collection. These samples are used to ensure that, in the event that cross-contamination between samples occurs during collection and delivery, the error can be detected, and appropriate resampling performed. Marine local boards of health were reminded on the proper use of trip blanks prior to the start of the 2009 beach season.

MDPH staff conducted audits to ensure quality control procedures were utilized during sample collection.

E. Laboratory Program

MDPH Requests for Responses (RFR) for laboratory services were posted in the spring of 2008 on the Commonwealth Procurement Access and Solicitation System (Comm-PASS) professional services open solicitation section. The evaluation criteria were grouped into sample collection, management, and value. Contracts were revised such that they were renewable on a yearly basis for a maximum of three additional years. Laboratories were also required to supply local marine communities with routine monitoring and provide notification of test results and sampling data in a timely manner. The laboratories chosen were the Barnstable County Department of Health and Environment Water Quality Testing Laboratory, Town of Chatham Department of Health and Environment Water Quality Laboratory, G & L Laboratories, Inc., New Bedford Health Department Laboratory, and Wampanoag Environmental Laboratory. These laboratories analyzed 4,348 marine beach samples from 55 marine beach communities during the 2008 beach season.

New laboratory contracts were established in 2008 resulting in increased participation in the contract laboratory system.

Laboratories fulfilled their contract requirements by promptly entering sampling data and laboratory results into the MDPH/BEH public notification website as results became available. Beach postings were automatically generated by the website when submitted samples exceeded acceptable water quality standards. Display of these postings on the public pages occurs twice per day, at 9:30 AM and 12:30 PM.

F. Sanitary Surveys

MDPH/BEH staff provided outreach and technical assistance to communities with Tier Three eligible beaches. (Note: Beaches are eligible for Tier Three status if, for at least the two years previous, they have complete weekly sampling data and have not had any exceedances.) Personal communication and mailings resulted in requests for MDPH/BEH to conduct sanitary surveys at 17 marine beaches. Based on sanitary surveys conducted by MDPH staff, these beaches were granted sampling variances. The goal of MDPH/BEH's Public Health-Based Beach Evaluation, Classification, and Tiered Monitoring Plan is to ultimately direct water quality monitoring resources to beaches identified as those in greatest need of remediation of pollution problems.

Seventeen beaches were awarded Tier Three status before the 2008 beach season.

For example, in August of 2008, MDPH released its sanitary surveys of five beaches within Barnstable County. Each had a history of Enterococcus counts in excess of state health standards. The beaches chosen for the surveys were: Colonial Acres in Yarmouth, Rock Harbor in Orleans, Cooks Brook in Eastham, Town Landing West of Coast Guard Station and Adkins Lane in Provincetown. The communities received their reports to assist in identifying potential sources of pollution and make recommendations in reducing the number of closures at these highly visible and popular beaches. This was accomplished through additional monitoring, analysis of weather and tidal conditions, and review of environmental data. While each beach was characterized by its unique set of environmental factors, similar sources of pollution were found to increase the potential for high Enterococcus counts. Identifying these transport mechanisms for bacteria at local beaches and recommending remedial actions allows towns to be better equipped at reducing the amount of beach closure days they encounter in future seasons.

Five sanitary surveys were conducted by MDPH to help identify bacterial pollution sources at Cape Cod beaches.

G. Public Health Emergency Response

During the 2008 season, MDPH/BEH responded to several non-bacterial incidents on bathing beaches. Algae blooms were reported at Spy Pond in Arlington, Buffumville Lake in Charlton, East and West Monponsett Ponds in Halifax, Lake Siog in Holland, Oldham Pond in Pembroke, and White Island Pond in Plymouth. MDPH/BEH worked with all local health officials to ensure that the public was aware of potential health issues related to algae blooms. MDPH/BEH distributed fact sheets to local boards of health and conducted on-site assessments of the algae bloom where needed.

Algae blooms were reported at several freshwater beaches in 2008. MDPH provided support to local boards of health were needed

MDPH/BEH ETP staff also provided technical assistance in response to a case of cryptosporidium infection and other related gastrointestinal illnesses

MDPH investigated a cryptosporidium infection that may have been related to a beach in Franklin.

reported by a family who had recently swum at Chilson Beach, located in Franklin, MA. Sampling results and case information were reviewed to determine if the beach could have been a potential exposure route. In conjunction with the Franklin Board of Health, and MDPH, Bureau of Infectious Disease Prevention, Response and Services, Division of Epidemiology and Immunization, it was determined that the beach was unlikely to have been the source for cryptosporidium infection in this individual.

II. MONITORING

A. Results

This report presents the results and analysis of the 2008 data from Massachusetts marine and freshwater bathing beaches.

During the 2008 bathing season, 215 of 228 communities in Massachusetts with public or semi-public, marine or freshwater beaches sent water quality data to MDPH/BEH. Of those thirteen communities that did not submit data, twelve had closed their beaches for the duration of the 2008 beach season. These beaches were closed mainly due to lack of use and resources (e.g. staff to maintain and collect samples or money to conduct required sampling). Only one community did not submit data for freshwater beaches that were open (Oxford).

Over 99% of communities with open beaches reported data to MDPH in 2008.

In total, MDPH received water quality data collected from 603 marine and 597 freshwater sampling locations at 528 marine and 538 freshwater beaches respectively. Due to the length of some beaches in Massachusetts, multiple sampling locations are necessary to distinguish specific areas of water quality. For the purposes of this report, a sample location is considered a single beach. In total, MDPH/BEH received results for 15,470 water samples from marine and freshwater beaches collected during the 2008 beach season. There are 33 communities that have only marine bathing beaches, 168 communities that have only freshwater beaches, and 27 that have both marine and freshwater bathing beaches within their limits (Table 1).

MDPH received data for 1,200 sampling locations at over 1,000 marine and freshwater beaches in 2008.

1. MARINE BEACHES

During the 2008 bathing season, all of the 60 Massachusetts coastal communities with known public or semi-public marine bathing beaches submitted beach monitoring data to MDPH/BEH. The 60 communities that have known public and semi-public marine bathing beaches accounted for 603 sampling locations at 528 public or semi-public marine bathing beaches.

There are 60 communities with marine beaches in Massachusetts.

A total of 7,636 water samples were collected from marine public and semi-public beaches and reported to MDPH/BEH during the 2008 bathing beach season (Table 2). Bather density data were collected as part of routine sampling during 2008. Massachusetts regulations require samples to be taken within the area of greatest bather density (105 CMR 445.000). GPS

Over 7,600 samples were collected at marine beaches in 2008 to evaluate bacterial water quality.

surveys of marine beaches completed by MDPH/BEH in 2003 and subsequent observations by MDPH/BEH beach inspectors confirm that samples are being taken within the areas that typically receive the highest use (greatest bather density) such as areas near main entrances and/or areas closest to parking lots. Due to the time needed to collect and analyze samples, a majority of the samples were collected at times when bather density consisted of ten or fewer individuals (Table 3). Most samples are collected before noon, when the bather load is generally low even in high-use areas.

With the passage of the Massachusetts Beaches Act in 2000, the state adopted the USEPA recommended Enterococci as the standard indicator for water quality monitoring at marine beaches. Since the institution of the MDPH/BEH contract laboratories and website, boards of health in Massachusetts marine communities have all adopted the use of Enterococci as an indicator organism. Enterococci were the indicator used for all water samples taken at marine beaches in 2008. The use of MDPH/BEH contracted laboratories for analyzing public marine beach water samples has played a major role in achieving uniform compliance with the MDPH/BEH regulation for marine beaches.

100% of the samples collected were analyzed with the mandated indicator method.

Eighty-four percent of the marine beaches were tested daily or weekly (in most cases, the minimum requirement is weekly sampling) (Table 4). Most of the remaining marine beaches were permitted to sample less frequently because of Tier Three status. However, there was one beach that was not tested with the required frequency. This community has been contacted and reminded of the regulatory requirements for frequency of testing. MDPH/BEH contract laboratories performed the majority of analyses at marine beaches during 2008. Local health departments, independent laboratories, the National Park Service, and MDCR performed the remainder of the marine beach water analyses. Two marine beach communities opted to use non-MDPH/BEH contracted laboratories in 2008. These communities were Kingston and Mattapoisett, who faxed their data to MDPH beach inspectors, who subsequently entered the data directly onto the beaches website for prompt public notification.

Nearly 100% of all marine beaches were tested as required in 2008.

The total number of marine beach postings (i.e., verification to MDPH/BEH that a sign was posted at the beach) received in 2008 was 466 (Table 5), an increase from the 228 postings received in 2007. The number of postings in 2008 (466) was greater than the total number of single sample exceedances (433). This could be due to a variety of factors, such as increased precautionary postings due to rainfall. These data are discussed further in the Analysis of Results section. The percentage of exceedances versus total number of samples collected was 5.7% in 2008 (Table 6). Of the 603 public or semi-public marine beach locations, 195 (32%) incurred at least one bacterial exceedance (Table 7).

The number of beach postings in 2008 was 466.

5.7% of all samples collected exceeded the bacterial standard.

195 marine beaches had at least one exceedance.

Total rainfall amounts at many Massachusetts beaches during the 2008 season were higher compared to 2007 (Tables 8 through 11). In 2008, the Boston area's summer rainfall totals were above normal in the three-month beach season, particularly in July and August. The southeast region

Total rainfall in Boston was above normal in July and August.

(Chatham) received below average rainfall for June, July and August, but the amount of rainfall was higher than received in 2007. Rainfall for June, July and August was more than four inches above normal in Boston, while it was more than three inches below normal in Chatham.

As part of routine sampling, environmental observations should be recorded on a field data form and reported to MDPH/BEH. Samplers have the option of recording potential sources of pollution, as well as noting when no sources are observed. In 2008, about 40% of field data forms accompanying marine samples had information whether pollution sources were or were not observed. Thirteen percent (n=1,005) of the forms recorded a potential transient pollution source, such as birds, dogs, algae, trash, sludge deposits, waste solids, and oils. These sources are not always permanently located at the beach and thus are recorded at the time of sampling. Of the 1,005 samples that had transient pollution sources noted, 57 (5.7%) of the associated analytical results exceeded the bacterial standard (Table 12). No potential source was noted for 2,064 samples. Of these samples, 111 (5.4%) exceeded the bacterial standard. There were no observations recorded on the field data forms from 4,567 bacterial samples. There were 265 of these samples (5.8%) that exceeded the bacterial standard.

Samples that noted potential pollution sources at the beach at the time of sampling had a slightly higher rate of exceedances compared to beaches were no potential sources were noted.

2. FRESHWATER BEACHES

During the 2008 bathing season, 182 of the 195 Massachusetts communities with known public or semi-public freshwater bathing beaches submitted beach monitoring data to MDPH/BEH. Of the thirteen communities that did not report freshwater data for 2008, twelve (Brookfield, Dartmouth, Duxbury, Medway, Merrimac, New Bedford, New Marlborough, Norton, Shirley, Westport, Weymouth, and Worthington) did not open the freshwater beaches in their communities. Oxford is the only community that did not submit data for open freshwater beaches. The 182 communities contain 597 public or semi-public freshwater bathing beaches and collected a total of 7,834 freshwater samples that were reported to MDPH/BEH during the 2008 bathing beach season (Table 2).

7,834 samples were collected at Massachusetts freshwater beaches in 2008.

For bather density (Table 3), the data look similar to those for marine beaches, with a high percentage (81%) indicating low bather density (0-10 bathers on the beach) during sampling. As discussed previously, most samples are collected during non-peak bathing hours, usually between 8 AM and 12 PM. Samples at beaches are often taken in the morning to allow adequate time for delivery to and analysis at the laboratory.

Routine samples are most often collected in the morning to allow time for laboratory delivery.

In 2008, local health officials used the approved indicator organism at 100% of freshwater beaches in Massachusetts, with the majority of beaches using the *E. coli* indicator. Approximately 97% of public and semi-public freshwater beaches in Massachusetts were tested with the minimum required weekly frequency in 2008 (Table 4). Five freshwater beaches have Tier Three status and sample every other week, as approved by MDPH and the local board of health. Two percent of freshwater beaches (n = 15) either did not sample as required or did not submit data to MDPH/BEH detailing all sampling conducted for the season. As noted, communities that did not test

97% of freshwater beaches were tested weekly.

all their beaches with the required frequency have been contacted to review regulatory requirements. Independent laboratories were responsible for a majority of samples analyzed from freshwater beaches. Local health departments and MDCR performed the remainder of analyses at freshwater beaches.

The total number of freshwater beach exceedances detected in 2008 was 325 (Table 5), an increase from the 236 detected in 2007. The number of exceedances of the freshwater water quality standards (235 cfu/100 ml *E. coli* and 61 cfu/100 ml Enterococci) increased from 236 (3.0%) in 2007 to 325 (4.1%) in 2008 (Table 6). These data are discussed further in the Analysis of Results section.

325 bacterial exceedances were reported in 2008.

4.1% of bacterial water quality samples exceeded the freshwater standard.

About 59% of all samples were accompanied by field data forms that had no information on whether pollution sources were or were not observed. Ten percent (n=810) of the samples collected in 2008 were associated with a transient pollution source (Table 12) reported on the field data form, and 71 (8.8%) of these samples exceeded the bacterial standard. For the 4,598 samples with no information on the field data form, 219 (4.8%) exceeded the bacterial standard. There were no observations recorded on the field data forms from 4,593 bacterial samples. Approximately 3.9% (n=177) of these samples exceeded the bacterial standard. Of the 2,421 samples for which the absence of any observed pollution source was specifically reported, 77 (3.2%) exceeded the bacterial standard.

Samples that noted potential pollution sources at the beach at the time of sampling had a significantly higher rate of exceedance compared to beaches where no potential sources were noted.

B. Analysis of Results

Continuing the trends of previous years, MDPH/BEH observed improvements in the beach monitoring program based upon the number of communities complying with bathing beach water quality reporting requirements in 2008. All marine communities and 99% of freshwater communities with open beaches reported bathing beach water quality data to MDPH/BEH, up from 98% of marine communities and 83% of freshwater communities reporting in 2001. A significant improvement, particularly for marine beaches, is the public notification figures and increased compliance in reporting to MDPH/BEH of any posting within 24 hours. In 2001, MDPH/BEH received postings for approximately 35% of all exceedances at marine bathing beaches and approximately 40% of all exceedances at freshwater beaches. In 2008, for the first time MDPH/BEH received postings for all instances when notification to MDPH/BEH was required (a total of 466 postings for marine waters). It should be noted that a posting may not always occur when there is an exceedance. For example, if a beach is already posted because of a prior single sample or geometric mean exceedance and a follow-up sample shows a continued exceedance, an additional posting notification to MDPH/BEH is not required for the follow-up exceedance result. Therefore a single beach posting could cover several exceedances. Additionally, a posting notification is not required if a second sample is taken within 24 hours of the original exceedance and the resample results do not exceed the standard. It should also be noted that

Compliance with the Massachusetts Beach regulations continued to increase in 2008.

In 2008, all exceedances at marine beaches had corresponding posting notifications.

local boards of health may preemptively post beaches without a test result showing bacterial exceedance, and instances of this are included in the total number of postings. The current rate of postings received versus exceedances has improved greatly over the past few years.

In 2008, all but 61 exceedances had corresponding posting notifications at freshwater beaches.

Posting notifications were not received by MDPH/BEH for 61 exceedances at freshwater beaches in 2008, which is an increase over 2007, when there were 41 exceedances without posting notifications. However, this still represents an improvement over the earlier years of the beach regulations. In 2001, MDPH was notified of beach postings after 40% of exceedances. In 2008, MPDH was notified after 87% of exceedances. Nonetheless, these results highlight the need for continued outreach to health departments of freshwater communities on beach water quality regulatory requirements. Efforts were made by MDPH/BEH staff to obtain posting information by directly contacting communities both during and after the beach season to explain the regulations and by providing standardized reporting forms; both the forms and regulations were made available for download from the MDPH/BEH website. MDPH/BEH will target local health officials in communities with freshwater beaches to provide technical assistance and improve compliance with the posting requirements before the 2009 beach season.

Environmental pollution sources are being recorded by samplers more often.

Completeness of the field data forms filled out by samplers has also increased over the years. While there are still areas for improvement, such as actively reporting the presence or absence of environmental pollution sources, Massachusetts local health officials have for the most part adhered to MDPH/BEH's field forms. This can be seen in the wide range of potential sources of pollution noted on the field forms submitted in 2008. Prior to 2003, most noted potential sources of pollution were fairly general (i.e., outflow pipes, wildlife, and boats). Starting in 2004 and continuing in the 2008 bathing beach season, more communities began to document incidents of algae and wrack build-up on beaches and the presence of trash, birds, dogs, waste solids and fish die-offs. These notations become an important factor when the communities or MDPH/BEH need to identify possible reasons for continuously elevated bacterial levels at a particular beach that may increase potential health risks and to develop strategies to reduce these sources.

Observations made by samplers at freshwater beaches may help to explain some contributing factors to elevated indicator levels (Table 12). Of freshwater beaches that had a recorded pollution source, 8.8% exceeded public health standards, compared to 3.2% for those that actively noted an absence of observed sources. For marine beaches, there was a negligible difference between the percentage of exceedances at beaches where a pollution source was noted versus those where none were noted. However, it should be noted that, overall, 40% of marine samples and 41% of freshwater samples were accompanied by a field data form that did not include any information on the presence or absence of pollution sources. Active notification on the presence or absence of pollution sources is an area that needs improvement in order to help in the formulation of mitigation strategies.

As shown in Table 6, 4.5% of all marine samples collected from 2001 through 2008 exceeded the Enterococcus standard. The highest percentage of exceedances in any given year occurred in 2001 (6.2%), while the lowest occurred in 2002 (2.8%). Between 2003 and 2006, the percentages slightly rose each year from 4.2% in 2003 to 4.8% in 2006. In 2007, the percent exceedances dropped to 3.2%, which likely related to the reduced rainfall that year. In 2008, 5.7% of all the samples collected exceeded the bacterial standard, which is above the historical average. As shown in Tables 8 through 11, the amount of rainfall was elevated compared to previous years, and in the Boston area the amount of rain was considerably higher, which is likely an important reason for the increase in exceedances in 2008. A complete listing of marine beaches sampled during the 2008 beach season, their exceedances, and postings can be found in Table 13.

Exceedance rates were above historical averages for marine beaches in 2008.

Overall 4.1% of the samples collected at freshwater beaches during 2008 exceeded bacterial standards (Table 6). This percentage of exceedances was slightly lower than the historical average (4.3%), but higher than the percentage of exceedances observed in 2007 (3.0%). All communities that experienced at least one freshwater exceedance in 2008 can be seen in Figure 1. A complete listing of freshwater beaches sampled during the 2008 beach season, their exceedances, and postings can be found in Table 14.

In the summer of 2008, the Boston area experienced higher than normal rainfall, and the amount of rainfall was greater in the Boston area versus the southeast region (Chatham). Data from Amherst and Ashburnham show that, in 2008, those towns also experienced higher rainfall, both in comparison to previous years and in comparison to Chatham in 2008.

Rainfall totals were significantly elevated in the Boston area in 2008 compared to 2007.

Rainfall was below average for all three months in Chatham, but compared to 2007, each summer month in 2008 received more rainfall. For additional detail on rainfall amounts, see Tables 8 through 11, which show rainfall totals and deviation from the norm for the months of June, July and August, from 2001 through 2008. It should be noted that these are only four data points for a large geographical area and therefore localized rainfall data could be different. Stormwater runoff associated with wet weather has been shown to be a significant source of sewage contamination at bathing beaches (Cabelli et al, 1982; Cabelli, 1989; Pruss, 1998; Gerba, 2000; Schindler, 2001). Sources of runoff to surface waters include direct runoff from paved surfaces such as roads and boat ramps, runoff channeled through drainpipes, natural and man-made swales, and increased flow of freshwater streams. These sources can carry bacteria present over a wide area directly to a beach. Runoff is positively related to land-use density (houses per unit area) of the area drained (MDEP and MCZM, 1997). Therefore, exceedances are likely to be more numerous at beaches in urban areas (i.e. Boston Harbor) than beaches in rural areas (i.e. Nantucket). As shown in Figures 2-7 the majority of beaches that had multiple bacterial exceedances were in areas with high population densities. All marine communities that had at least one exceedance in 2008 appear in Figure 8. Many Massachusetts communities have addressed combined sewer overflows and stormwater runoff problems in response to USEPA's

Bacterial exceedances more likely in urban areas due to population density.

stormwater regulations. Water quality improvements are expected to continue into the future with the assistance of better monitoring and reporting as well as new infrastructure projects.

Bacterial exceedances are closely tied to rain events.

Table 15 and Figure 9 show that the total number of exceedances statewide is significantly higher within 24 hours of a rain event. These rain data are based on information recorded on the field data form. For marine beaches, all 433 exceedances had corresponding rain event information, while for freshwater beaches rain event data were recorded for 221 of the 325 bacterial exceedances in 2008. Eighty percent of marine beach exceedances and nearly 47% of freshwater exceedances occurred within 24 hours of a rain event. This figure shows the exponential drop-off in the number of exceedances as the time from rainfall increases.

Greater bather use at a beach can increase bacterial levels.

The bather load at a particular beach can affect water quality as well because humans are also sources of fecal pollution. The greater the bather density at a beach, the greater the likelihood that human sources are contributing to higher Enterococci levels. However, as in previous years, more than three quarters of the marine beach samples (89%) and freshwater beach samples (81%) that reported bather density indicated low bather density (0-10 bathers on the beach) during sampling. This can be attributed largely to samples being taken during off-peak hours for swimming. Samples are primarily collected before 12:00 PM so that laboratories can begin the analysis before the close of business and before the six hour holding time expires. Thus, it is difficult to comprehensively evaluate the effect of bather density on beach water quality.

Studies have shown spring tides to increase bacterial levels.

Another potential influence on bacteria levels in bathing waters may be spring tides. These strong tides, which take place year-round, occur when the earth, moon, and sun are in line and the gravitational forces of both the moon and sun contribute to the larger than normal tides. Spring tides occur during full and new moons, and recent attention has been focused on them with respect to water quality and beaches. In a study released by the Southern California Coastal Water Research Project, a government agency that focuses on marine environmental research, researchers found beaches twice as likely to be out of compliance with water quality standards during spring tides. This study concluded bacteria levels may be higher during spring-ebb tides (receding tides) compared to all other tidal conditions and that Enterococci densities were found at beaches during tidal events with no obvious point source. The study suggested that tidally forced sources of Enterococci may be occurring at beaches (Boehm, A. B. and S.B. Weisberg, 2005). Potential sources for these Enterococci could include beach sands and sediments, decaying plant material, and polluted groundwater. All of these sources are known to harbor fecal indicator bacteria and have the potential to become ‘activated’ with the mass and momentum of a spring tide (i.e., disturbing bacteria that would have otherwise lain dormant).

Decaying plant material has been shown to incubate bacteria and may release bacteria to the water at high tide.

The decaying plant material, or wrack line, at a beach may also be an incubator for bacteria, potentially increasing bacterial counts even outside spring tides. In addition, it has been suggested that wrack is often the subject of scavenging by wildlife and pets, which may defecate in it, further

increasing its contribution to bacterial contamination (Heufelder 1988). Wrack also keeps the soil surfaces it covers in a dark, wet environment, which is conducive to bacterial growth. Researchers have found that survival of fecal coliform and Enterococcus bacteria was far greater in salt water when organic debris (i.e., wrack) were present (Martin and Gruber 2005). Furthermore, they concluded that tidal flushing of wrack during high tide could easily transport elevated bacterial densities into the marine environment, thus potentially degrading the surrounding waters (Martin and Gruber 2005).

Other potential sources of bacteria, which are difficult to directly measure through routine beach water sampling, have the ability to influence overall water quality. At marine beaches, illicit discharges of human waste from boats may cause significant degradation of water quality where there is significant boating activity. It is generally believed that the number of illicit discharges from boats is proportional to the difficulty posed in the disposal of the wastewater; therefore there has been significant effort by many coastal communities to increase the number of locations where boat waste can safely be discharged. USEPA has also worked with state and local officials to designate all marine waters within three miles of the Massachusetts coast as a no-discharge zone and has set up a series of fines for persons who do discharge illegally.

Illicit boat waste can be a major source of beach closures.

Most of the Massachusetts coast line is now a no-discharge zone.

Additionally, sediments may act as a sink for fecal indicators at both fresh and marine beaches. These sediments may be disturbed by tides, human activities, or stormwater runoff and potentially increase bacterial contamination.

Sediments may also be a bacterial incubator and contribute to higher bacterial results.

III. FUTURE PLANS

A. Direct Web-Based Reporting

In 2009, MDPH/BEH contract laboratories, local boards of health, and others will continue to perform data entry to the electronic, web-based public notification website. MDPH/BEH will be working with contract laboratories and other data reporters to ensure that field data are accurately recorded via the web-based reporting system. Important information regarding recent rainfall data and the presence of transient pollution sources will be targeted. As in previous years, a history of postings will be maintained on the website to facilitate analysis of the data. This will provide more accurate recordkeeping so that trends can be analyzed in future annual reports.

B. Training and Community Outreach

In the spring of 2009, MDPH/BEH worked in collaboration with the MDPH/BEH Community Sanitation Program and the Massachusetts Health Officers Association to provide five separate training events for local boards of health in five different regions of the state. These trainings focused on current regulations, sampling techniques and the use of standardized reporting forms, and also provided information on harmful algae blooms. MDPH/BEH will continue to offer such training and to provide technical

MDPH conducted five trainings in the spring of 2009 for local health officials.

assistance to freshwater communities. MDPH/BEH will also provide assistance on the use of the MPDH posting form and the field data forms that are required to be completed each time a sample is taken.

C. Beach Regulations

New beach regulations will be proposed in 2009 for implementation in 2010.

MDPH/BEH will be proposing amendments to the Massachusetts beach regulations to provide more information to beachgoers and help local health officials with enforcement of the current testing and posting requirements. These amendments are also designed to clarify language currently in the regulations and ensure that notification is received by local boards of health and MDPH/BEH in the event of bacterial exceedance. The proposed amendments to the regulations or a portion of them are expected to be presented to the Public Health Council for final approval in 2009, for implementation before the 2010 beach season.

D. Sanitary Surveys

Additional sanitary surveys will be conducted to further the goals of the Tiered Monitoring Plan in 2009.

MDPH/BEH will continue to facilitate sanitary surveys in support of the Tiered Monitoring Plan and the variance process during 2009. When the Tiered Monitoring Plan is adopted at specific beaches, a “high” priority beach will receive the most frequent water quality sampling and analysis. Such a beach might be one with high bather volume, high frequency or percentage of exceedances, problematic sources of pollution, or a combination of these factors. A “medium” priority beach will be sampled once per week and will still be required to meet water quality standards. Beaches that are tiered “medium” can have any of the factors listed for “high” priority beaches but with less frequency or intensity of any of the three criteria. A “low” priority beach is one that is relatively pristine. Low-priority beaches are eligible for less frequent testing, as infrequently as every 30 days under 105 CMR 445.000, if the local health department receives a testing variance. This categorization will assist MDPH/BEH in working with local health departments in 2009 to conduct sanitary surveys that will support the Tiered Monitoring Plan. Data from the 2006 and 2007 beach seasons will be incorporated into the existing Tiered Monitoring Plan to update the published classifications. These efforts will allow MDPH/BEH and marine communities to focus on determining and alleviating pollution sources at problematic beaches, and also allowing MDPH/BEH to reduce unnecessary sampling at low-priority beaches through the variance process. MDPH/BEH will be conducting many sanitary surveys at public marine beaches in support of these efforts.

IV. SUMMARY

Over 15,000 samples were collected at 1,200 beaches in 2009.

This report summarizes beach monitoring and testing data from Massachusetts public and semi-public marine and freshwater bathing beaches in the 2008 season. In total, 215 of the 216 communities with operating bathing beaches reported 15,470 water samples collected at 1,200 beaches. The beach testing results from the 2008 season show degraded water quality compared to prior years’ results at marine beaches, with the percentage of exceedances higher than the 2007 beach season’s

averages and historical averages. As noted previously, this is likely due to increased rainfall during the 2008 beach season. Massachusetts marine communities are nearly in full compliance with the regulations with the exception of some semi-public beaches missing sampling rounds and posting notifications. This illustrates in part the success of the electronic reporting requirement through the MDPH/BEH contract laboratory system for marine beaches. This requirement has also facilitated improved compliance with the regulations by BOHs in other areas besides sample reporting. For example, 100% of the marine beach samples were tested for the correct indicator required by regulation. MDPH/BEH also achieved nearly full compliance with the posting regulation in marine communities and improved the number of postings received from freshwater communities. Also, all freshwater beaches were tested with the required indicator for the first time in 2008.

Increases in exceedances were likely related to increased rainfall that occurred during the 2008 beach season.

Compliance with beach regulation mandates continued to improve in 2008.

MDPH/BEH continues to provide training and information to local communities in an effort to improve compliance with the regulations. MDPH/BEH also continues to make improvements to its public notification website to make sure that information is accessible to the public as soon as it becomes available. In addition, MDPH/BEH is continuing to focus efforts on the most vulnerable beaches through its Tiered Monitoring Plan and sanitary surveys.

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TABLES

Table 1

MA Beaches (2008): All communities grouped by the presence or absence of marine and/or freshwater public and semi-public bathing beaches.

Type of community	#	%
Marine beach only	33	9.4%
Freshwater beach only	168	47.9%
Marine and freshwater beaches	27	7.7%
No beaches	123	35.0%
Total	351	100%

Table 2

MA Beaches (2008): Water quality testing at marine and freshwater public and semi-public bathing beaches, grouped by community, beach, and sample.

Type of community	# communities (total)	# communities with data	# beaches[1] tested	# samples
Communities with marine bathing beaches	60	60	603	7,636
Communities with freshwater bathing beaches	195	182	597	7,834
		Total	1,200	15,470

1. Note this table does not include number of beaches not tested, as data was not compiled to accurately determine this number.

Table 3

MA Beaches (2008): Bather density at marine and freshwater public and semi-public bathing beaches at times when samples were taken.

Marine beaches

Bather Density (# people)	# Samples	%
0-10	6,760	88.5%
10-20	252	3.3%
20-50	78	1.0%
>50	40	0.5%
Not indicated	506	6.6%
Total	7,636	100.0%

Freshwater beaches

Bather Density (# people)	# Samples	%
0-10	6,360	81.2%
10-20	227	2.9%
20-50	100	1.3%
>50	42	0.5%
Not indicated	1,105	14.1%
Total	7,834	100.0%

Table 4

MA Beaches (2008): Frequency of water quality testing at public and semi-public bathing beaches, grouped by beach and frequency.

Marine Beaches

Test frequency	# Beaches	%
Daily	12	2.0%
Weekly	494	81.9%
Monthly	82	13.6%
Biweekly	14	2.3%
Not monitored	1	0.2%
Total	603	100.0%

Freshwater Beaches

Test frequency	# Beaches	%
Weekly	577	96.6%
Monthly	0	0.0%
Biweekly	9	1.5%
Twice per week	4	0.7%
Unknown	5	0.8%
One time	1	0.2%
Not monitored	1	0.2%
Total	597	100.0%

Table 5

MA Beaches (2008): Number of exceedances and postings at marine and freshwater public and semi-public bathing beaches.

Marine beaches

Exceedances, Total (Enterococcus)	433
Postings, Total[1]	466
Postings, Enterococcus	331
Postings, Geomean	20
Postings, Preemptive Rainfall	108
Postings, Preemptive - Other	7

Freshwater beaches

Exceedances, Total	325
Exceedances, Enterococcus	126
Exceedances, E. Coli	198
Postings, Total[1]	196
Postings, Enterococcus	93
Postings, E. Coli	87
Postings, Preemptive	8
Postings, Algae	1
Postings, Geomean	7

1. Total postings does not necessarily equal total exceedances because some tests that resulted in exceedances may have occurred while the beach was closed, or beach closings covered multiple parts of a beach that were counted as separate beaches in this report.

Table 6

MA Beaches (2008): Number of samples in which the measured Enterococcus concentration (marine beaches) or Enterococcus or E. coli concentration (freshwater beaches) exceeded their respective water quality criteria at public and semi-public bathing beaches.

Year	Marine Beaches			Freshwater Beaches		
	Exceedances[1]	Total Samples Analyzed	%	Exceedances[1]	Total Samples Analyzed	%
2001	444	7200	6.2%	336	5651	5.9%
2002	185	6686	2.8%	264	6473	4.1%
2003	311	7451	4.2%	333	6480	5.1%
2004	336	7868	4.3%	267	7313	3.7%
2005	369	8073	4.6%	286	7148	4.0%
2006	404	8361	4.8%	279	7438	3.8%
2007	247	7674	3.2%	236	7977	3.0%
2008	433	7636	5.7%	325	7834	4.1%
Average	341	7619	4.5%	291	7039	4.3%

1. For marine beaches, Enterococcus is the indicator species. A sample is said to be in exceedance if the number of colony forming units (CFU) / 100 ml is greater than 104 for a single sample or greater than 35 for the average of 5 samples over a 40-day period. For freshwater beaches, either Enterococcus or *E. coli* can be used as indicator species. For Enterococcus, a sample is said to be in exceedance if the number of CFU / 100 ml is greater than 61 for a single sample or greater than 33 for the average of at least 5 samples over a 40-day period. For *E. coli*, a sample is said to be in exceedance if the number of CFU / 100 ml is greater than 235 for a single sample or greater than 126 for the average of at least 5 samples over a 40-day period.

Table 7

MA Beaches (2008): Number of beaches in which
at least one measured Enterococcus concentration (marine beaches)
or at least one Enterococcus or E. coli concentration (freshwater beaches)
exceeded the respective water quality criteria at public bathing beaches.

Marine	195	603	32.3%
Freshwater	161	597	27.0%

Table 8

MA Beaches (2002-2008): Rainfall during swimming season - Boston*

Boston

Year	Rainfall	June	July	August	Total
n/a	**Norm for month**	**3.22**	**3.06**	**3.37**	**9.65**
2002	**Total**	4.78	1.42	2.13	8.33
	Dev From Norm	+48%	-54%	-37%	-14%
2003	**Total**	4.69	2.11	2.89	9.69
	Dev From Norm	+46%	-31%	-14%	<1%
2004	**Total**	1.95	3.87	4.38	10.20
	Dev From Norm	-39%	+26%	+30%	+6%
2005	**Total**	1.46	3.37	2.88	7.71
	Dev From Norm	-55%	+10%	-15%	-20%
2006	**Total**	10.09	3.58	3.20	16.87
	Dev From Norm	+213%	+17%	-5%	+75%
2007	**Total**	2.12	5.26	0.66	8.04
	Dev From Norm	-34%	+72%	-80%	-17%
2008	**Total**	3.46	6.00	4.47	13.93
	Dev From Norm	+7%	+96%	+33%	+44%

* obtained from the National Weather Service Forecast office, at
http://www.erh.noaa.gov/er/box/dailystns.shtml

Table 9

MA Beaches (2002-2008): Rainfall during swimming season - Chatham*

Chatham

Year	Rainfall	June	July	August	Total
n/a	**Norm for month**	**3.44**	**3.38**	**3.33**	**10.15**
2002	**Total**	2.88	0.48	2.45	5.81
	Dev From Norm	-16%	-86%	-26%	-43%
2003	**Total**	5.07	1.78	3.46	10.31
	Dev From Norm	+47%	-47%	+4%	+2%
2004	**Total**	1.60	2.48	5.49	9.57
	Dev From Norm	-53%	-27%	+65%	-6%
2005	**Total**	1.61	3.37	2.99	7.97
	Dev From Norm	-53%	<1%	-10%	-21%
2006	**Total**	9.49	2.97	2.61	15.07
	Dev From Norm	+176%	-12%	-22%	+48%
2007	**Total**	1.38	2.80	0.35	4.53
	Dev From Norm	-60%	-17%	-89%	-55%
2008	**Total**	1.78	2.85	1.92	6.55
	Dev From Norm	-48%	-16%	-42%	-35%

* obtained from the National Weather Service Forecast office, at
http://www.erh.noaa.gov/er/box/dailystns.shtml

Table 10

MA Beaches (2002-2008): Rainfall during swimming season - Amherst*

Amherst

Year	Rainfall	June	July	August	Total
n/a	**Norm for month**	**3.81**	**3.95**	**4.1**	**11.86**
2002	**Total**	4.80	2.08	3.41	10.29
	Dev From Norm	+26%	-47%	-17%	-13%
2003	**Total**	5.90	2.69	7.99	16.58
	Dev From Norm	+55%	-32%	+95%	+40%
2004	**Total**	2.91	3.89	3.77	10.57
	Dev From Norm	-24%	-2%	-8%	-11%
2005	**Total**	4.42	2.41	2.81	9.64
	Dev From Norm	+16%	-39%	-31%	-19%
2006	**Total**	6.39	2.83	3.31	12.53
	Dev From Norm	+68%	-28%	-19%	+6%
2007	**Total**	2.59	5.50	1.12	9.21
	Dev From Norm	-32%	+39%	-73%	-22%
2008	**Total**	6.92	8.20	2.37	17.49
	Dev From Norm	+82%	+108%	-42%	+47%

* Data obtained from the National Climatic Data Center's
Preliminary Record of Climatological Observations, at
http://cdo.ncdc.noaa.gov/pls/plclimprod/poemain.cdobystn?dataset=DS3220&StnList=190120NN

Table 11

MA Beaches (2002-2008): Rainfall during swimming season - Ashburnham*

Ashburnham

Year	Rainfall	June	July	August	Total
n/a	**Norm for month**	**4.06**	**4.05**	**4.28**	**12.39**
2002	**Total**	4.08	2.50	3.16	9.74
	Dev From Norm	<1%	-38%	-26%	-21%
2003	**Total**	4.46	1.10	5.74	11.30
	Dev From Norm	+10%	-73%	+34%	-9%
2004	**Total**	1.93	2.90	5.15	9.98
	Dev From Norm	-52%	-28%	+20%	-19%
2005	**Total**	4.43	5.07	3.37	12.87
	Dev From Norm	+9%	+25%	-21%	+4%
2006	**Total**	8.54	3.55	4.50	16.59
	Dev From Norm	+110%	-12%	+5%	+34%
2007	**Total**	3.76	6.23	1.32	11.31
	Dev From Norm	-7%	+54%	-69%	-9%
2008	**Total**	4.14	7.80	3.90	15.84
	Dev From Norm	+2%	+93%	-9%	+28%

* Data obtained from the National Climatic Data Center's
Preliminary Record of Climatological Observations, at
http://cdo.ncdc.noaa.gov/pls/plclimprod/poemain.cdobystn?dataset=DS3220&StnList=190190NN

Table 12

MA Beaches (2008): Number of exceedances at public and semi-public beaches which reported environmental sources of pollution.

Pollution Source?[1]	Marine beaches			Freshwater beaches		
	# Excee-dances	# Samples	%	# Excee-dances	# Samples	%
Yes	57	1005	5.7%	71	810	8.8%
Unknown	265	4,567	5.8%	177	4,593	3.9%
No	111	2,064	5.4%	77	2,431	3.2%
Total	433	7636	5.7%	325	7,834	4.1%

1 "Yes" indicates that a source was observed; "unknown" means that no information was recorded; "no" indicates that the field forms explicitly record an absence of pollution sources.

Table 13

MA Marine Beaches (2008): Water quality data for public and semi-public bathing beaches.

Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Aquinnah	Lobsterville	Monthly	Enterococci	3				
Aquinnah	Moshup Beach	Monthly	Enterococci	5				
Aquinnah	Philbin Beach	Weekly	Enterococci	13	1	146	146	
Aquinnah	Red Beach	Monthly	Enterococci	3				
Barnstable	Bone Hill	Weekly	Enterococci	13				
Barnstable	Bridge Street	Weekly	Enterococci	13				
Barnstable	Cordwood Road	Weekly	Enterococci	14	1	188	188	1
Barnstable	Cotuit Bay Shores Association	Weekly	Enterococci	14	1	116	116	1
Barnstable	Covell's	Weekly	Enterococci	16	1	268	268	1
Barnstable	Craigville	Weekly	Enterococci	16	1	130	130	1
Barnstable	Craigville Beach Club	Weekly	Enterococci	11				
Barnstable	Crocker's Neck	Weekly	Enterococci	13				
Barnstable	Cross Street	Weekly	Enterococci	13				
Barnstable	Dowses	Weekly	Enterococci	15				
Barnstable	East (Town) Beach	Weekly	Enterococci	14	1	156	156	1
Barnstable	Estey Avenue	Weekly	Enterococci	14	1	156	156	1
Barnstable	Fifth Ave (boat launch)	Weekly	Enterococci	13				
Barnstable	Indian Trail	Weekly	Enterococci	13				
Barnstable	Kalmus Ocean	Weekly	Enterococci	16	1	374	374	1
Barnstable	Kalmus Yacht	Weekly	Enterococci	14	1	400	400	1
Barnstable	Kennedy Memorial	Weekly	Enterococci	13				
Barnstable	Keyes Beach	Weekly	Enterococci	20	5	126	400	5
Barnstable	Little River Road	Weekly	Enterococci	14	1	154	154	1
Barnstable	Loops	Weekly	Enterococci	13				
Barnstable	Millway	Weekly	Enterococci	13				
Barnstable	Oregon	Weekly	Enterococci	14	1	220	220	1
Barnstable	Oyster Harbors Club	Weekly	Enterococci	13	1	166	166	1
Barnstable	Oyster Place	Weekly	Enterococci	13				
Barnstable	Ropes	Weekly	Enterococci	16	3	106	400	3
Barnstable	Sandy Neck	Weekly	Enterococci	13				
Barnstable	Scudder Lane	Weekly	Enterococci	13				
Barnstable	Seaside Park Improvement Association	Weekly	Enterococci	12				
Barnstable	Veterans	Weekly	Enterococci	15	1	118	118	1
Barnstable	Wianno Avenue	Weekly	Enterococci	13				
Barnstable	Wianno Club (Salt-107 Seaview)	Weekly	Enterococci	12				
Beverly	Brackenbury	Weekly	Enterococci	14	2	142	148	2
Beverly	Dane Street - Bathhouse	Weekly	Enterococci	14	2	130	146	1
Beverly	Goat Hill	Weekly	Enterococci	13	2	138	202	1
Beverly	Independence Park	Weekly	Enterococci	12				

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Beverly	Lynch Park	Weekly	Enterococci	13	1	196	196	1
Beverly	Mingo	Weekly	Enterococci	13	1	264	264	1
Beverly	Obear Park	Weekly	Enterococci	14	1	156	156	1
Beverly	Rice	Weekly	Enterococci	12				
Beverly	Sandy Point	Weekly	Enterococci	13	1	160	160	1
Beverly	West	Weekly	Enterococci	12				
Beverly	Woodbury	Weekly	Enterococci	12				
Boston	Camp Harbor View	Weekly	Enterococci	14				
Boston	Carson Beach (DCR - DUPR) @ Bathhouse	Daily	Enterococci	77	8	197	4630	19
Boston	Carson Beach (DCR - DUPR) @ I St.	Daily	Enterococci	77	10	121	2300	19
Boston	City Point Beach (DCR)	Daily	Enterococci	77	1	663	663	11
Boston	Constitution (DCR - DUPR) - Middle	Daily	Enterococci	77	9	110	2780	13
Boston	Constitution (DCR - DUPR) - North	Daily	Enterococci	77	6	132	2930	13
Boston	Constitution (DCR - DUPR) - Rec Center	Daily	Enterococci	77	7	145	1630	13
Boston	Lovell's Island (DCR - DUPR)	Weekly	Enterococci	12				
Boston	M Street Beach @ M Street (DCR - DUPR)	Daily	Enterococci	76	9	108	1270	16
Boston	Malibu (DCR - DUPR)	Weekly	Enterococci	17	2	784	5400	1
Boston	Pleasure Bay @ Broadway (DCR - DUPR)	Weekly	Enterococci	30	1	4000	4000	2
Boston	Savin Hill (DCR - DUPR)	Weekly	Enterococci	17	2	1090	5700	1
Boston	Spectacle Island	Weekly	Enterococci	12				
Boston	Tenean (DCR - DUPR)	Daily	Enterococci	78	18	108	1600	27
Bourne	Barlows Landing	Weekly	Enterococci	5				
Bourne	Briarwood Marine and Science	Weekly	Enterococci	9				
Bourne	Cataumet Harbor	Weekly	Enterococci	14	1	122	122	1
Bourne	Cedar Point Association	Weekly	Enterococci	12				
Bourne	Electric Avenue	Weekly	Enterococci	5				
Bourne	Gray Gables	Weekly	Enterococci	14	1	300	300	1
Bourne	Hideaway Village Association	Weekly	Enterococci	12				
Bourne	Monument	Weekly	Enterococci	5				
Bourne	Patiusset Beach	Weekly	Enterococci	13				
Bourne	Pocasset Beach Improvement Association	Weekly	Enterococci	12				
Bourne	Sagamore	Weekly	Enterococci	13				
Bourne	Scraggy Neck Recreation Association	Weekly	Enterococci	12				
Bourne	Tahanto Associates, Inc.	Weekly	Enterococci	12				
Bourne	Wings Neck Trust Association (North Beach)	Weekly	Enterococci	12				
Bourne	Wings Neck Trust Association (South Beach)	Weekly	Enterococci	12				
Braintree	Smith Beach	Weekly	Enterococci	13				
Brewster	Breakwater Landing	Weekly	Enterococci	13				
Brewster	Brewster Dunes	Weekly	Enterococci	12				
Brewster	Cape Cod Sea Camps (Bay)	Weekly	Enterococci	13	1	116	116	
Brewster	Crosby Landing	Weekly	Enterococci	14	1	166	166	1
Brewster	Ellis Landing	Weekly	Enterococci	11	1	128	128	1

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Brewster	Ellis Landing Park Condominiums	Weekly	Enterococci	13	1	140	140	
Brewster	Linnell Landing	Monthly	Enterococci	4				
Brewster	Ocean Edge	Weekly	Enterococci	12				
Brewster	Paines Creek	Weekly	Enterococci	14	1	130	130	1
Brewster	Pilgrim Pine Acres	Weekly	Enterococci	8				
Brewster	Pinelands Park	Weekly	Enterococci	12				
Brewster	Point of Rocks	Monthly	Enterococci	4				
Brewster	Robbins Hill	Weekly	Enterococci	13				
Brewster	Saints Landing	Weekly	Enterococci	13				
Brewster	Sea Pines	Weekly	Enterococci	12				
Brewster	Sunset Beach Association	Weekly	Enterococci	13	1	214	214	1
Brewster	Winslow Landing Road	Weekly	Enterococci	10				
Chatham	Andrew Harding Lane Beach	Weekly	Enterococci	13				
Chatham	Bucks Creek	Weekly	Enterococci	15	2	112	152	1
Chatham	Chatham Bars Inn	Weekly	Enterococci	11				
Chatham	Cockle Cove	Weekly	Enterococci	13				
Chatham	Cockle Cove Creek @ Parking Lot	Weekly	Enterococci	13	8	111	569	1
Chatham	Cockle Cove Creek @ Bridge	Weekly	Enterococci	13	1	262	262	1
Chatham	Forest Street Beach	Weekly	Enterococci	13				
Chatham	Hardings	Weekly	Enterococci	13				
Chatham	Hardings	Weekly	Enterococci	13				
Chatham	Hawthorne	Weekly	Enterococci	13				
Chatham	Jacknife Harbor	Weekly	Enterococci	13				
Chatham	Lighthouse	Weekly	Enterococci	13				
Chatham	Oyster Pond	Weekly	Enterococci	13				
Chatham	Pleasant Street	Weekly	Enterococci	13				
Chatham	Ridgevale	Weekly	Enterococci	13				
Chatham	Scatteree Town Landing	Weekly	Enterococci	13				
Chilmark	Great Rock Bight	Monthly	Enterococci	3				
Chilmark	Menemsha	Monthly	Enterococci	4				
Chilmark	Ocean @ Chilmark Pond Preserve	Weekly	Enterococci	12				
Chilmark	Ocean @ Lucy Vincent Beach	Monthly	Enterococci	5				
Chilmark	Ocean @ Squibnocket Beach	Weekly	Enterococci	12				
Chilmark	Pond @ Lucy Vincent Beach	Weekly	Enterococci	13	2	123	181	2
Cohasset	Bassing's (Sailing Club)	Weekly	Enterococci	14	2	113	116	2
Cohasset	Black Rock	Weekly	Enterococci	12				
Cohasset	Sandy	Weekly	Enterococci	12				
Cohasset	Sandy Cove	Weekly	Enterococci	11				
Cohasset	Yacht Club	Weekly	Enterococci	12				
Danvers	Sandy Beach	Weekly	Enterococci	13	1	210	210	1
Dartmouth	Anthony's	Weekly	Enterococci	13	1	500	500	1
Dartmouth	Apponagansett Town Beach	Weekly	Enterococci	13	1	500	500	1

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Dartmouth	Bayview	Weekly	Enterococci	14	2	220	500	2
Dartmouth	Demarest Lloyd (DCR - DSPR)	Weekly	Enterococci	15	1	112	112	1
Dartmouth	Hidden Bay	Weekly	Enterococci	12	2	160	500	2
Dartmouth	Jones Town Beach	Weekly	Enterococci	13				1
Dartmouth	Moses Smith Creek	Weekly	Enterococci	12	1	500	500	1
Dartmouth	Nonquitt	Weekly	Enterococci	12				
Dartmouth	Oak Hill Shores	Weekly	Enterococci	12	1	500	500	1
Dartmouth	Round Hill	Biweekly	Enterococci	6				
Dartmouth	Salter's Point East	Weekly	Enterococci	12				
Dartmouth	Salter's Point South	Weekly	Enterococci	12				
Dennis	Bayview	Weekly	Enterococci	14	1	400	400	1
Dennis	Chapin Memorial	Weekly	Enterococci	16	1	156	156	1
Dennis	Cold Storage	Weekly	Enterococci	13				1
Dennis	Corporation	Weekly	Enterococci	16	1	120	120	1
Dennis	Follins Pond	Weekly	Enterococci	13				
Dennis	Glendon Road	Weekly	Enterococci	13				
Dennis	Haigis	Weekly	Enterococci	13				
Dennis	Harborview	Weekly	Enterococci	13				
Dennis	Howes Street	Weekly	Enterococci	14	1	400	400	1
Dennis	Inman Road	Weekly	Enterococci	14	1	400	400	1
Dennis	Mayflower	Weekly	Enterococci	16	1	394	394	1
Dennis	Raycroft	Weekly	Enterococci	13				
Dennis	Sea Street (Dennisport)	Weekly	Enterococci	13				
Dennis	Sea Street (East Dennis)	Weekly	Enterococci	14				1
Dennis	South Village	Weekly	Enterococci	13				
Dennis	Sullivan (Depot St.)	Weekly	Enterococci	13				
Dennis	Trotting Park	Weekly	Enterococci	13				
Dennis	West Dennis - Residential	Weekly	Enterococci	16	3	114	304	3
Dennis	West Dennis - West	Weekly	Enterococci	13				
Dennis	West Dennis - West of Snack Bar	Weekly	Enterococci	13				
Duxbury	Duxbury Beach @ Bath House	Weekly	Enterococci	14				
Duxbury	Landing Road	Weekly	Enterococci	16	3	120	1800	2
Duxbury	Residents Beach (Duxbury Beach)	Weekly	Enterococci	14				
Duxbury	Shipyard Lane	Weekly	Enterococci	14				
Duxbury	West End	Weekly	Enterococci	16	2	105	107	2
Eastham	Boat Meadow	Weekly	Enterococci	13				
Eastham	Campground	Weekly	Enterococci	14	1	114	114	1
Eastham	Coast Guard 1	Weekly	Enterococci	10				
Eastham	Coast Guard 2	Weekly	Enterococci	10				
Eastham	Cole Road	Weekly	Enterococci	13				
Eastham	Cook's Brook	Weekly	Enterococci	13				
Eastham	Dyer Prince	Weekly	Enterococci	13				

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Eastham	First Encounter Beach	Weekly	Enterococci	13				
Eastham	First Encounter - Spit River	Weekly	Enterococci	13				
Eastham	Kingsbury	Weekly	Enterococci	13				
Eastham	Nauset Light 1	Weekly	Enterococci	10				
Eastham	Nauset Light 2	Weekly	Enterococci	10				
Eastham	Nauset Light 3	Weekly	Enterococci	10				
Eastham	S. Sunken Meadow	Weekly	Enterococci	13				
Eastham	Silver Springs Association	Weekly	Enterococci	12				
Eastham	Thumpertown	Weekly	Enterococci	13				
Eastham	Town Cove	Weekly	Enterococci	13				
Edgartown	Bend in the Road	Monthly	Enterococci	4				
Edgartown	Chappy Beach Club	Weekly	Enterococci	8				
Edgartown	Chappy Point Beach	Monthly	Enterococci	3				
Edgartown	East Beach (Chappy)	Monthly	Enterococci	7				
Edgartown	Fuller Street	Monthly	Enterococci	4				
Edgartown	Joseph Sylvia State Beach - Big Bridge	Weekly	Enterococci	13				
Edgartown	Norton Point Beach - East Ocean	Monthly	Enterococci	6				
Edgartown	Ocean @ Edgartown Great Pond	Monthly	Enterococci	3				
Edgartown	South Beach State Park East	Monthly	Enterococci	3				
Edgartown	South Beach State Park Middle	Weekly	Enterococci	12				
Edgartown	South Beach State Park West	Monthly	Enterococci	3				
Edgartown	Wasque Swim Beach	Weekly	Enterococci	7				
Essex	Clammer's Beach	Weekly	Enterococci	13				
Essex	Front Beach	Monthly	Enterococci	4				
Fairhaven	Fort Phoenix (DCR - DSPR)	Weekly	Enterococci	15	1	410	410	1
Fairhaven	Manhattan Avenue	Weekly	Enterococci	11				
Fairhaven	Raymond Street	Weekly	Enterococci	11				
Fairhaven	Seaview	Weekly	Enterococci	13	2	248	500	2
Fairhaven	West Island Causeway	Monthly	Enterococci	3				
Fairhaven	West Island Town Beach	Monthly	Enterococci	3				
Falmouth	Acapesket Improvement Association	Weekly	Enterococci	12				
Falmouth	Bikepath Beach (Trunk River) East	Weekly	Enterococci	8	2	112	244	1
Falmouth	Bikepath Beach (Trunk River) West	Weekly	Enterococci	14	1	114	114	1
Falmouth	Bristol East	Weekly	Enterococci	14	1	110	110	1
Falmouth	Bristol West	Weekly	Enterococci	13				
Falmouth	Chapoquoit	Weekly	Enterococci	14	1	120	120	1
Falmouth	Chapoquoit Associates - Front Beach	Weekly	Enterococci	12				
Falmouth	Chapoquoit Associates - Little Beach	Weekly	Enterococci	12				
Falmouth	Falmouth Associates - 564 Surf Drive	Weekly	Enterococci	12				
Falmouth	Falmouth Heights East	Weekly	Enterococci	13				
Falmouth	Falmouth Heights West	Weekly	Enterococci	13				
Falmouth	Falmouth Yacht Club	Weekly	Enterococci	13	1	400	400	1

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Falmouth	Jetty Lane	Weekly	Enterococci	12				
Falmouth	Little Island Beach Preserve	Weekly	Enterococci	10				
Falmouth	Megansett North	Weekly	Enterococci	13				
Falmouth	Menauhant East	Weekly	Enterococci	13				
Falmouth	Menauhant West	Weekly	Enterococci	13				
Falmouth	Mill Road	Weekly	Enterococci	13				
Falmouth	New Silver (Silver Beach Improvement Association)	Weekly	Enterococci	9				
Falmouth	Nobska Beach Association	Weekly	Enterococci	12				
Falmouth	Old Silver 1 Central	Weekly	Enterococci	13				
Falmouth	Old Silver 2 North	Weekly	Enterococci	14	1	136	136	1
Falmouth	Old Silver 2 South	Weekly	Enterococci	14	1	148	148	1
Falmouth	Old Silver Beach Estates Assoc.	Weekly	Enterococci	14	2	108	320	2
Falmouth	Quisset Beach Association	Weekly	Enterococci	6				
Falmouth	Racing Beach Association	Weekly	Enterococci	12				
Falmouth	Saconessett Hills Association	Weekly	Enterococci	15	3	112	400	2
Falmouth	Seacoast Shores Associates, Inc.	Weekly	Enterococci	12	1	400	400	1
Falmouth	Seacrest Resort	Weekly	Enterococci	8	1	176	176	1
Falmouth	Shorewood Beach Association	Weekly	Enterococci	13	1	400	400	1
Falmouth	Sippewissett Highlands Trust	Weekly	Enterococci	13	1	132	132	1
Falmouth	Stoney Beach (MBL)	Weekly	Enterococci	14	1	168	168	1
Falmouth	Surf Drive 1	Weekly	Enterococci	13				
Falmouth	Surf Drive East	Weekly	Enterococci	13				
Falmouth	Surf Drive Pool	Weekly	Enterococci	13				
Falmouth	Wild Harbour Estates	Weekly	Enterococci	14	2	120	126	2
Falmouth	Wood Neck Beach	Weekly	Enterococci	13				
Falmouth	Wood Neck River	Weekly	Enterococci	17	4	114	298	3
Gloucester	Cressy's	Monthly	Enterococci	3				
Gloucester	Good Harbor	Weekly	Enterococci	13				
Gloucester	Good Harbor Creek	Weekly	Enterococci	12				
Gloucester	Half Moon	Monthly	Enterococci	3				
Gloucester	Niles	Monthly	Enterococci	3				
Gloucester	Pavillion Beach	Monthly	Enterococci	3				
Gloucester	Plum Cove	Weekly	Enterococci	7	2	180	300	2
Gloucester	Wingearsheek	Weekly	Enterococci	13				
Harwich	Allen Harbor	Weekly	Enterococci	12				
Harwich	Atlantic Avenue	Monthly	Enterococci	4				
Harwich	Bank Street - Bayview Rd	Monthly	Enterococci	4				
Harwich	Brooks	Monthly	Enterococci	4				
Harwich	Earle Road	Monthly	Enterococci	4				
Harwich	Grey Neck	Monthly	Enterococci	4				
Harwich	Merkel Beach (Snow Inn Road)	Monthly	Enterococci	4				
Harwich	Neel Road	Monthly	Enterococci	4				

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Harwich	Old Mill Point Association Left	Weekly	Enterococci	12				
Harwich	Old Mill Point Association Right	Weekly	Enterococci	14	2	136	140	2
Harwich	Pleasant Bay	Monthly	Enterococci	4				
Harwich	Pleasant Road	Monthly	Enterococci	4				
Harwich	Red River East	Weekly	Enterococci	4				
Harwich	Red River Middle	Weekly	Enterococci	11	1	128	128	1
Harwich	Red River West	Weekly	Enterococci	14	1	400	400	1
Harwich	Seabreeze	Monthly	Enterococci	4				
Harwich	The Belmont	Weekly	Enterococci	14	2	114	182	1
Harwich	Wah Wah Taysee Road	Monthly	Enterococci	4				
Harwich	Wequasett Inn Resort	Weekly	Enterococci	12				
Harwich	Zylpha	Monthly	Enterococci	5				
Hingham	Belair	Weekly	Enterococci	10				
Hingham	Kimball	Weekly	Enterococci	10				
Hingham	North	Weekly	Enterococci	11	1	291	291	1
Hingham	Otis	Weekly	Enterococci	10				
Hingham	Seal Cove	Weekly	Enterococci	9				
Hingham	Town Beach	Weekly	Enterococci	10				
Hingham	Wampatuck	Weekly	Enterococci	10				
Hingham	Yacht Club	Weekly	Enterococci	10				
Hull	A Street Bay Side	Weekly	Enterococci	15	3	115	236	4
Hull	A Street Ocean	Weekly	Enterococci	12				
Hull	Darcy's	Weekly	Enterococci	12				
Hull	Edgewater	Weekly	Enterococci	13	1	473	473	1
Hull	Gunrock	Weekly	Enterococci	13	1	346	346	1
Hull	Hampton Circle	Weekly	Enterococci	7				
Hull	James Ave.	Weekly	Enterococci	12				
Hull	Kenberma	Biweekly	Enterococci	7				
Hull	Nantasket (DCR - DUPR) @ Bathhouse	Weekly	Enterococci	16	1	120	120	1
Hull	Nantasket (DCR - DUPR) @ North Site	Weekly	Enterococci	16	1	173	173	1
Hull	Nantasket (DCR - DUPR) @ Park St.	Weekly	Enterococci	16				1
Hull	Nantasket (DCR - DUPR) @ Water St.	Weekly	Enterococci	16	1	173	173	1
Hull	Newport	Weekly	Enterococci	12				
Hull	XYZ	Biweekly	Enterococci	7				
Ipswich	Clark	Weekly	Enterococci	14				
Ipswich	Crane	Monthly	Enterococci	4				
Ipswich	Little Neck	Weekly	Enterococci	14				
Ipswich	Pavillion	Monthly	Enterococci	4				
Ipswich	Steep Hill	Weekly	Enterococci	14				
Kingston	Gray's	Weekly	Enterococci	15				
Kingston	Rocky Nook	Weekly	Enterococci	15				
Lynn	Kings (DCR - DUPR) @ Kimball Rd.	Weekly	Enterococci	25	10	125	6550	7

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Lynn	Kings (DCR - DUPR) @ Ocean Terrace	Weekly	Enterococci	16	6	141	8000	4
Lynn	Kings (DCR - DUPR) @ Outlet	Weekly	Enterococci	25	18	135	45000	7
Manchester	Black	Weekly	Enterococci	15				
Manchester	Magnolia @ Tennis Club	Weekly	Enterococci	14				
Manchester	Magnolia 1	Weekly	Enterococci	16	1	176	176	
Manchester	Singing - Right of Parking	Weekly	Enterococci	15				
Manchester	Singing 1	Weekly	Enterococci	15				
Manchester	Tuck's Point	Weekly	Enterococci	16	2	128	260	1
Manchester	West Manchester	Weekly	Enterococci	16	2	134	400	2
Manchester	White	Weekly	Enterococci	15				
Marblehead	Crocker Park	Weekly	Enterococci	12				
Marblehead	Devereux	Weekly	Enterococci	12				
Marblehead	Gas House	Weekly	Enterococci	13	1	240	240	1
Marblehead	Grace Oliver	Weekly	Enterococci	12				
Marblehead	Stramski	Weekly	Enterococci	12				
Marblehead	Sunset Road	Weekly	Enterococci	12				
Marblehead	Village Street	Weekly	Enterococci	12				
Marion	Beverly Yacht	Weekly	Enterococci	12				
Marion	Converse Point	Weekly	Enterococci	12				
Marion	Dexter Lane	Weekly	Enterococci	12				
Marion	Island Wharf	Weekly	Enterococci	12				
Marion	Oakdale Avenue	Weekly	Enterococci	12				
Marion	Piney Point	Weekly	Enterococci	12				
Marion	Planting Island	Weekly	Enterococci	12				
Marion	Silver Shell - North Jetty	Weekly	Enterococci	13	1	228	228	1
Marion	Silver Shell - South Jetty	Weekly	Enterococci	12				
Marion	Tabor Academy 1	Weekly	Enterococci	12				
Marion	Tabor Academy 2	Weekly	Enterococci	12				
Marshfield	Brant Rock	Weekly	Enterococci	12				
Marshfield	Fieldston @ 9th Rd.	Weekly	Enterococci	12				
Marshfield	Fieldston	Weekly	Enterococci	12				
Marshfield	Green Harbor	Weekly	Enterococci	14	2	346	473	1
Marshfield	Rexhame	Weekly	Enterococci	15				
Mashpee	Callies Beach	Monthly	Enterococci	4				
Mashpee	Mashpee Neck Road (Town Landing)	Weekly	Enterococci	13				
Mashpee	Maushup Village	Weekly	Enterococci	13	1	110	110	1
Mashpee	New Seabury Inn	Weekly	Enterococci	12	1	128	128	1
Mashpee	Popponesset	Weekly	Enterococci	13	1	130	130	1
Mashpee	Popponesset Spit	Weekly	Enterococci	13	1	176	176	1
Mashpee	Seconsett Island Causeway	Weekly	Enterococci	13				
Mashpee	South Cape Beach (DCR - DSPR)	Weekly	Enterococci	14				
Mattapoisett	Antasawomak 1	Weekly	Enterococci	10				

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Mattapoisett	Antasawomak 2	Weekly	Enterococci	10				
Mattapoisett	Aucoot	Weekly	Enterococci	12	2	108	498	
Mattapoisett	Brant Beach	Weekly	Enterococci	10	1	272	272	
Mattapoisett	Crescent	Weekly	Enterococci	10				
Mattapoisett	Harbor 1	Weekly	Enterococci	13	3	242	500	1
Mattapoisett	Harbor 2	Weekly	Enterococci	10				
Mattapoisett	Hollywoods 1	Weekly	Enterococci	10				
Mattapoisett	Hollywoods 2	Weekly	Enterococci	10				
Mattapoisett	Land Trust Reservation	Weekly	Enterococci	10				
Mattapoisett	Leisure Shores	Weekly	Enterococci	11	1	150	150	1
Mattapoisett	Mattapoisett Shores Association	Weekly	Enterococci	10				
Mattapoisett	Ned's Point	Weekly	Enterococci	10				
Mattapoisett	Peases Point	Weekly	Enterococci	10				
Mattapoisett	Point Connett	Weekly	Enterococci	10				
Mattapoisett	Town Beach	Weekly	Enterococci	12	2	320	440	
Nahant	Black Rock	Weekly	Enterococci	12	1	111	111	1
Nahant	Canoe	Weekly	Enterococci	12				
Nahant	Nahant Beach (DCR - DUPR) @ Flagpole	Weekly	Enterococci	15				1
Nahant	Nahant Beach (DCR - DUPR) @ N. of Bathhouse	Weekly	Enterococci	16				1
Nahant	Nahant Beach (DCR - DUPR) @ Parking #9	Weekly	Enterococci	16	1	120	120	1
Nahant	Nahant Beach (DCR - DUPR) @ South Site	Weekly	Enterococci	16	2	106	220	1
Nahant	Short	Weekly	Enterococci	12				
Nahant	Tudor	Weekly	Enterococci	13	1	113	113	1
Nantucket	40th Pole 1	Weekly	Enterococci	12	1	400	400	1
Nantucket	Children's	Weekly	Enterococci	11				
Nantucket	Cisco	Monthly	Enterococci	3				
Nantucket	Cliffside	Monthly	Enterococci	8				
Nantucket	Dionis	Weekly	Enterococci	3				
Nantucket	Jetties	Monthly	Enterococci	3				
Nantucket	Madaket	Monthly	Enterococci	3				
Nantucket	Miacomet	Monthly	Enterococci	3				
Nantucket	Sconset 1	Weekly	Enterococci	3				
Nantucket	Sewerbeds	Monthly	Enterococci	3				
Nantucket	Surfside 1	Monthly	Enterococci	1				
Nantucket	Surfside 2	Monthly	Enterococci	3				
Nantucket	Warren's Landing	Monthly	Enterococci	3				
Nantucket	Washing Pond	Monthly	Enterococci	3				
Nantucket	Washington Street	Weekly	Enterococci	12	1	400	400	1
Nantucket	Wauwinet	Weekly	Enterococci	11	1	126	126	1
New Bedford	400 North	Weekly	Enterococci	11				
New Bedford	400 South	Weekly	Enterococci	12	1	500	500	1
New Bedford	Davy's Locker	Weekly	Enterococci	12	1	440	440	1

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
New Bedford	J. Beach	Weekly	Enterococci	11				
New Bedford	Kids Beach	Weekly	Enterococci	11				
New Bedford	O'Tools	Weekly	Enterococci	17	3	136	578	2
New Bedford	Squid	Weekly	Enterococci	12	1	384	384	1
New Bedford	Tabor Park South	Weekly	Enterococci	12	1	500	500	1
New Bedford	Tower 1	Weekly	Enterococci	12	1	500	500	1
New Bedford	Tower 4	Weekly	Enterococci	13	2	254	500	1
Newbury	Plum Island	Monthly	Enterococci	3				
Newburyport	Plum Island @ 55th St.	Biweekly	Enterococci	7				
Newburyport	Plum Island - End of Island 1	Biweekly	Enterococci	7				
Newburyport	Plum Island - End of Island 2	Biweekly	Enterococci	7				
Newburyport	Plum Island Point	Biweekly	Enterococci	7				
Oak Bluffs	Eastville Town Beach - Drawbridge	Weekly	Enterococci	11				
Oak Bluffs	Eastville Town Beach - Harbor	Weekly	Enterococci	11				
Oak Bluffs	Joseph Sylvia State Beach - Little Bridge	Weekly	Enterococci	11				
Oak Bluffs	Joseph Sylvia State Beach Sound	Weekly	Enterococci	11				
Oak Bluffs	Marinelli (Jetty) Beach	Weekly	Enterococci	11				
Oak Bluffs	Pay Beach - Inkwell	Weekly	Enterococci	10				
Oak Bluffs	Pay Beach	Weekly	Enterococci	11				
Oak Bluffs	Pecoy Point Preserve Beach	Weekly	Enterococci	11				
Oak Bluffs	Sailing Camp Park	Weekly	Enterococci	11				
Orleans	Kent's Point	Biweekly	Enterococci	7				
Orleans	Little Inn at Pleasant Bay	Weekly	Enterococci	12				
Orleans	Meeting House Pond	Weekly	Enterococci	5	1	116	116	1
Orleans	Nauset	Monthly	Enterococci	4				
Orleans	Paw Wah Pond	Monthly	Enterococci	4				
Orleans	Pleasant Bay	Monthly	Enterococci	4				
Orleans	Priscilla's Landing	Monthly	Enterococci	4				
Orleans	Quanset Harbor Club Association	Weekly	Enterococci	12				
Orleans	Rock Harbor	Weekly	Enterococci	13				
Orleans	Skaket Beach	Biweekly	Enterococci	7				
Orleans	Skaket Beach Condominiums	Weekly	Enterococci	13	1	132	132	1
Orleans	Town Cove	Weekly	Enterococci	13				
Plymouth	Nelson Street	Weekly	Enterococci	12				
Plymouth	Plymouth 1	Weekly	Enterococci	12				
Plymouth	Plymouth 3	Weekly	Enterococci	12	1	125	125	1
Plymouth	Plymouth 5	Weekly	Enterococci	12				
Plymouth	White Horse - Full Sail	Weekly	Enterococci	12	1	3000	3000	1
Plymouth	White Horse - Hill Top	Weekly	Enterococci	12				
Provincetown	29 Commercial Street	Weekly	Enterococci	16	3	120	1890	3
Provincetown	333 Commercial Street	Weekly	Enterococci	14	1	480	480	1
Provincetown	451 Commerical Street	Weekly	Enterococci	14	1	260	260	1

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Provincetown	593 Commercial Street	Weekly	Enterococci	18	5	142	1780	3
Provincetown	637 Commercial Street	Weekly	Enterococci	16	3	300	1810	1
Provincetown	Atkins Lane	Weekly	Enterococci	16	3	184	400	3
Provincetown	Atlantic Avenue	Weekly	Enterococci	16	3	136	990	3
Provincetown	Court Street	Weekly	Enterococci	16	3	110	860	3
Provincetown	Herring Cove (National)	Weekly	Enterococci	10				
Provincetown	Johnson Street	Weekly	Enterococci	13				
Provincetown	Kendal Lane	Weekly	Enterococci	18	5	120	810	3
Provincetown	Provincetown Inn Rotary	Weekly	Enterococci	14	1	400	400	1
Provincetown	Race Point (National) 1	Weekly	Enterococci	10				
Provincetown	Race Point (National) 2	Weekly	Enterococci	10				
Provincetown	Race Point (National) 3	Weekly	Enterococci	10				
Provincetown	Ryder Street Left	Weekly	Enterococci	14	1	320	320	1
Provincetown	Ryder Street Middle	Weekly	Enterococci	14	1	450	450	1
Provincetown	Ryder Street Right	Weekly	Enterococci	14	1	500	500	1
Provincetown	Town Landing - Breakwater	Weekly	Enterococci	16	3	250	970	1
Provincetown	Town Landing - Snail Road	Weekly	Enterococci	17	5	106	1270	2
Provincetown	Town Landing West of Coast Guard	Weekly	Enterococci	15	2	184	1140	2
Provincetown	West End Lot	Weekly	Enterococci	16	3	110	2500	3
Quincy	Avalon	Weekly	Enterococci	14	1	125	125	1
Quincy	Broady (Baker)	Weekly	Enterococci	14	1	364	364	1
Quincy	Chikatawbot	Weekly	Enterococci	14	1	149	149	1
Quincy	Delano Ave.	Weekly	Enterococci	14	1	134	134	1
Quincy	Edgewater	Weekly	Enterococci	14	1	113	113	1
Quincy	Germantown Firestation	Weekly	Enterococci	13				
Quincy	Heron	Weekly	Enterococci	14	1	116	116	1
Quincy	Merrymount	Weekly	Enterococci	13				
Quincy	Mound	Weekly	Enterococci	13				
Quincy	Nickerson	Weekly	Enterococci	14	1	364	364	1
Quincy	Orchard Street	Weekly	Enterococci	14	1	464	464	1
Quincy	Parkhurst	Weekly	Enterococci	15	3	113	1800	3
Quincy	Rhoda	Weekly	Enterococci	18	8	108	4100	5
Quincy	Wollaston (DCR - DUPR) @ Channing	Daily	Enterococci	77	14	108	2930	18
Quincy	Wollaston (DCR - DUPR) @ Milton	Daily	Enterococci	77	11	132	7270	19
Quincy	Wollaston (DCR - DUPR) @ Rice	Daily	Enterococci	77	10	109	2380	20
Quincy	Wollaston (DCR - DUPR) @ Sachem	Daily	Enterococci	76	9	110	4110	20
Revere	Revere (DCR - DUPR) @ State Police	Weekly	Enterococci	15	1	133	133	
Revere	Revere (DCR - DUPR) @ Oak Island	Weekly	Enterococci	15				
Revere	Revere (DCR - DUPR) @ Point of Pines	Weekly	Enterococci	15				
Revere	Revere (DCR - DUPR) @ Shirley	Weekly	Enterococci	15				
Revere	Short (DCR - DUPR)	Weekly	Enterococci	15				
Rockport	Back	Monthly	Enterococci	3				

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Rockport	Cape Hedge	Monthly	Enterococci	3				
Rockport	Front Beach	Weekly	Enterococci	12				
Rockport	Long - Gloucester	Monthly	Enterococci	3				
Rockport	Long - North	Monthly	Enterococci	3				
Rockport	Old Garden	Weekly	Enterococci	12				
Rockport	Pebble	Monthly	Enterococci	3				
Salem	Children's Island - Back	Weekly	Enterococci	10	1	366	366	
Salem	Children's Island - Dock	Weekly	Enterococci	10				
Salem	Children's Island - Wally	Weekly	Enterococci	10				
Salem	Collins Cove	Weekly	Enterococci	12				
Salem	Dead Horse	Weekly	Enterococci	12				
Salem	Forest River Point	Weekly	Enterococci	12				
Salem	Juniper Point	Weekly	Enterococci	12				
Salem	Mackey	Weekly	Enterococci	12				
Salem	Ocean Avenue	Weekly	Enterococci	12				
Salem	Osgood	Weekly	Enterococci	12				
Salem	Pioneer	Weekly	Enterococci	12				
Salem	Steps	Weekly	Enterococci	13	1	560	560	1
Salem	Willow Avenue	Weekly	Enterococci	12				
Salem	Willows Pier	Weekly	Enterococci	12				
Salem	Winter Island (Waikiki)	Weekly	Enterococci	13	1	184	184	1
Salisbury	Salisbury (DCR - DSPR) - North Beach	Weekly	Enterococci	15				
Salisbury	Salisbury (DCR - DSPR)	Weekly	Enterococci	15				
Sandwich	East Sandwich	Weekly	Enterococci	13				
Sandwich	Scusset (DCR - DSPR)	Weekly	Enterococci	15	1	220	220	1
Sandwich	Torrey Beach Community Association	Weekly	Enterococci	13	1	110	110	
Sandwich	Town Neck - End of Boardwalk	Weekly	Enterococci	13	1	308	308	1
Sandwich	Town Neck - Mill Creek	Weekly	Enterococci	14	1	108	108	1
Sandwich	Town Neck (Horizons)	Weekly	Enterococci	14				
Scituate	Egypt	Weekly	Enterococci	11				
Scituate	Humarock	Weekly	Enterococci	11				
Scituate	Minot	Weekly	Enterococci	11				
Scituate	Peggotty	Weekly	Enterococci	11				
Scituate	Sand Hills	Weekly	Enterococci	10				
Scituate	Scituate Lighthouse	Weekly	Enterococci	11				
Somerset	Pearse	Weekly	Enterococci	17	4	107	500	4
Swampscott	Eisman's	Weekly	Enterococci	11				
Swampscott	Fisherman's	Weekly	Enterococci	12	1	150	150	1
Swampscott	Kings	Weekly	Enterococci	11				
Swampscott	Phillips	Biweekly	Enterococci	6				
Swampscott	Preston	Weekly	Enterococci	12	1	455	455	1
Swampscott	Whales	Weekly	Enterococci	11				

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Swansea	Cedar Cove	Weekly	Enterococci	12				
Swansea	Coles River Club off Harbor Rd	Weekly	Enterococci	11				
Swansea	Leeside	Weekly	Enterococci	12				
Swansea	Sandy Beach	Weekly	Enterococci	12				
Swansea	Town Beach	Weekly	Enterococci	12				
Tisbury	Hilman's Point	Weekly	Enterococci	12				
Tisbury	Mink Meadows	Not Monitored						1
Tisbury	Owen Little Way	Weekly	Enterococci	14	2	141	176	2
Tisbury	Owen Park	Monthly	Enterococci	4				
Tisbury	Ramble Trail Preserve Beach	Weekly	Enterococci	11				
Tisbury	Sound @ Wilfred's Pond Preserve	Monthly	Enterococci	4				
Tisbury	Tashmoo Beach	Monthly	Enterococci	4				
Tisbury	Tashmoo Cut	Monthly	Enterococci	4				
Tisbury	Vineyard Harbor Motel	Weekly	Enterococci	12				
Truro	Ballston	Monthly	Enterococci	4				
Truro	Coast Guard Town	Monthly	Enterococci	4				
Truro	Cold Storage/Pond Village	Weekly	Enterococci	14	1	110	110	1
Truro	Corn Hill	Monthly	Enterococci	4				
Truro	Crow's Nest (496 Shore Rd)	Weekly	Enterococci	13				
Truro	Dune's Colony (648 Shore Rd)	Weekly	Enterococci	14	1	400	400	1
Truro	Fisher	Monthly	Enterococci	4				
Truro	Great Hollow	Monthly	Enterococci	4				
Truro	Head of the Meadow (National)	Weekly	Enterococci	10				
Truro	Head of the Meadow (Town)	Monthly	Enterococci	4				
Truro	Longnook	Monthly	Enterococci	4				
Truro	Noon's Landing	Weekly	Enterococci	14	1	174	174	1
Truro	Pamet Harbor	Weekly	Enterococci	15	2	126	400	2
Truro	Ryder	Monthly	Enterococci	4				
Truro	Sunset Village (379 Shore Rd)	Weekly	Enterococci	14	1	154	154	1
Truro	Town Landing Beach Point	Weekly	Enterococci	14	1	400	400	1
Wareham	Briarwood	Weekly	Enterococci	13	1	110	110	1
Wareham	East Boulevard	Biweekly	Enterococci	7				
Wareham	Forbes	Weekly	Enterococci	16	7	106	400	7
Wareham	Little Harbor	Weekly	Enterococci	14	2	168	234	2
Wareham	North Boulevard	Weekly	Enterococci	13	1	254	254	1
Wareham	Onset	Weekly	Enterococci	12				
Wareham	Parkwood	Weekly	Enterococci	12				
Wareham	Pinehurst	Weekly	Enterococci	12				
Wareham	Point Independence	Weekly	Enterococci	12				
Wareham	Riverside Avenue	Biweekly	Enterococci	7				
Wareham	Shell Point	Biweekly	Enterococci	7				
Wareham	Swift's	Weekly	Enterococci	12				

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Wareham	Swift's Neck	Weekly	Enterococci	12				
Wellfleet	Burton Baker	Monthly	Enterococci	4				
Wellfleet	Cahoon Hollow	Monthly	Enterococci	4				
Wellfleet	Chequesset Yacht and Country Club	Weekly	Enterococci	12				
Wellfleet	Duck Harbor	Monthly	Enterococci	4				
Wellfleet	Indian Neck	Monthly	Enterococci	4				
Wellfleet	Kellers Corner	Monthly	Enterococci	4				
Wellfleet	Maguires Landing	Monthly	Enterococci	4				
Wellfleet	Marconi 1	Weekly	Enterococci	10				
Wellfleet	Marconi 2	Weekly	Enterococci	10				
Wellfleet	Marconi 3	Weekly	Enterococci	10				
Wellfleet	Mayo	Weekly	Enterococci	13				
Wellfleet	Newcomb Hollow	Monthly	Enterococci	4				
Wellfleet	Omaha Road	Monthly	Enterococci	4				
Wellfleet	Powers Landing	Monthly	Enterococci	4				
Wellfleet	White Crest	Monthly	Enterococci	4				
West Tisbury	Great Pond @ Long Point	Weekly	Enterococci	12				
West Tisbury	Lambert's Cove Beach North	Weekly	Enterococci	12				
West Tisbury	Lambert's Cove Beach South	Weekly	Enterococci	12				
West Tisbury	Ocean @ Long Point East	Weekly	Enterococci	11				
West Tisbury	Ocean @ Long Point West	Weekly	Enterococci	11				
West Tisbury	Sepiessa Point	Weekly	Enterococci	12				
Westport	Baker's Beach	Weekly	Enterococci	11				
Westport	C and K Club	Weekly	Enterococci	13	3	176	320	
Westport	Cherry & Webb	Monthly	Enterococci	3				
Westport	East Beach	Monthly	Enterococci	3				
Westport	Elephant Rock	Weekly	Enterococci	12				
Westport	Horseneck (DCR - DSPR)	Weekly	Enterococci	14				
Westport	Spindle Rock	Weekly	Enterococci	13	1	440	440	
Westport	Town Beach	Weekly	Enterococci	12				
Weymouth	George E. Lane	Weekly	Enterococci	11	2	115	139	2
Weymouth	Wessagusett (Old Wessagussett)	Biweekly	Enterococci	6				
Winthrop	Donovans	Weekly	Enterococci	11	2	427	6900	4
Winthrop	Grandview	Weekly	Enterococci	11	1	2800	2800	1
Winthrop	Halford	Weekly	Enterococci	11				
Winthrop	Pico	Weekly	Enterococci	11	1	655	655	1
Winthrop	Winthrop (DCR - DUPR)	Weekly	Enterococci	14				
Winthrop	Yerrill	Weekly	Enterococci	11				
Yarmouth	Bass River East	Weekly	Enterococci	15				
Yarmouth	Bass River West	Weekly	Enterococci	15				
Yarmouth	Baxter Avenue	Weekly	Enterococci	13				
Yarmouth	Bay Road	Weekly	Enterococci	14	1	400	400	1

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Yarmouth	Bayview Street	Weekly	Enterococci	16	1	222	222	1
Yarmouth	Colonial Acres East	Weekly	Enterococci	16	1	126	126	
Yarmouth	Colonial Acres West	Weekly	Enterococci	18	3	250	400	
Yarmouth	Columbus Avenue	Weekly	Enterococci	13				
Yarmouth	Englewood	Weekly	Enterococci	13				
Yarmouth	Follins Pond	Weekly	Enterococci	13				
Yarmouth	Gray's Beach	Weekly	Enterococci	15				
Yarmouth	Ocean Club @ Smugglers Beach	Weekly	Enterococci	12				
Yarmouth	Parkers River East	Weekly	Enterococci	15				
Yarmouth	Parkers River West	Weekly	Enterococci	15	1	168	168	1
Yarmouth	Seagull (Center)	Weekly	Enterococci	15				
Yarmouth	Seagull (Left)	Weekly	Enterococci	15				
Yarmouth	Seagull (Right)	Weekly	Enterococci	15				
Yarmouth	Seaview Ave. Beach	Weekly	Enterococci	14	1	112	112	1
Yarmouth	South Middle	Weekly	Enterococci	13				
Yarmouth	Thatcher Town Park	Weekly	Enterococci	15				
Yarmouth	Wilbur Park	Weekly	Enterococci	13				
Yarmouth	Windmill	Weekly	Enterococci	13				

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Table 14

MA Freshwater Beaches (2008): Water quality data for public and semi-public bathing beaches.

Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Abington	Island Grove Beach	Weekly	E. Coli	10				
Acton	NARA Beach	Weekly	E. Coli	22	3	240	600	1
Agawam	Robinson Pond Beach 1	Weekly	Enterococci	16	1	360	360	1
Amesbury	Camp Bauercrest	Weekly	E. Coli	9				
Amesbury	Glen Devin Condominiums	Weekly	E. Coli	13	3	320	2400	
Amesbury	Lake Attitash-Dam/Bathing area	Weekly	E. Coli	13				
Amesbury	Lake Gardner-Greatest batherload	Weekly	E. Coli	13				
Amesbury	Whitehall Lake Condominiums-Crowninshield Mgmt.	Weekly	E. Coli	13				
Andover	Pomps Pond - Center	Weekly	E. Coli	12	2	260	390	
Andover	Pomps Pond - Center	Weekly	Fecal Coliform	11				
Andover	Pomps Pond - Left Side	Weekly	E. Coli	12				
Andover	Pomps Pond - Left Side	Weekly	Fecal Coliform	12				
Andover	Pomps Pond - Right Side	Weekly	E. Coli	12	1	240	240	
Andover	Pomps Pond - Right Side	Weekly	Fecal Coliform	12				
Arlington	Arlington Reservoir	Weekly	E. Coli	11				
Arlington	Medford Boat Club - Upper	Weekly	E. Coli	13	2	316	1120	1
Arlington	Medford Boat Club - Lower	Weekly	E. Coli	13	1	440	440	
Ashburnham	Camp Winnekeag Pond	Weekly	E. Coli	9				
Ashby	Camp Middlesex	Weekly	E. Coli	11	1	410	410	2
Ashby	Damon Pond Beach	Weekly	Enterococci	18	4	100	310	3
Ashfield	Ashfield Lake Beach	Weekly	E. Coli	16				
Ashland	Ashland Reservoir-Main Beach	Weekly	Enterococci	16	1	94	94	1
Athol	Ellis Beach	Weekly	E. Coli	15				
Athol	Silver Lake	Weekly	E. Coli	14				
Auburn	Century Sportsmen	Weekly	E. Coli	15				
Ayer	Ayer Town Beach	Weekly	E. Coli	14				
Ayer	Mirror Lake	Weekly	E. Coli	10				
Barnstable	Bearses Pond	Weekly	E. Coli	13				
Barnstable	Fair Acres Country Day School	Weekly	E. Coli	8				
Barnstable	Garrett's Pond	Weekly	E. Coli	14	1	444	444	1
Barnstable	Gooseberry Pond	Weekly	E. Coli	13				
Barnstable	Hamblin Pond	Weekly	E. Coli	13				
Barnstable	Hathaway Pond	Weekly	E. Coli	13				
Barnstable	Homestead Homeowner's Association	Weekly	E. Coli	13	1	696	696	1
Barnstable	Joshua's Pond	Weekly	E. Coli	13				
Barnstable	Long Pond (Centerville)	Weekly	E. Coli	13				
Barnstable	Long Pond Farms Association	Weekly	E. Coli	12				
Barnstable	Lovell's Pond	Weekly	E. Coli	13				

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Barnstable	Middle Pond	Weekly	E. Coli	14	1	740	740	1
Barnstable	Mystic Lake Race Lane	Weekly	E. Coli	13				
Barnstable	Mystic Lake Sawmill	Weekly	E. Coli	13				
Barnstable	Regency Drive Owners Association 1	Weekly	E. Coli	13	1	800	800	1
Barnstable	Regency Drive Owners Association 2	Weekly	E. Coli	13				1
Barnstable	Sand Shores Association	Twice per week	E. Coli	25				
Barnstable	Shallow Pond	Weekly	E. Coli	14	1	280	280	1
Barnstable	Shubael Pond	Weekly	E. Coli	13				
Barnstable	Wequaquet Heights Association - 118 Conners	Weekly	E. Coli	12				
Barnstable	Wequaquet Heights Association - Jimmy's Beach	Weekly	E. Coli	12				
Barnstable	Wequaquet Lake Town	Weekly	E. Coli	13				
Barnstable	Wequaquet Lake Yacht	Weekly	E. Coli	13				
Barnstable	Wianno Club (Fresh-Crystal Lake)	Weekly	E. Coli	11				
Barnstable	Wianno Club (Fresh-Crystal Lake)	Weekly	Enterococci	1				
Becket	Becket Woods Beach	Weekly	E. Coli	9				
Becket	Becket Woods Dock	Weekly	E. Coli	9				
Becket	Camp Becket Iroquois Beach	Weekly	E. Coli	14				
Becket	Camp Becket Main Beach	Weekly	E. Coli	14				
Becket	Camp Greylock Jr. Beach	Weekly	E. Coli	11				
Becket	Camp Watitoh Beach	Weekly	E. Coli	10				
Becket	Center Lake Estates Beach	Weekly	E. Coli	16				
Becket	Center Pond Beach	Weekly	E. Coli	16				
Becket	Chimney Corners Beach	Weekly	E. Coli	14				
Becket	Crystal Pond Beach	Weekly	E. Coli	16				
Becket	Excalibur	Biweekly	E. Coli	9				
Becket	Indian Lake Boat Dock	Weekly	E. Coli	16				
Becket	Indian Lake Large Beach	Weekly	E. Coli	16				
Becket	Indian Lake Small Beach	Weekly	E. Coli	16				
Becket	Indian Lake Small Pond Beach	Weekly	E. Coli	16				
Becket	Lancelot Beach	Biweekly	E. Coli	9				
Becket	Little Robin Beach	Biweekly	E. Coli	9				
Becket	Mountain Grove Beach	Weekly	E. Coli	16				
Becket	Robin Hood #1	Biweekly	E. Coli	9				
Becket	Robin Hood #2	Biweekly	E. Coli	9				
Becket	Shawnee Shore Beach	Weekly	E. Coli	16				
Bedford	Springs Brook Park Bathing Beach Pad	Weekly	E. Coli	16				
Bedford	Springs Brook Park Bathing Beach Rivulet	Weekly	E. Coli	8				
Belchertown	Lake Arcadia	Weekly	E. Coli	9				
Bellingham	Arcand Park	Weekly	E. Coli	12				
Bellingham	Silver Lake	Weekly	E. Coli	12	1	330	330	
Billerica	Nutting Lake - Micozzi Beach North	Weekly	E. Coli	16	2	248	600	2

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Billerica	Nutting Lake - Micozzi Beach South	Weekly	E. Coli	16				2
Bolton	Bolton Town Beach	Weekly	E. Coli	15				
Bolton	Camp Virginia Beach	Weekly	E. Coli	8				
Bolton	Tom Denny Camp	Weekly	E. Coli	11	1	250	250	1
Bourne	Picture Lake	Weekly	E. Coli	15	2	256	344	2
Bourne	Queen Sewell Pond	Weekly	E. Coli	13				
Boxford	Camp Rotary - Greatest Batherload	Biweekly	E. Coli	5				
Braintree	Sunset Lake	Weekly	E. Coli	15	4	260	1380	4
Brewster	Beechwood	Weekly	E. Coli	12				
Brewster	Blueberry Pond	Weekly	E. Coli	12				
Brewster	Cape Cod Sea Camps (Long Pond)	Weekly	E. Coli	12				
Brewster	Cliff Pond - DYS	Weekly	Enterococci	14	1	500	500	1
Brewster	Cliff Pond	Weekly	Enterococci	13				
Brewster	Flax Pond	Weekly	Enterococci	13				
Brewster	Greenland Pond	Weekly	E. Coli	12				
Brewster	Long Pond	Weekly	E. Coli	13				
Brewster	Long Pond at Camp Favorite	Weekly	E. Coli	12				
Brewster	Owl Pond	Weekly	E. Coli	13	1	400	400	
Brewster	Seymour Pond	Weekly	E. Coli	13				
Brewster	Sheep Pond	Weekly	E. Coli	13				
Brewster	Sheep Pond Beach (Tupelo Rd.)	Weekly	E. Coli	13	1	236	236	
Brewster	Slough Pond Camp	Weekly	E. Coli	10				
Brewster	Slough Pond	Weekly	E. Coli	13				
Brewster	Upper Mill Pond	Weekly	E. Coli	13				
Brimfield	Dean Pond Beach	Weekly	Enterococci	17	2	70	600	2
Carver	Cooper's Pond	Weekly	E. Coli	17				
Carver	Crystal Lake	Weekly	E. Coli	17				
Carver	John's Pond	Weekly	E. Coli	17				
Carver	Sampson's Pond	Weekly	E. Coli	17				
Charlemont	Cold River Pool	Weekly	Enterococci	19	6	70	600	4
Charlton	Camp Foskett	Weekly	E. Coli	16	1	470	470	
Charlton	Camp Joslin	Weekly	E. Coli	10				
Charlton	Little Nugget	Weekly	E. Coli	9				
Charlton	Prindle Beach	Weekly	E. Coli	9				
Chatham	Goose Pond	Weekly	Enterococci	15	2	88	104	2
Chatham	Pilgrim Village	Weekly	Enterococci	8				
Chatham	Schoolhouse Pond	Weekly	Enterococci	13				
Chatham	White Pond	Weekly	Enterococci	18				
Chelmsford	Freeman Lake - Dam	Weekly	E. Coli	11	3	396	600	2
Chelmsford	Freeman Lake - Dock	Weekly	E. Coli	11	2	480	600	1
Chesterfield	Chesterfield Scout Reservation - BSA	Weekly	E. Coli	9				
Chicopee	Chicopee Beach	Weekly	Enterococci	16	1	70	70	1

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Clarksburg	Mausert Pond - Day use area beach	Weekly	Enterococci	17	3	260	500	2
Concord	Annursnac Hill Assoc.	Weekly	E. Coli	16				
Concord	Silver Hill Assoc	Weekly	E. Coli	17	1	1000	1000	1
Concord	Walden Pond - Main	Weekly	Enterococci	17	1	179	179	1
Concord	Walden Pond - Red Cross	Weekly	Enterococci	16				
Concord	White Pond - SW Cove	Weekly	E. Coli	16				
Concord	White Pond Assoc	Weekly	E. Coli	16				
Conway	Conway Swimming Pool	Weekly	E. Coli	11	1	346	346	
Cummington	Shire Village Beach	Weekly	E. Coli	8				
Dennis	Flax Pond	Weekly	E. Coli	13				
Dennis	Princess Beach-Scargo Lake	Weekly	E. Coli	13				
Dennis	Scargo Lake	Weekly	E. Coli	13				
Douglas	Breezy Picnic Grounds	Weekly	E. Coli	14				
Douglas	Lake Manchaug Camping	Weekly	E. Coli	14				
Douglas	Wallum Lake	Weekly	E. Coli	7				
Douglas	Wallum Lake	Weekly	Enterococci	15				
Dover	Grossman Beach	Weekly	E. Coli	11				
Dover	Powissett	Weekly	E. Coli	11				
Dracut	Fleur de Lis	Weekly	E. Coli	9				
Dracut	Grove	Weekly	E. Coli	9				
Dracut	Hilltop	Weekly	E. Coli	9				
Dracut	Mascuppic	Weekly	E. Coli	10				
Dracut	Passaconaway	Weekly	E. Coli	9				
Dracut	Peter's Pond	Weekly	E. Coli	9				
Dracut	Richardson	Weekly	E. Coli	9				
Dudley	Merino Pond	Weekly	E. Coli	9				
East Brookfield	Camp Frank A Day	Weekly	E. Coli	13	1	1200	1200	
East Brookfield	Lake Lashaway	Weekly	E. Coli	11	1	560	560	1
Eastham	Great Pond	Weekly	E. Coli	13				
Eastham	Herring Pond	Weekly	E. Coli	13				
Eastham	Long Pond (Depot St.)	Weekly	E. Coli	13				
Eastham	Minister's Pond	Weekly	E. Coli	13				
Eastham	Nauset Haven Lakeside Condo (Minister)	Weekly	E. Coli	12				
Eastham	Whispering Pines Condo (Muddy Pond)	Weekly	E. Coli	12				
Eastham	Wiley Park	Weekly	E. Coli	13				
Easton	Swim Area	Weekly	E. Coli	12				
Egremont	Prospect Lake Park	Weekly	E. Coli	12				
Erving	Laurel Lake	Weekly	Enterococci	16	1	600	600	1
Essex	Camp Menorah	Weekly	E. Coli	11	3	382	1200	3
Essex	Centennial Grove	Weekly	E. Coli	12				
Falmouth	Ashumet Pond	Weekly	E. Coli	13				
Falmouth	Ashumet Valley Holly Sands	Weekly	E. Coli	12				

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Falmouth	Cape Cod Camp Resort	Weekly	E. Coli	12				
Falmouth	Coonamessett Pond	Weekly	E. Coli	14	1	372	372	1
Falmouth	Grew's Pond	Weekly	E. Coli	13				
Falmouth	Jenkins Pond - Pinecrest	Weekly	E. Coli	12				
Falmouth	Lochstead Association	Weekly	E. Coli	12				
Falmouth	Mares Pond Association	Weekly	E. Coli	12				
Falmouth	Sand Pointe Shores-Rock Hollow	Weekly	E. Coli	12				
Falmouth	Sand Pointe Shores-White Cap	Weekly	E. Coli	12				
Falmouth	Shady Lane HA-Crooked Pond	Weekly	E. Coli	12				
Falmouth	Water-by Estates Association-Flax Pond	Weekly	E. Coli	12				
Florida	Manice Education Center Beach	Weekly	E. Coli	19				
Framingham	Cochituate Beach	Weekly	E. Coli	8				
Framingham	Learned Beach	Weekly	E. Coli	9				
Framingham	Washakum Beach	Weekly	E. Coli	12	2	760	1420	1
Franklin	Chilson Beach	Weekly	E. Coli	9				
Freetown	Town Beach	Weekly	E. Coli	11	1	2000	2000	1
Gardner	Dunn Pond	Weekly	Enterococci	16	1	600	600	1
Gardner	Kendall Pond	Weekly	E. Coli	16				
Gardner	P.A.C.C.	Weekly	E. Coli	16				
Georgetown	American Legion Park	Weekly	E. Coli	12	2	290	326	1
Georgetown	Camp Leslie	Weekly	E. Coli	9				
Goshen	Camp Holy Cross	Weekly	E. Coli	16				
Goshen	Camp Howe	Weekly	E. Coli	12				
Goshen	Hammond Acres	Weekly	E. Coli	16				
Goshen	Upper Highland Lake - Campers Beach	Weekly	Enterococci	15				
Goshen	Upper Highland Lake - Day use area beach	Weekly	Enterococci	15				
Grafton	Silver Lake Beach	Weekly	E. Coli	11				
Great Barrington	Green River	Weekly	E. Coli	16				
Great Barrington	Lake Mansfield	Weekly	E. Coli	16				
Greenfield	Greenfield Municipal Bathing Beach	Weekly	E. Coli	14	1	272	272	
Groton	Baby Beach Lost Lake	Weekly	E. Coli	13				
Groton	Groton Town Beach	Weekly	E. Coli	14				
Groton	Grotonwood Camp	Weekly	E. Coli	10				
Halifax	Annawon Street	Weekly	E. Coli	13				
Halifax	Halifax Beach	Weekly	E. Coli	13				
Halifax	Holmes Street	Weekly	E. Coli	13	1	480	480	1
Halifax	Lingan Street	Weekly	E. Coli	13				
Halifax	Wamsutta	Weekly	E. Coli	13				
Hanson	Arlene	Weekly	E. Coli	8				
Hanson	Cranberry	Weekly	E. Coli	12				
Hanson	Ocean Ave.	Weekly	E. Coli	12				
Hanson	Wilkey's	Weekly	E. Coli	12	2	400	700	1

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Harvard	Harvard Town Beach	Weekly	E. Coli	7				
Harwich	Aunt Edie's Pond	Weekly	E. Coli	12				
Harwich	Buck's Pond	Weekly	E. Coli	13				
Harwich	Great Sands 2	Weekly	E. Coli	14	2	276	596	2
Harwich	Great Sands 3	Weekly	E. Coli	12				
Harwich	Great Sands - Lakeside Terrace	Weekly	E. Coli	12				
Harwich	Hinkley's Pond	Weekly	E. Coli	13				
Harwich	Long Pond Rte 124	Weekly	E. Coli	13				
Harwich	Long Pond-Cahoon St.	Weekly	E. Coli	13				
Harwich	Long Pond-Long Pond Drive	Weekly	E. Coli	13				
Harwich	Robbins Pond	Weekly	E. Coli	13				
Harwich	Sand Pond	Weekly	E. Coli	13				
Harwich	Seymour Pond	Weekly	E. Coli	13				
Harwich	Skinequit Pond	Weekly	E. Coli	13				
Haverhill	Plug's Pond	Weekly	E. Coli	12				
Heath	Mohawk Estates Beach	Weekly	E. Coli	14				
Heath	Mohawk Estates Inlet	Weekly	E. Coli	14				
Heath	Mohawk Estates Outlet	Weekly	E. Coli	14				
Hinsdale	Camp Ashmere Beach	Weekly	E. Coli	13				
Hinsdale	Camp Emerson Beach	Weekly	E. Coli	12				
Hinsdale	Camp Emerson Marina	Weekly	E. Coli	12				
Hinsdale	Camp Romaca	Weekly	E. Coli	14				
Hinsdale	Camp Taconic Beach	Weekly	E. Coli	12				
Hinsdale	Dan Duquette Sports Academy	Weekly	E. Coli	10				
Hinsdale	Plunkett Lake Beach	Weekly	E. Coli	16				
Holden	Camp Kinneywood Beach	Unknown	E. Coli	4				
Holden	Eagle Lake	Weekly	E. Coli	14	1	360	360	
Holland	Holland Pond	Weekly	E. Coli	14				
Holliston	Pleasure Point	Weekly	E. Coli	13				
Holliston	Stoddard	Weekly	E. Coli	13				
Hopkinton	Hopkinton Reservoir-Main Beach	Weekly	Enterococci	17	2	140	180	2
Hopkinton	Hopkinton Reservoir-Upper Beach	Weekly	Enterococci	17	2	112	300	2
Hopkinton	Sandy Beach Left	Weekly	E. Coli	13	1	540	540	
Hopkinton	Sandy Beach Middle	Weekly	E. Coli	13	1	560	560	
Hopkinton	Sandy Beach Right	Weekly	E. Coli	13				
Hubbardston	Comet Pond Beach	Weekly	Enterococci	15				
Hubbardston	Pinecrest Property Owners Assoc.	Weekly	E. Coli	15				
Hudson	Hudson Centennial Beach	Weekly	E. Coli	12	1	620	620	
Huntington	Timothy Hill Children's Ranch	Weekly	E. Coli	13				
Ipswich	Hood Pond-boat ramp	Weekly	Enterococci	15				
Kingston	Camp Mishannock	Weekly	E. Coli	5				
Lakeville	Big Beach	Weekly	E. Coli	18	3	240	670	3

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Lakeville	Clark Shores 3	Weekly	E. Coli	15				
Lakeville	Clear Pond	Weekly	E. Coli	10				
Lakeville	Loon Pond	Unknown	E. Coli	2				
Lancaster	Camp Lowe Beach	Weekly	E. Coli	11				
Lancaster	Lancaster Town Beach	Weekly	E. Coli	8				
Lanesborough	Camp Mohawk Beach	Weekly	E. Coli	9				
Lanesborough	Sunrise Beach	Weekly	E. Coli	16				
Lee	Sandy Beach	Weekly	E. Coli	12	1	800	800	
Lee	Sandy Beach	Weekly	Total coliform	1				
Lenox	Laurel Lake	Weekly	E. Coli	12				
Leominster	Ricker's Kindercamp	Weekly	E. Coli	10	1	430	430	1
Lexington	Old Reservoir Swim Area Left #1	Weekly	Enterococci	14	2	70	420	5
Lexington	Old Reservoir Swim Area Right #1	Weekly	Enterococci	15	2	282	564	5
Littleton	Littleton Town Beach	Weekly	E. Coli	14				
Lowell	Merrimac River - Boat House	Weekly	E. Coli	21	7	500	1000	
Ludlow	Haviland Pond - Middle	Weekly	E. Coli	17	2	1000	1600	1
Ludlow	Haviland Pond - Restrooms	Weekly	E. Coli	20	5	300	2000	4
Lunenburg	Hickory Hill	Weekly	E. Coli	9				1
Lunenburg	Hickory Hills Island Rd.	Weekly	E. Coli	10	1	340	340	2
Lunenburg	Lunenburg Town Beach	Weekly	E. Coli	9				
Lynn	Flax Pond - Railing	Weekly	E. Coli	13	9	300	1400	
Lynn	Flax Pond - Rocks	Weekly	E. Coli	13	8	260	40000	
Lynn	Sluice Pond - Briarcliff Lodge	Weekly	E. Coli	13	2	450	2600	
Lynn	Sluice Pond - Four Winds	Weekly	E. Coli	13				
Marlborough	Memorial - Left	Weekly	Enterococci	7				
Marlborough	Memorial - Right	Weekly	Enterococci	7				
Mashpee	Attaquin	Weekly	E. Coli	13				
Mashpee	Camp Farley - Wakeby Pond	Weekly	E. Coli	13				
Mashpee	Fells Pond	Weekly	E. Coli	12				
Mashpee	John's Pond (Tim's Beach)	Weekly	E. Coli	12				
Mashpee	John's Pond (Briarwood)	Weekly	E. Coli	12				
Mashpee	John's Pond (North)	Weekly	E. Coli	12				
Mashpee	John's Pond (Public)	Weekly	E. Coli	13				
Mashpee	John's Pond (Public)	Weekly	E. Coli	13				
Mashpee	Mashpee Shores Assoc.	Weekly	E. Coli	12				
Mashpee	Santuit Pond	Weekly	E. Coli	19	6	248	800	6
Mashpee	Santuit Pond	Weekly	E. Coli	13				
Mashpee	Santuit Pond Estate Assoc. - Santuit Pond	Weekly	E. Coli	12				
Mashpee	Trustees of the Reservation (Mashpee Pond)	Weekly	E. Coli	12				
Mashpee	Trustees of the Reservation (Wakeby Pond)	Weekly	E. Coli	12				
Medfield	Hinkley 1	Weekly	E. Coli	8				
Medfield	Hinkley 2	Weekly	E. Coli	8				

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Medfield	Hinkley 3	Weekly	Enterococci	8				
Medfield	Hinkley 4	Weekly	Enterococci	8				
Medford	Wrights Pond - Deep End	Weekly	E. Coli	11	1	252	252	1
Medford	Wrights Pond - Shallow End	Weekly	E. Coli	12	2	240	800	1
Mendon	Nipmuc Pond	Weekly	E. Coli	11				
Methuen	Forest Lake: Boat Ramp	Weekly	E. Coli	17	1	1414	1414	3
Methuen	Forest Lake: Nonswimming Beach	Weekly	E. Coli	26	6	291	614	
Methuen	Forest Lake: Palanga St.	Weekly	E. Coli	17	2	411	649	
Methuen	Forest Lake: Swimming Beach	Weekly	E. Coli	26	6	239	580	
Middleborough	Camp Avoda	Weekly	E. Coli	9				
Middleborough	Camp Yomechas	Weekly	E. Coli	16				
Middleborough	Woods Pond Cabins	Weekly	E. Coli	10				
Middleton	Thunderbridge	Weekly	E. Coli	15	1	310	310	1
Milton	DCR - Houghton's Pond @ Bathouse	Weekly	Enterococci	16	1	67	67	1
Monterey	Benedict Pond Beach	Weekly	Enterococci	15	1	230	230	1
Monterey	Camp Half Moon	Weekly	E. Coli	11				
Monterey	Lake Garfield	Weekly	E. Coli	16				
Monterey	The Seven Stones Beach	Weekly	E. Coli	12				
Mt. Washington	Camp Hi Rock - Bear Rock Beach	Weekly	E. Coli	17				
Mt. Washington	Camp Hi Rock - Main Beach	Weekly	E. Coli	17				
Nantucket	Miacomet Pond	Weekly	E. Coli	10	5	380	800	3
Nantucket	Sesachacha Pond	Weekly	E. Coli	10				
Natick	Camp Arrowhead	Weekly	E. Coli	11	1	252	252	1
Natick	Camp Nonesuch	Weekly	E. Coli	11	1	296	296	1
Natick	Cochituate Lake-North Beach	Weekly	Enterococci	17	3	80	92	2
Natick	Dug Pond - Diving	Weekly	E. Coli	13	1	360	360	1
Natick	Dug Pond - Kiddie	Weekly	E. Coli	12				
New Braintree	Camp Putnam	Weekly	E. Coli	12	1	240	240	
Newton	Crystal Lake	Weekly	E. Coli	11				
North Adams	Windsor Lake	Weekly	E. Coli	16				
North Andover	Berry Pond Beach	Weekly	Enterococci	16	1	89	89	1
North Andover	Frye Pond Beach	Weekly	Enterococci	16	2	92	148	1
North Andover	Stevens Pond - Right	Weekly	E. Coli	9				
North Attleboro	Falls Pond	Weekly	E. Coli	12	2	350	1420	1
North Attleboro	Whitings Pond	Weekly	E. Coli	12	2	310	340	
North Brookfield	Brooks Pond	Weekly	E. Coli	11				
North Brookfield	Camp Atwater	Weekly	E. Coli	7				
Northampton	Musante Beach	Weekly	E. Coli	15	1	320	320	
Northbridge	Camp Hickory Hills	Weekly	E. Coli	7				
Northbridge	Memorial Beach	Weekly	E. Coli	15	3	260	640	3
Oakham	Lake Dean - Dean Campground	Weekly	E. Coli	15				
Oakham	Lake Dean - Pine Acres Campground	Weekly	E. Coli	15				

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Oakham	Treasure Valley Scout East	Weekly	E. Coli	12				
Oakham	Treasure Valley Scout West	Weekly	E. Coli	12				
Orange	Camp Selah	Weekly	E. Coli	7				
Orleans	Crystal Lake	Weekly	E. Coli	13				
Orleans	Pilgrim Lake	Weekly	E. Coli	13				
Otis	Camp Bonnie Brae	Weekly	E. Coli	10				
Otis	Camp Nawaka	Weekly	E. Coli	10				
Otis	Camp Overflow Beach	Weekly	E. Coli	16				
Otis	Otis Reservoir Beach	Weekly	Enterococci	15				
Otis	Otis Woodlands Beach	Weekly	E. Coli	17				
Otis	Otis Woodlands Picnic Grove	Weekly	E. Coli	17				
Otis	Otis Woodlands Weir	Weekly	E. Coli	17				
Oxford	Barton Pond							1
Pembroke	Finn Camp	Weekly	E. Coli	13				
Pembroke	Hobomoc Pond	Weekly	E. Coli	13				
Pembroke	Little Sandy	Weekly	E. Coli	15	1	292	292	1
Pembroke	Oldham	Weekly	E. Coli	13				
Pembroke	Stetson	Weekly	E. Coli	16	3	620	1000	1
Peru	Camp Danbee	Weekly	E. Coli	16				
Phillipston	Queen Lake Beach North Beach	Weekly	E. Coli	17				
Phillipston	Queen Lake Beach South Beach	Weekly	E. Coli	16				1
Pittsfield	892 West St. Beach	Weekly	E. Coli	11				
Pittsfield	892 West St. Lakeside Terrace	Weekly	E. Coli	9				
Pittsfield	892 West St. Wood	Weekly	E. Coli	11	1	260	260	
Pittsfield	Camp St. Michael	Weekly	E. Coli	8				
Pittsfield	Camp Stevenson/Witawentin	Weekly	E. Coli	21	1	249	249	
Pittsfield	Country Club of Pittsfield	Weekly	E. Coli	12				
Pittsfield	Lakeside Christian Camp	Weekly	E. Coli	12				
Pittsfield	Lulu Pond Beach	Weekly	Enterococci	12	4	70	132	4
Pittsfield	Onota Lake Dock	Weekly	E. Coli	12				
Pittsfield	Onota Lake Burbank Park	Weekly	E. Coli	13				
Pittsfield	Onota Lake Controy Pavillion	Weekly	E. Coli	13	1	525	525	
Pittsfield	Onota Lake Beach	Weekly	E. Coli	12				
Pittsfield	Pontoosuc Lake Dock	Weekly	E. Coli	12				
Pittsfield	Pontoosuc Lake Pines	Weekly	E. Coli	12				
Pittsfield	Pontoosuc Lake Beach	Weekly	E. Coli	12				
Plainfield	Plainfield Pond	Weekly	E. Coli	15				
Plymouth	American Legion	Unknown	E. Coli	3				
Plymouth	Barrett Pond	Weekly	Enterococci	14				
Plymouth	Bloody Pond - Baird Center	Weekly	E. Coli	12				
Plymouth	Blueberry Hill Camp - Curlew Pond	Weekly	E. Coli	15				
Plymouth	Camp Bournedale - Great Herring Pond	Weekly	E. Coli	9				

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Plymouth	Camp Cachalot	Weekly	E. Coli	10				
Plymouth	Camp Clark YMCA - Hyles Pond	Weekly	E. Coli	10				
Plymouth	Camp Massasoit - Elbow Pond	Weekly	E. Coli	9				
Plymouth	Camp Squanto	Weekly	E. Coli	10				
Plymouth	Charge Pond	Weekly	Enterococci	14				
Plymouth	Clear Pond Motel	Unknown	E. Coli	4				
Plymouth	College Pond Day Use	Weekly	Enterococci	14				
Plymouth	Curlew Pond	Weekly	Enterococci	14				
Plymouth	Ellis Haven - Ellis Pond	Weekly	E. Coli	15				
Plymouth	Ellis Haven - Swimming Hole	Weekly	E. Coli	15				
Plymouth	Fearing Pond 1	Weekly	Enterococci	14				
Plymouth	Fearing Pond 2	Weekly	Enterococci	14				
Plymouth	Fresh Pond - End Pond	Weekly	E. Coli	12				
Plymouth	Fresh Pond - Mid Pond	Weekly	E. Coli	11	1	450	450	1
Plymouth	Indian Head	Weekly	E. Coli	6				
Plymouth	Morton Park - Boy's Swimming Hole	Weekly	E. Coli	11	1	800	800	1
Plymouth	Morton Park - Left	Weekly	E. Coli	11				
Plymouth	Morton Park - Right	Weekly	E. Coli	11				
Plymouth	Pinewood Camp - Camphouse Beach	Weekly	E. Coli	14				
Plymouth	Pinewood Camp - Crew Dock	Weekly	E. Coli	13				
Plymouth	Pinewood Camp - Pinecones Beach	Weekly	E. Coli	12				
Plymouth	Pinewood Lodge - Fresh Meadow	Weekly	E. Coli	14	1	400	400	
Plymouth	Plymouth Estates	Biweekly	E. Coli	2				
Plymouth	Sandy Pond Campground	Weekly	E. Coli	17				
Plymouth	Wind-in-the-Pines Camp	Weekly	E. Coli	11				
Randolph	Ponkapoag Pond	Weekly	E. Coli	12	1	256	256	
Richmond	Camp Marion White	Weekly	E. Coli	18				
Richmond	Camp Russell	Weekly	E. Coli	15				
Richmond	Richmond Shores - East	Weekly	E. Coli	14				
Richmond	Richmond Town Beach	Weekly	E. Coli	15				
Rochester	Perry's Camp	Weekly	E. Coli	12				1
Rochester	Snipituit Pond	Weekly	E. Coli	10				1
Rockland	Hartstuff Park	Weekly	E. Coli	1				
Rockland	Hartstuff Park	Weekly	Enterococci	6				
Rowe	Rowe Beach - Center	Weekly	E. Coli	16				
Rowe	Rowe Beach - Inlet	Weekly	E. Coli	11	2	272	2400	
Rowe	Rowe Beach - Right	Weekly	E. Coli	16	1	397	397	
Royalston	St. Laurent Camp	Weekly	Enterococci	15	2	132	210	2
Royalston	Tully Lake Campground	Weekly	E. Coli	16				
Russell	H.A. Moses Beach	Weekly	E. Coli	10				
Rutland	Whitehall Pond Beach	Weekly	Enterococci	15				
Sandisfield	York Lake Beach	Weekly	Enterococci	16	1	280	280	1

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Sandwich	Camp Burgess	Weekly	E. Coli	11				
Sandwich	Camp Good News	Weekly	E. Coli	12				
Sandwich	Camp Hayward	Weekly	E. Coli	11				
Sandwich	Camp Lyndon	Weekly	E. Coli	9				
Sandwich	Dunroamin Park & Cottages	Weekly	E. Coli	12				
Sandwich	Hoxie Pond	Weekly	E. Coli	13				
Sandwich	Lakefield Farms Trust	Weekly	E. Coli	11				
Sandwich	Lakewood Hills Property Owners Assoc.	Weekly	E. Coli	12				
Sandwich	Lawrence Pond	Weekly	E. Coli	13				
Sandwich	Lawrence Pond Mobile Home Park	Weekly	E. Coli	12				
Sandwich	Peter's Pond Park (boat ramp)	Weekly	E. Coli	13				
Sandwich	Peter's Pond Town Park 1	Weekly	E. Coli	13				
Sandwich	Pimlico Pond	Weekly	E. Coli	13				
Sandwich	Rolling Ridge Homeowners Assoc.-Lawrence Pond	Weekly	E. Coli	12				
Sandwich	Snake Pond	Weekly	E. Coli	13				
Sandwich	Triangle Pond	Weekly	E. Coli	13				
Sandwich	Wakeby Pond	Weekly	E. Coli	13				
Saugus	DCR - Pearce Lake @ Breakheart	Weekly	Enterococci	19	4	110	1000	3
Saugus	DCR - Pecham Pond @ Camp Nihan	Weekly	Enterococci	18	3	80	662	2
Savoy	North Pond Beach	Weekly	Enterococci	15				
Savoy	South Pond Beach	Weekly	Enterococci	15				
Sharon	Camp Gan Israil Beach	Weekly	E. Coli	8				
Sharon	Camp Gannett Beach	Weekly	E. Coli	9				
Sharon	Camp Wonderland Beach	Weekly	E. Coli	12	3	312	364	2
Sharon	Community Center Beach	Twice per week	E. Coli	25				
Sharon	Horizons for Youth Beach	Once	E. Coli	1				
Sharon	Massapoag Yacht Club	Weekly	E. Coli	15				
Sharon	Town Beach - Boat Landing	Twice per week	E. Coli	25	1	400	400	1
Sharon	Town Beach - Docks	Twice per week	E. Coli	25				
Sheffield	Berkshire School Beach	Weekly	E. Coli	16				
Sherborn	Farm Pond	Weekly	E. Coli	16				
Shrewsbury	Sunset Beach	Weekly	E. Coli	12				
Shrewsbury	Sunset Beach	Weekly	Total coliform	10				
Shutesbury	Lake Wyola	Weekly	Enterococci	16	1	68	68	1
Southwick	South Pond Beach - North	Weekly	E. Coli	9				
Spencer	Camp Laurelwood	Weekly	E. Coli	13				
Spencer	Camp Marshall - Thompson	Weekly	E. Coli	10				
Spencer	Luther Hill Park	Weekly	E. Coli	11	1	260	260	
Springfield	Bass Pond - Left	Weekly	Enterococci	11				
Springfield	Bass Pond - Right	Weekly	Enterococci	12	2	74	201	
Springfield	Camp Wilder - Left	Weekly	Enterococci	6				

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Springfield	Camp Wilder - Right	Weekly	Enterococci	6				
Springfield	Five Mile Pond - Left	Weekly	Enterococci	11	1	146	146	
Springfield	Five Mile Pond - Right	Weekly	Enterococci	11	2	89	95	
Springfield	Knights of Columbus - Left	Weekly	Enterococci	10				
Springfield	Knights of Columbus - Right	Weekly	Enterococci	10				
Springfield	Lake Lorraine	Weekly	Enterococci	16	5	100	570	3
Springfield	Paddle Club - Left	Weekly	Enterococci	11	2	62	201	
Springfield	Paddle Club - Right	Weekly	Enterococci	12	1	83	83	
Sterling	Lake Waushacum #1	Weekly	E. Coli	12				
Stockbridge	Beachwood Assoc. - Stockbridge Bowl	Weekly	E. Coli	16	2	800	800	
Stockbridge	Berkshire Country Day School	Weekly	E. Coli	8				
Stockbridge	Camp Mahkeenac	Weekly	E. Coli	16				
Stockbridge	Kripalu	Weekly	E. Coli	16				
Stockbridge	Sports School Day Camp	Weekly	E. Coli	7				
Stockbridge	Stockbridge Bowl	Weekly	E. Coli	11				
Stockbridge	White Pines Condos	Weekly	E. Coli	16				
Stoughton	Ames Pond	Weekly	E. Coli	15	2	570	1100	
Stow	Lake Boone	Weekly	E. Coli	11				
Sturbridge	Main Beach - Walker Pond Assoc.	Weekly	E. Coli	15	1	2000	2000	
Sturbridge	Oak Cove - Walker Pond Assoc.	Weekly	E. Coli	14				
Sturbridge	Outdoor World Beach	Weekly	E. Coli	29				
Sturbridge	Streeter Point	Weekly	Enterococci	17	3	94	600	2
Sturbridge	Sturbridge Host Hotel	Weekly	E. Coli	14				
Sturbridge	Sturbridge Recreation - Cedar Pond	Weekly	E. Coli	9	3	320	800	1
Sturbridge	Wells State Park	Weekly	Enterococci	16	2	114	212	2
Sutton	Camp Blanchard	Weekly	E. Coli	13				
Sutton	Camp Marion	Weekly	E. Coli	12				
Sutton	King's Campground	Weekly	E. Coli	18				
Sutton	Old Holbrook Campground	Weekly	E. Coli	17				
Sutton	Sutton Falls Camp	Weekly	E. Coli	20	3	600	2000	
Taunton	Campers Beach / Middle Pond	Weekly	Enterococci	15	1	206	206	1
Taunton	Watsons Pond	Weekly	Enterococci	18	4	68	140	2
Templeton	Beamans Pond	Weekly	Enterococci	18	3	100	340	2
Templeton	Beamans Pond Campground	Weekly	Enterococci	19	5	94	340	4
Templeton	Pinewood Shores	Weekly	E. Coli	1	1	64	64	1
Templeton	Pinewood Shores	Weekly	Enterococci	8				
Templeton	Templeton Fish and Game Club	Weekly	E. Coli	1				
Templeton	Templeton Fish and Game Club	Weekly	Enterococci	8				
Tolland	Camp Kinderland Beach	Weekly	E. Coli	10				
Tolland	Camp Timbertrails	Weekly	E. Coli	12				
Tolland	Fox Den - Wildwood	Weekly	E. Coli	16				
Tolland	Lakeside - Wildwood	Weekly	E. Coli	16				

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Tolland	Main Beach - Wildwood	Weekly	E. Coli	16				
Tolland	Meadow - Wildwood	Weekly	E. Coli	16				
Tolland	Otter Pond Beach - Wildwood	Weekly	E. Coli	16				
Topsfield	Hood's Pond	Weekly	E. Coli	11				
Townsend	Pearl Hill Pond Beach	Weekly	Enterococci	12				
Tyngsborough	Town	Weekly	E. Coli	18	3	300	1030	
Tyringham	Tyringham Park Beach	Weekly	E. Coli	16				
Upton	Pratt Pond	Weekly	E. Coli	12	1	600	600	
Uxbridge	Buffumville Lake	Weekly	E. Coli	15				
Uxbridge	Fairwoods	Weekly	E. Coli	14	2	520	590	
Uxbridge	Pout Pond	Weekly	E. Coli	16				
Uxbridge	West Hill Park	Weekly	E. Coli	16				
Wales	Lake Land	Weekly	E. Coli	14				
Wales	Sichols	Weekly	E. Coli	15				
Wales	Town Beach	Weekly	E. Coli	15				
Walpole	Sharon Country Day Camp Brook	Weekly	E. Coli	8				
Walpole	Sharon Country Day Camp Pond	Weekly	E. Coli	10				
Wareham	Glen Charlie at Shangri-La	Weekly	E. Coli	13				
Wareham	White Island Association	Weekly	E. Coli	13				
Warren	Comin's Pond	Weekly	E. Coli	15				
Wayland	Lake Cochituate - Left Buoy (deep)	Weekly	E. Coli	13				
Wayland	Lake Cochituate - Left Shallow	Weekly	E. Coli	14				
Wayland	Lake Cochituate - Middle	Weekly	E. Coli	14				
Wayland	Lake Cochituate - Right Shallow	Weekly	E. Coli	14				
Webster	Beacon Park	Weekly	E. Coli	14				
Webster	Birch Island	Weekly	E. Coli	14				
Webster	Colonial Park	Weekly	E. Coli	14				
Webster	Indian Ranch	Weekly	E. Coli	20	1	390	390	1
Webster	Kildeer Island	Weekly	E. Coli	17	3	260	390	3
Webster	Lakeside	Weekly	E. Coli	14				
Webster	Memorial Beach #1	Weekly	E. Coli	15				
Webster	Memorial Beach #2	Weekly	E. Coli	15				
Webster	Nipmuc Cove	Weekly	E. Coli	14				
Webster	Point Breeze	Weekly	E. Coli	14				
Webster	Treasure Island	Weekly	E. Coli	14				
Wellesley	Morses Beach - Shallow	Weekly	E. Coli	12	1	1000	1000	1
Wellfleet	Duck Pond	Weekly	E. Coli	13				
Wellfleet	Dyer Pond	Weekly	E. Coli	13				
Wellfleet	Great Pond	Weekly	E. Coli	13				
Wellfleet	Gull Pond	Weekly	E. Coli	13				
Wellfleet	Gull Pond (2)	Weekly	E. Coli	13				
Wellfleet	Higgins Pond	Weekly	E. Coli	13				

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Wellfleet	Long Pond	Weekly	E. Coli	13				
Wellfleet	Spectacle Pond	Weekly	E. Coli	13				
Wendell	Ruggles Pond	Weekly	Enterococci	15				
Wenham	Gull Pond	Biweekly	E. Coli	5				
Wenham	Pleasant Street Pond	Weekly	E. Coli	11	3	430	4800	
West Brookfield	Lake Wickabog - Main Beach	Weekly	E. Coli	13				
West Stockbridge	Card Pond Beach	Weekly	E. Coli	16				
West Stockbridge	Crane Lake Camp	Weekly	E. Coli	12				
West Tisbury	Long Cove (fresh)	Weekly	Enterococci	12	2	68	69	1
West Tisbury	Seth's Pond Beach #1	Weekly	Enterococci	12	1	64	64	
West Tisbury	Seth's Pond Beach #2	Weekly	Enterococci	12	1	68	68	
West Tisbury	Tisbury Great Pond	Weekly	Enterococci	12	3	64	84	
Westborough	Lake Chauncy Beach #1	Weekly	E. Coli	12	1	1500	1500	
Westfield	Kingsley	Weekly	Enterococci	16	1	4000	4000	1
Westfield	Lambert's	Weekly	Enterococci	16	1	260	260	1
Westford	American Legion	Weekly	E. Coli	15				
Westford	East Boston Camps - Boys Beach	Weekly	E. Coli	17	1	600	600	1
Westford	East Boston Camps - Day Care	Weekly	E. Coli	17	1	600	600	1
Westford	Edwards Town Beach	Weekly	E. Coli	15	1	260	260	1
Westford	Forge Village Beach	Weekly	E. Coli	13				
Westford	Lakeside Meadows	Weekly	E. Coli	15				
Westford	Marylou's Beach - NIA Beach	Weekly	E. Coli	14				
Westford	Nashoba Valley Campers Beach	Weekly	E. Coli	11				
Westford	Nashoba Valley Swim Club Beach	Weekly	E. Coli	11				
Westford	North Beach - NIA Beach	Weekly	E. Coli	15				
Westford	Sandy Beach - NIA Beach	Weekly	E. Coli	15				
Westford	Summer Village Main Beach	Weekly	E. Coli	15				
Westminster	Crocker Pond	Weekly	E. Coli	16				
Westminster	Crow Hill Pond Beach	Weekly	Enterococci	17	2	70	72	2
Westminster	Wyman Pond	Weekly	E. Coli	16				
Weston	River Day Camp	Weekly	E. Coli	13	1	296	296	1
Weston	Valley Pond	Weekly	E. Coli	15	1	660	660	1
Westwood	Membership Beach - Middle	Weekly	E. Coli	16				
Westwood	Membership Beach - North	Weekly	E. Coli	16				
Westwood	Membership Beach - South	Weekly	E. Coli	16	1	330	330	
Westwood	North Beach - Middle	Weekly	E. Coli	17				
Westwood	North Beach - North	Weekly	E. Coli	17				
Westwood	North Beach - South	Weekly	E. Coli	17	1	280	280	
Whately	Tri-Town Beach	Unknown	E. Coli	3				
Wilbraham	Spec Pond Beach	Weekly	E. Coli	10				
Williamstown	Margaret Lindley Park	Biweekly	E. Coli	6				
Wilmington	Baby Beach	Weekly	E. Coli	9				

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Community	Beach Name[1]	Testing Frequency	Indicator Type	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings[2]
Wilmington	Town Beach - Center	Weekly	E. Coli	10				
Wilmington	Town Beach - Left	Weekly	E. Coli	10	1	270	270	
Winchendon	Lake Dennison State Park - Day Use	Weekly	Enterococci	16	1	140	140	1
Winchendon	Lake Dennison State Park - North Camp	Weekly	Enterococci	18	3	66	88	3
Winchester	Sandy Beach @ Upper Mystic	Weekly	Enterococci	20	7	83	1600	2
Winchester	Wedge Pond - North	Weekly	E. Coli	7	1	380	380	1
Winchester	Wedge Pond - South	Weekly	E. Coli	6	1	560	560	1
Windsor	Westfield River Beach	Weekly	Enterococci	22	9	88	400	6
Worcester	Bell Pond Beach	Weekly	E. Coli	9				
Worcester	Coes Pond Beach (Mill St.)	Weekly	E. Coli	9	1	610	610	1
Worcester	Indian Lake Public Beach (Sherburne Ave)	Weekly	E. Coli	9				
Worcester	Indian Lake Shore Park	Weekly	E. Coli	10	1	317	317	1
Worcester	Lake Quinsigamond-Lake Park Beach	Weekly	Enterococci	18	5	72	280	6
Worcester	Lake Quinsigamond-Regatta Point Beach	Weekly	Enterococci	20	4	80	600	5
Wrentham	Lake Archer	Weekly	E. Coli	9				
Wrentham	Lake Pearl Park	Weekly	E. Coli	11				
Wrentham	Sweatt Beach	Weekly	E. Coli	8				
Yarmouth	Big Sandy Pond	Weekly	E. Coli	12				
Yarmouth	Camp Greenough - Boy Scouts	Weekly	E. Coli	8				
Yarmouth	Dennis Pond	Weekly	E. Coli	13				
Yarmouth	Elijah's Pond, Camp Wingate	Weekly	E. Coli	12				
Yarmouth	Flax Pond	Weekly	E. Coli	13				
Yarmouth	Horse Pond	Weekly	E. Coli	13				
Yarmouth	Horse Pond - Halcyon Condos	Weekly	E. Coli	12				
Yarmouth	Little Sandy Pond	Weekly	E. Coli	14	1	800	800	1
Yarmouth	Long Pond - Indian	Weekly	E. Coli	13				
Yarmouth	Long Pond - Lyman	Weekly	E. Coli	13				

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Table 15

MA Beaches (2008): Exceedances reported based on number of days since last rainfall at public and semi-public bathing beaches

Marine beaches

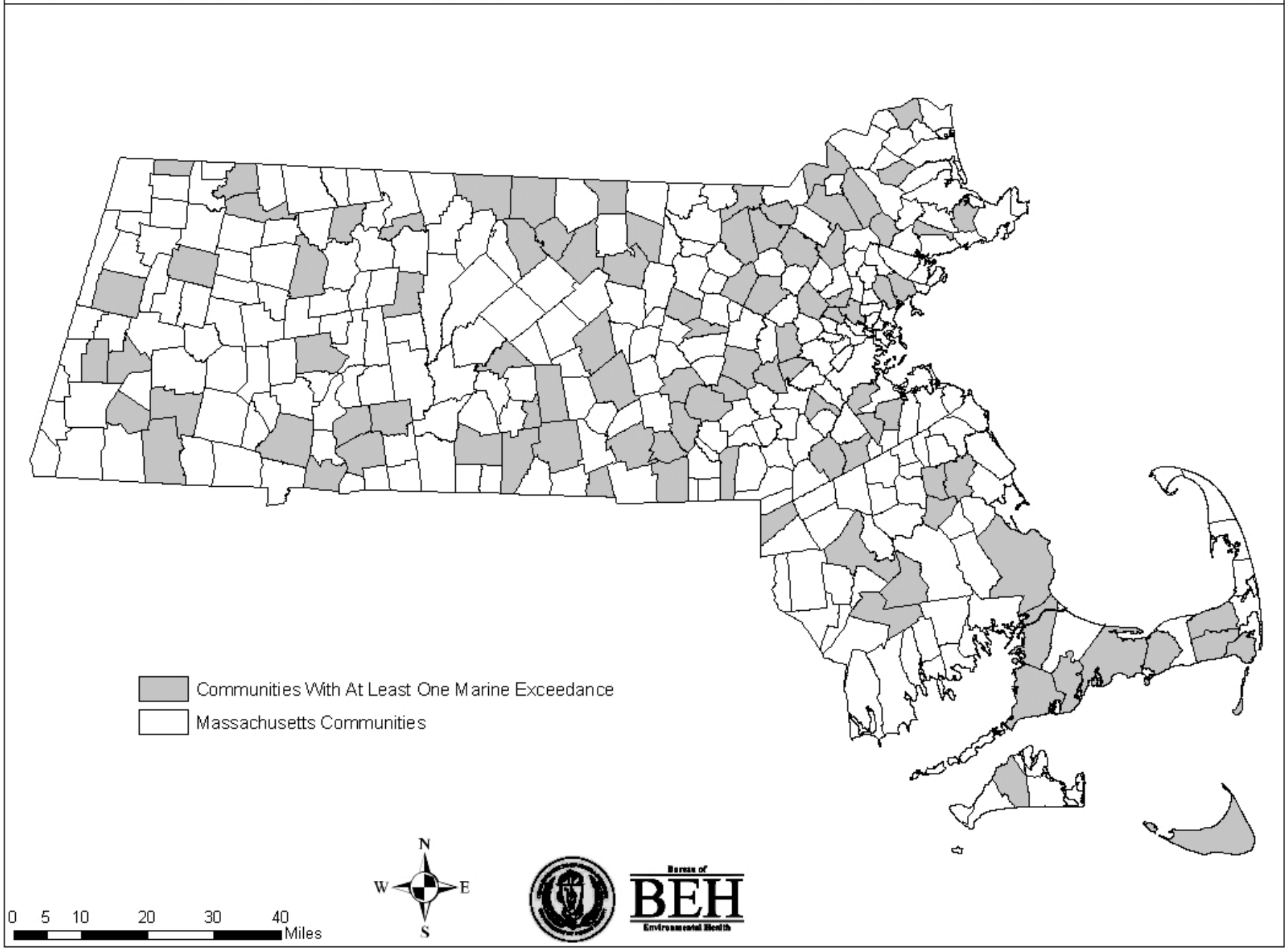
# Days Since Rain	# Exceedances	%
0	345	79.7%
1	35	8.1%
2	29	6.7%
3	10	2.3%
4	4	0.9%
5	3	0.7%
6	2	0.5%
7	1	0.2%
8	1	0.2%
9	3	0.7%
Total	433	100.0%

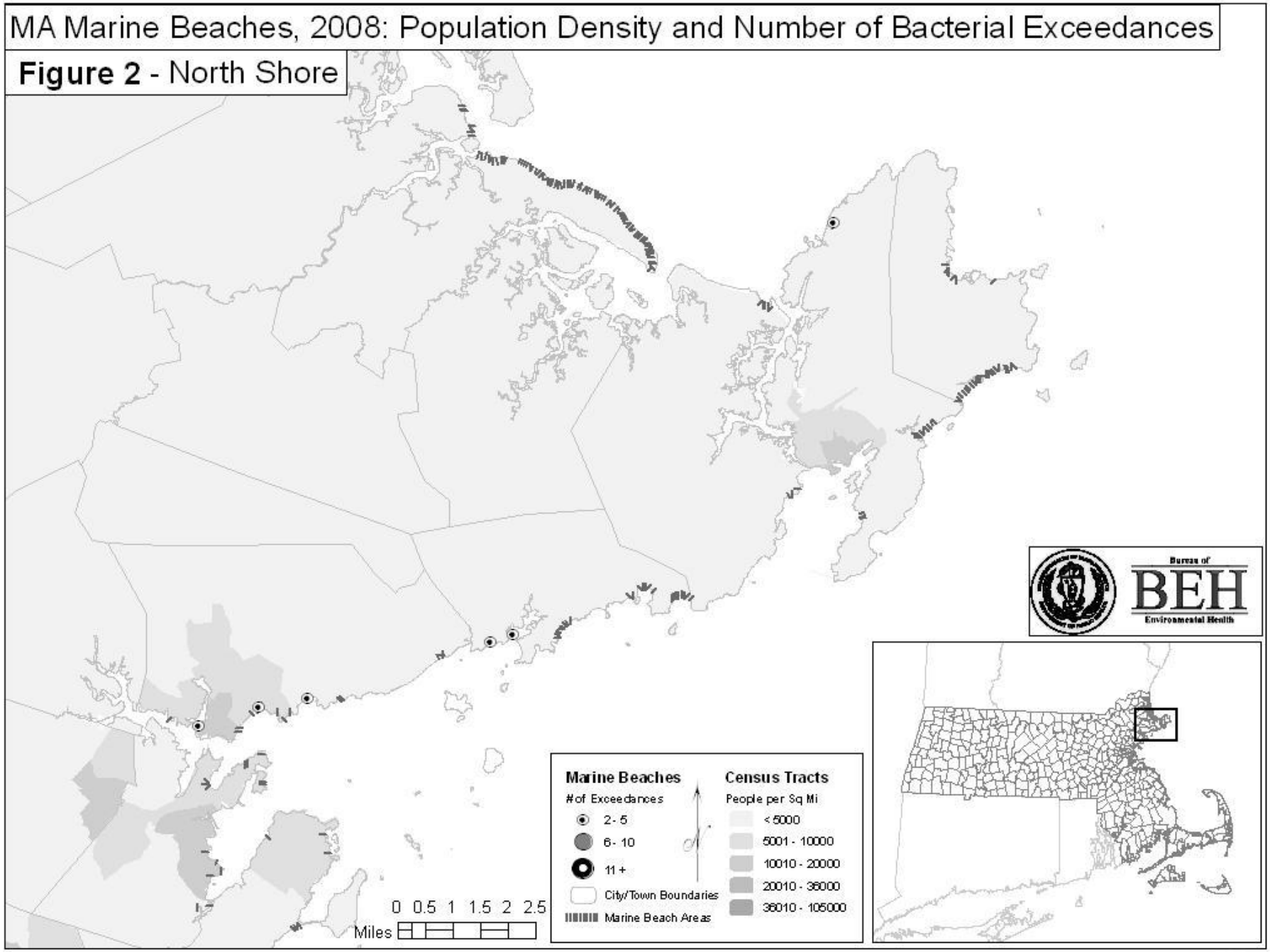
Freshwater beaches

# Days Since Rain	# Exceedances	%
0	103	46.6%
1	66	29.9%
2	29	13.1%
3	11	5.0%
4	5	2.3%
5	6	2.7%
6	0	0.0%
7	0	0.0%
8	0	0.0%
9	0	0.0%
10	1	0.5%
Total	221	100.0%

FIGURES

Figure 1 - MA Freshwater Beaches, 2008: All Communities With At Least One Exceedance



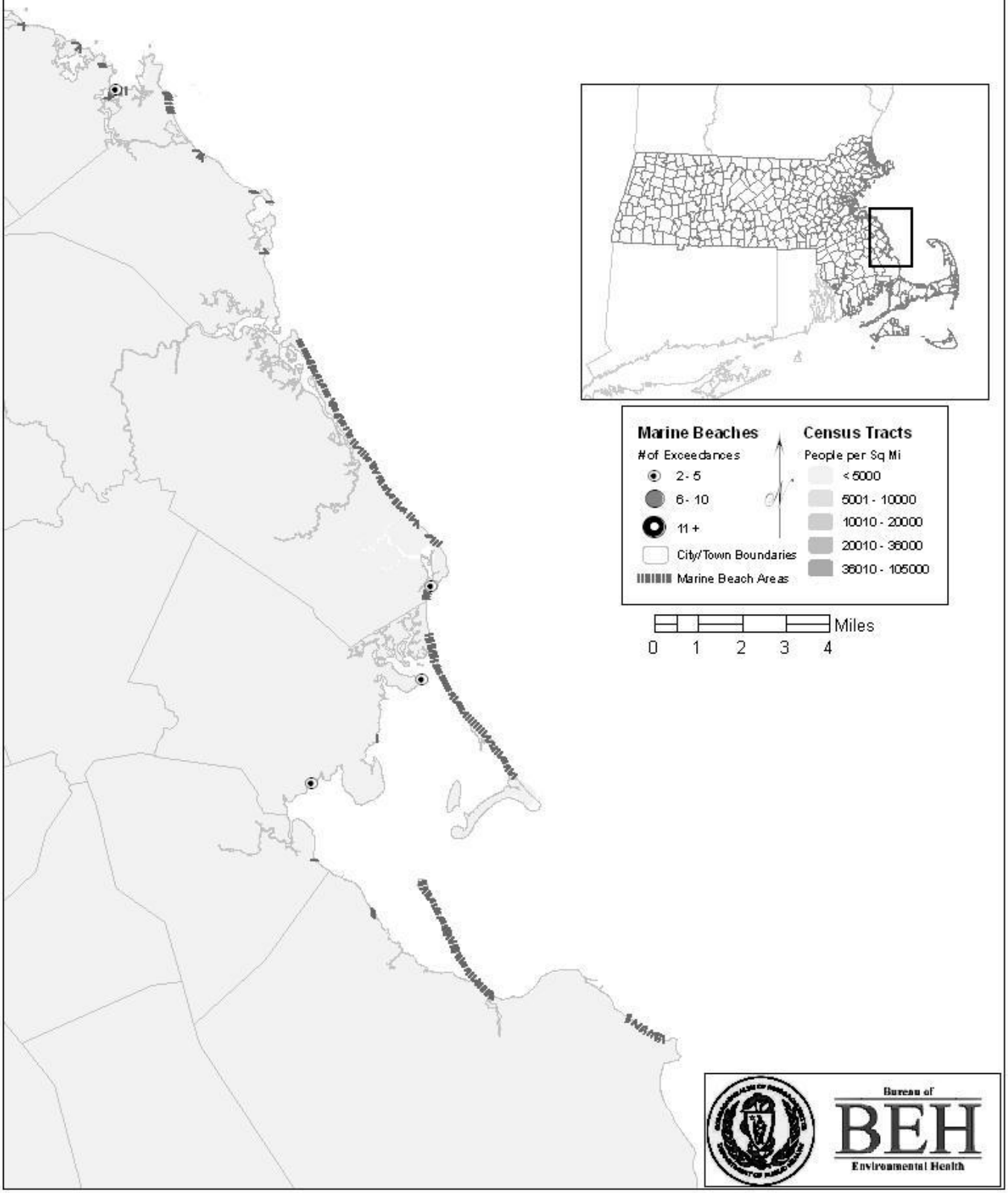

MA Marine Beaches, 2008: Population Density and Number of Bacterial Exceedances
Figure 2 - North Shore
Marine Beaches
# of Exceedances
2 - 5
6 - 10
11 +
City/Town Boundaries
Marine Beach Areas
Census Tracts
People per Sq Mi
< 5000
5001 - 10000
10010 - 20000
20010 - 36000
36010 - 105000
0 0.5 1 1.5 2 2.5
Miles
Bureau of
BEH
Environmental Health

MA Marine Beaches, 2008: Population Density and Number of Bacterial Exceedances

Figure 3 - Boston Area

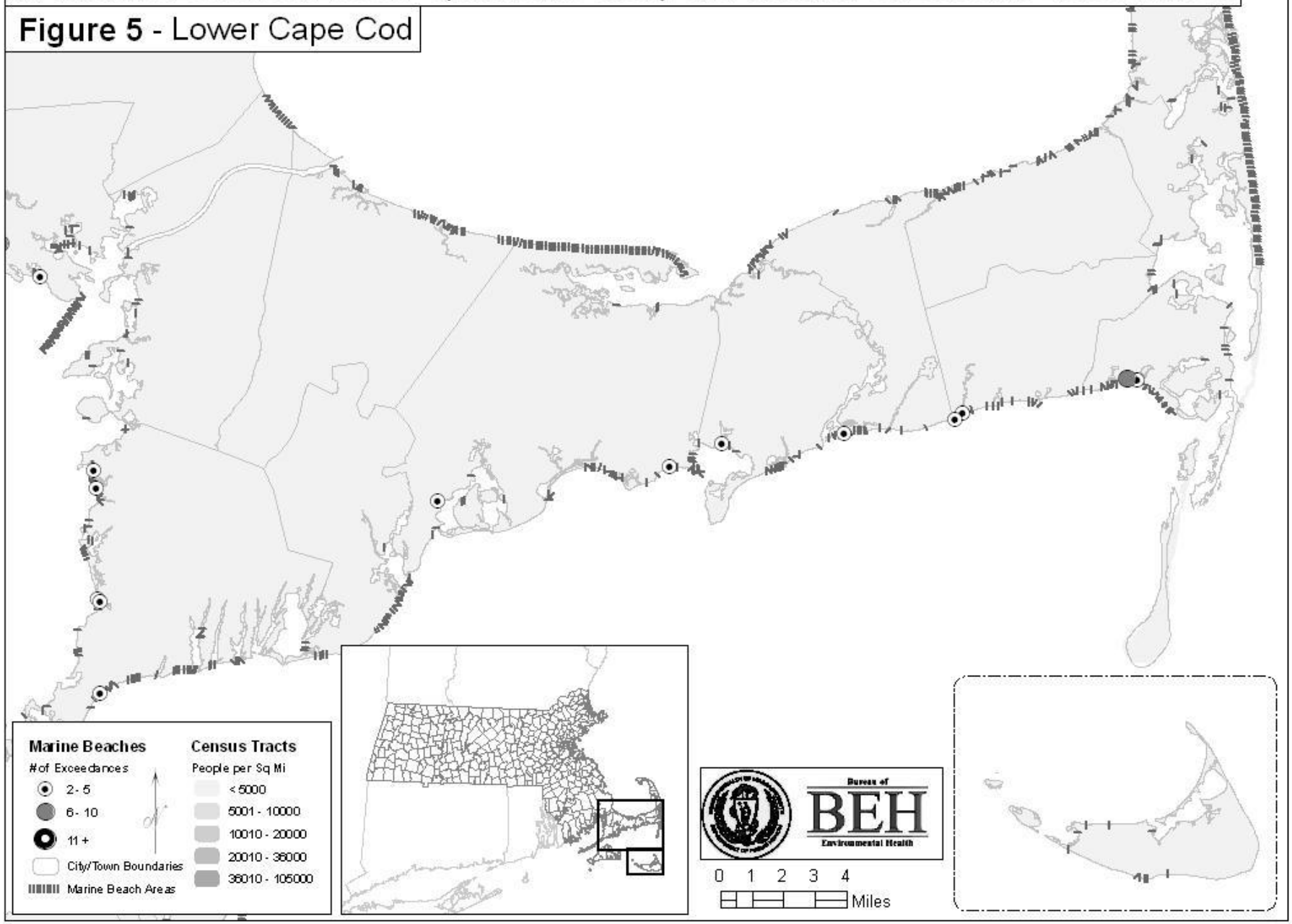
MA Marine Beaches, 2008: Population Density and Number of Bacterial Exceedances

Figure 4 - Plymouth Area



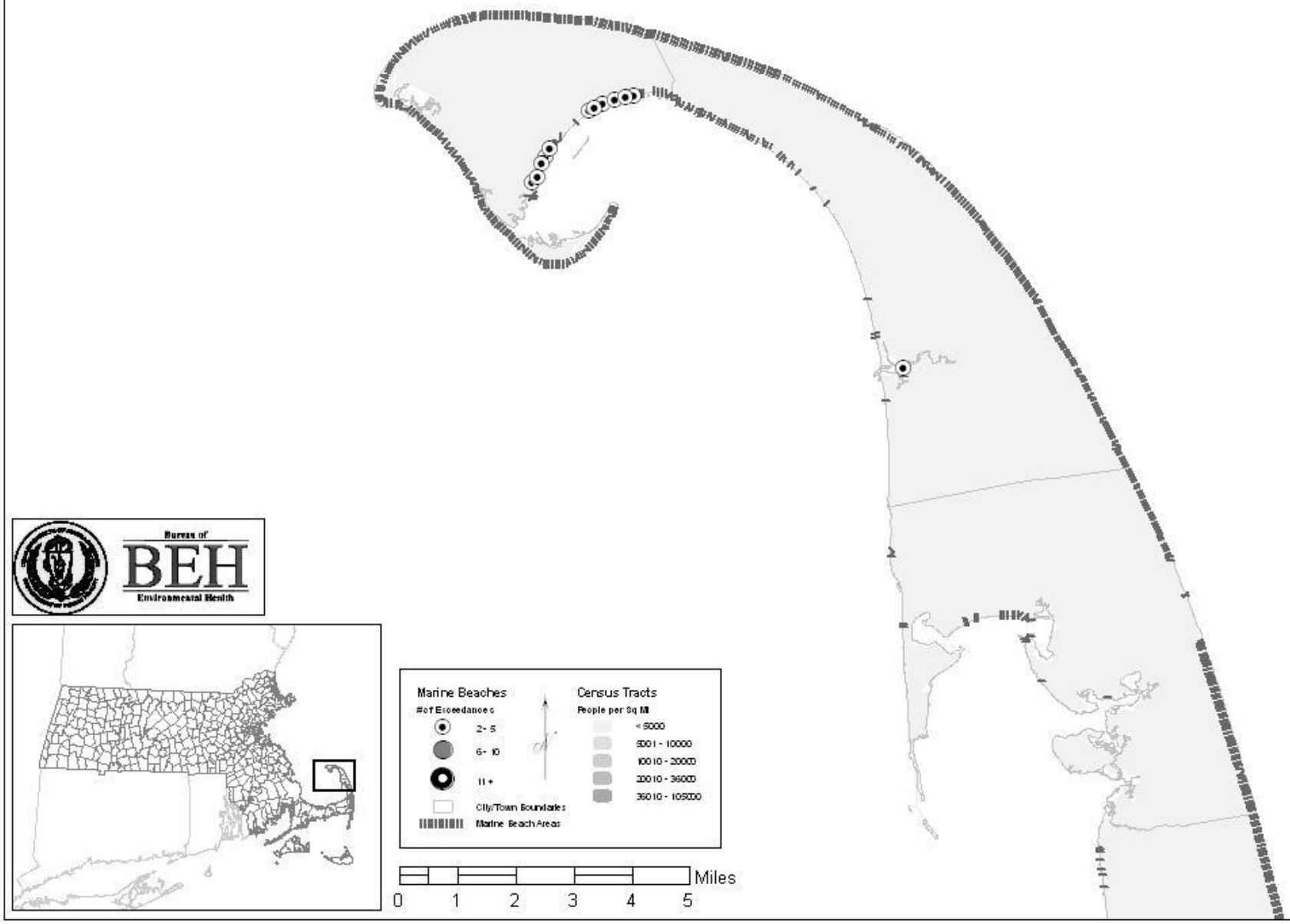
MA Marine Beaches, 2008: Population Density and Number of Bacterial Exceedances

Figure 5 - Lower Cape Cod



MA Marine Beaches, 2008: Population Density and Number of Bacterial Exceedances

Figure 6 - Upper Cape Cod



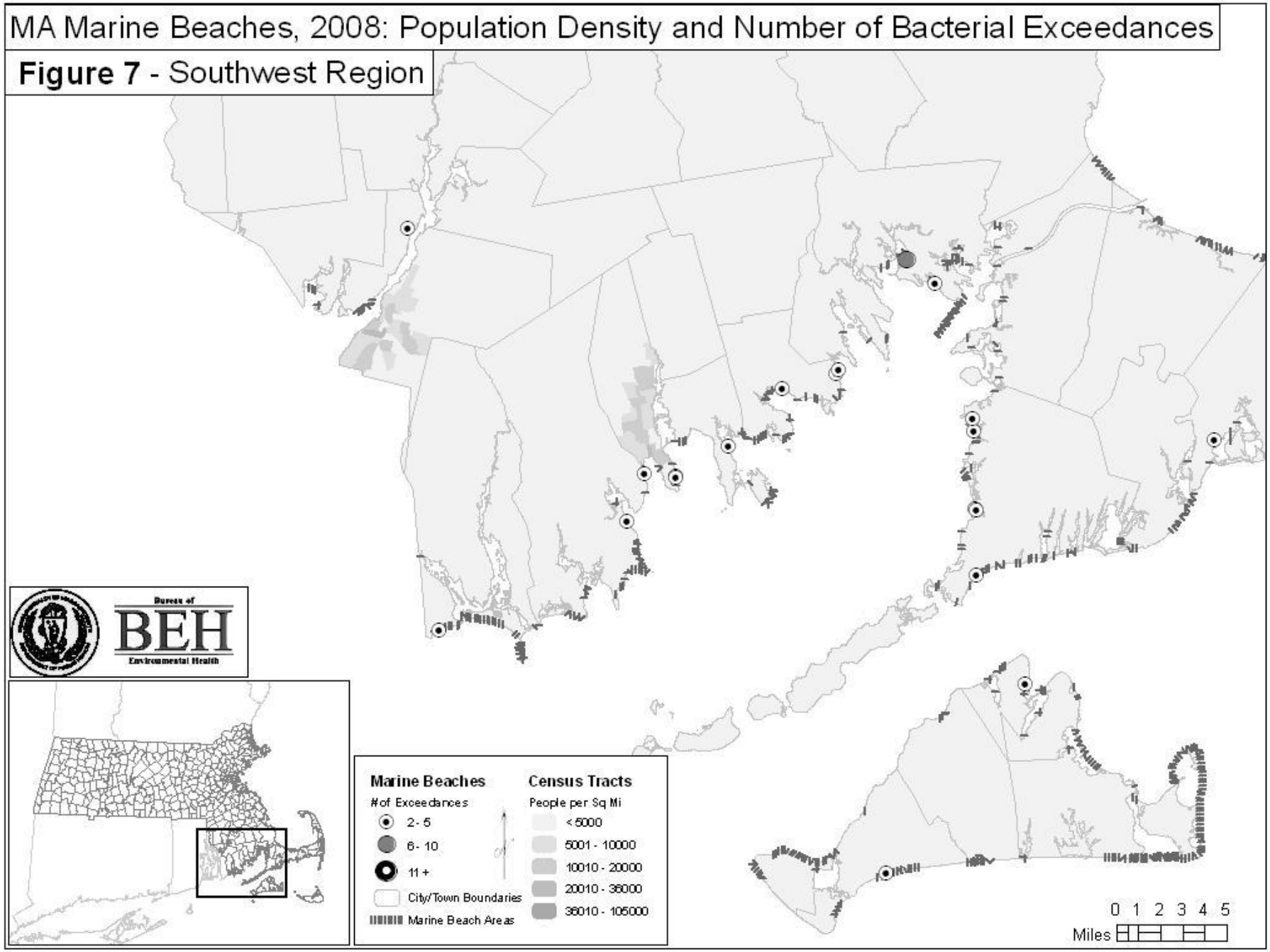

MA Marine Beaches, 2008: Population Density and Number of Bacterial Exceedances
Figure 7 - Southwest Region
Bureau of
BEH
Environmental Health
Marine Beaches
# of Exceedances
2 - 5
6 - 10
11 +
City/Town Boundaries
Marine Beach Areas
Census Tracts
People per Sq Mi
< 5000
5001 - 10000
10010 - 20000
20010 - 36000
36010 - 105000
0 1 2 3 4 5
Miles

Figure 8 - MA Marine Beaches, 2008: All Communities With At Least One Exceedance

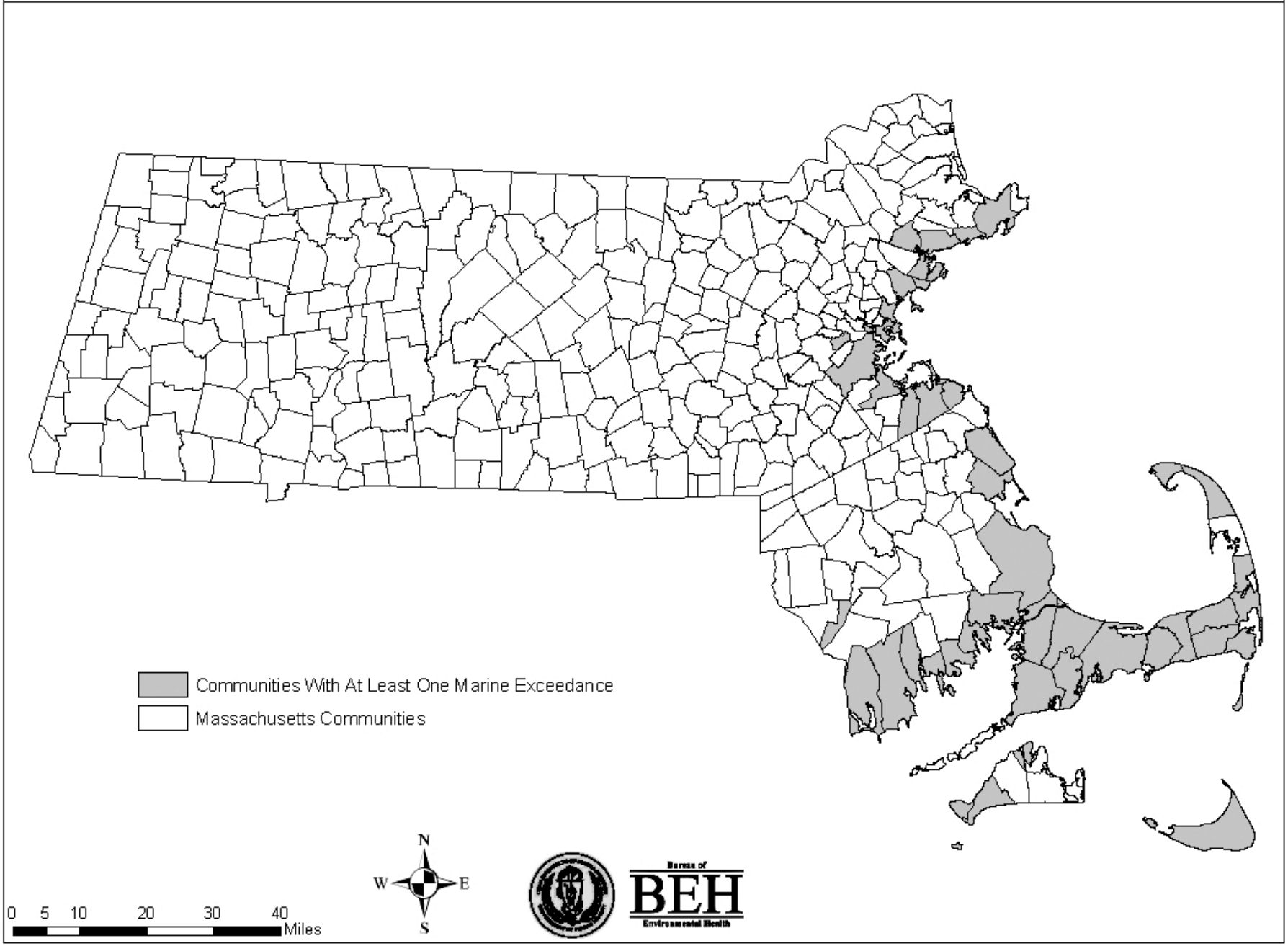
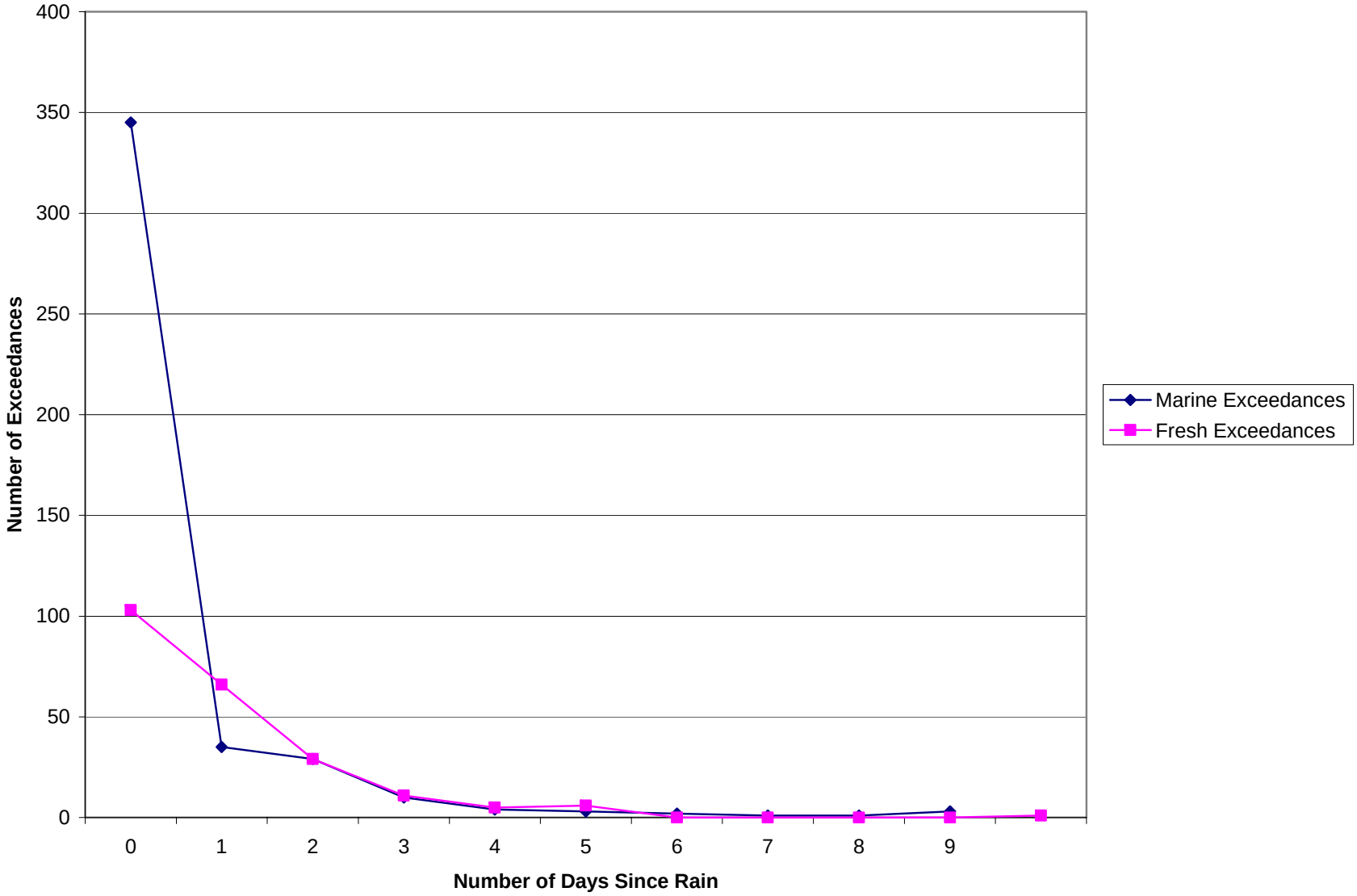


Figure 9
MA Beaches (2008): Relationship Between Bacterial Exceedances and Days Since Last Rainfall



APPENDICES

A. Massachusetts State Regulations

B. General Laws of Massachusetts

C. Massachusetts' Beach Act

D. Federal BEACH Act

E. MDPH Beach Sampling Field Data Form

APPENDIX

A. GENERAL LAWS OF MASSACHUSETTS

GENERAL LAWS OF MASSACHUSETTS

PART I.
ADMINISTRATION OF THE GOVERNMENT

TITLE XVI.
PUBLIC HEALTH

CHAPTER 111. PUBLIC HEALTH

DUTIES OF THE DEPARTMENT OF PUBLIC HEALTH
Chapter 111: Section 5S Public bathing waters; minimum sanitation standards; testing, monitoring and analysis; regulations

Section 5S. (a) As used in this section, the following words shall have the following meanings:--

“Bathing water”, fresh or salt water adjacent to any public bathing beach or semi-public bathing beach in the commonwealth.

“Department”, the department of public health.

“Public bathing beach”, a beach open to the general public, whether or not an entry fee is charged, that permits access to bathing waters.

“Semi-public bathing beach”, a bathing beach used in connection with a hotel, motel, trailer park, campground, apartment house, condominium, country club, youth club, school, camp or similar establishment where the primary purpose of the establishment is not the operation of the bathing beach, and where admission to the use of the bathing beach is included in the fee paid for use of the premises. A semi-public bathing beach shall also include a bathing beach operated and maintained solely for the use of members and guests of an organization that maintains such a bathing beach.

(b) The department, in consultation with local health officers, shall establish minimum sanitation standards to protect bathing waters from contamination from the following: (1) sludge deposits and solid refuse; (2) floating solid, grease or scum wastes; (3) oil, hazardous material, and heavy metals; and (4) bacteria, including but not limited to, total coliform, fecal coliform and enterococci bacteria.

(c) Such standards shall establish safe levels of human exposure to such contaminants, and shall further incorporate, at a minimum, the following provisions:--

(1) An officer or an agent of a local board of health shall test, monitor and analyze all bathing waters within its municipality. Every local board of health shall report the results from all testing, monitoring and analysis of bathing waters to the department. The department shall establish such reporting requirements and shall keep public records thereof. The department shall issue an annual report on the state of beach water quality

using data that has been reported to the department. The department shall make such data available to the public upon written request.

(2) The department shall determine at which sites to conduct testing and monitoring of bathing waters. The department shall consider, but not be limited to, the following factors in determining at which sites to conduct testing and monitoring of bathing waters: (i) prior testing results pursuant to this section for such bathing waters; (ii) the number of people who use the bathing beach annually; and (iii) whether the beach is located adjacent to a storm water drain, sewage, industrial and commercial wastewater discharges, or commercial, industrial and agricultural drains.

(d) The department shall determine at what frequency to conduct testing, monitoring and analysis of bathing waters. Testing, monitoring and analysis shall be conducted on at least a weekly basis during the bathing season, and at such times and under such conditions as shall be sufficient to protect public health and safety. The department may grant a variance from the weekly testing requirement for a public or semi-public bathing beach only where there is a documented history of no sources of pollution, both point and non-point, at the bathing beach, or where such pollution sources at the beach have been fully and completely remediated.

(e) The department shall require the posting of conspicuous warning signs to notify the public whenever there is a threat to human health or safety in bathing waters. Signs shall be posted at locations on the beach that are visible to the public in order to inform the public of the nature of the problem and the possibility of a threat to human health and safety. Signs shall be posted immediately after significant rainstorms at bathing beach locations where there has been a chronic history of violations of the department's minimum sanitation standards for bathing beaches after such rainstorms. When an officer or agent of a local board of health discovers a violation of such minimum sanitation standards, the officer or agent shall notify the department immediately, and in no event not later than 24 hours after such discovery. The local board of health shall also post signs immediately, and in no event not later than 24 hours after such a discovery.

(f) A person may request that a local board of health conduct testing, monitoring and analysis of bathing waters when there is a reasonable basis to believe that an alleged violation of such minimum sanitation standards established by this section has occurred. Local boards of health shall promptly review such requests and determine whether any such testing, monitoring and analysis is necessary to ensure the public health and safety in bathing waters.

(g) The owners of semi-public bathing beaches shall be required to pay for the costs of testing, monitoring and analysis of bathing waters adjacent to such semi-public bathing beaches.

(h) Local boards of health may enter into contractual agreements with owners of semi-public bathing beaches where the local board of health conducts testing, monitoring and analysis of such bathing waters.

(i) A municipality or state agency may adopt sanitation standards and testing, monitoring, and analysis requirements for bathing waters within its jurisdiction that are stricter than the

standards adopted by the department. In any case where a municipality or state agency adopts such stricter standards, any warning signs required by this section shall display the results of such stricter standards relative to the standards of the department.

(j) The testing, monitoring and analysis of bathing waters that are under the control of any state agency shall be conducted by that state agency. All such state agencies shall meet the requirements set forth by this section and the regulations promulgated by the department.

(k) The department may, subject to appropriation, award competitive grants to local boards of health in the form of a 50 per cent reimbursement for the testing, monitoring and analysis of bathing waters and to otherwise carry out the provisions of this section and the regulations promulgated there under. The department shall enter into a contractual agreement with a sole provider of testing services to be utilized by any state agency, and which may be utilized by any local board of health, to comply with the provisions of this section.

The department shall also ensure that the provisions of this section and the regulations promulgated there under are implemented in a cost effective manner by encouraging, where possible, regional approaches or other cost effective means of carrying out the purposes of this section.

(l) The department shall enforce the provisions of this section in accordance with the penalty and enforcement provisions of section 127A.

B. MASSACHUSETTS STATE REGULATIONS

105 CMR 445.000

MINIMUM STANDARDS FOR BATHING BEACHES
STATE SANITARY CODE, CHAPTER VII

445.001: Purpose

The purpose of 105 CMR 445.000 is to protect the health, safety and well-being of the users of bathing beaches, to establish acceptable standards for the operation of bathing water and to establish a procedure for informing the public of any bathing water closures.

445.002: Authority

105 CMR 445.000 is adopted under the authority of M.G.L. c. 111, ss. 3, 5S and 127A.

445.003: Citation

105 CMR 445.000 shall be known and may be cited as 105 CMR 445.000: *Minimum Standards for Bathing Beaches* (State Sanitary Code, Chapter VII).

445.004: Scope

105 CMR 445.000 shall apply to all public and semi-public bathing beaches.

445.010: Definitions

The words, terms or phrases listed below, for the purpose of 105 CMR 445.000, shall be defined and interpreted as follows:

Bathing Beach means the land where access to the bathing water is provided. It shall not mean a swimming pool as defined in 105 CMR 435.000: Minimum Standards for Swimming Pools (State Sanitary Code, Chapter V).

Bathing Water means fresh or salt water adjacent to any public bathing beach or semipublic bathing beach at the location where it is used for bathing and swimming purposes.

Board of Health means the appropriate and legally designated health authority of the city, town, or other legally constituted governmental unit within the Commonwealth having the usual powers and duties of the board of health of a city or town, or its authorized agent or representative.

Department means the Department of Public Health.

Operator means any person who

(1) alone or jointly or severally with others has legal title to a bathing beach, whether or not that person has legal title or control of the bathing water; or
(2) has care, charge or control of such bathing beach as agent or lessee of the owner or an independent contractor.

Person means any individual or any partnership, corporation, firm, association or group, or the Commonwealth, or any of its agencies, authorities or departments or any political subdivisions of the Commonwealth, including municipalities or other legal entity.

Public Bathing Beach means any bathing beach open to the general public, whether or not any entry fee is charged, that permits access to bathing waters.

Semi-Public Bathing Beach means any bathing beach used in connection with a hotel, motel, a manufactured home park, campground, apartment house, condominium, country club, youth club,

school, camp or other similar establishment where the primary purpose of the establishment is not the operation of the bathing beach, and where admission to the use of the bathing beach is included in the fee consideration paid or given for the primary use of the premises. Semi-Public Bathing Beach also means a bathing beach operated solely for the use of members and guests of an organization that maintains such a bathing beach.

Private Bathing Beach means any bathing beach not considered to be a public or semipublic bathing beach.

Sanitary Survey means a written report, conducted by a Massachusetts Registered Sanitary Engineer, Certified Health Officer or Registered Sanitarian, documenting an examination of the bathing water and contiguous land masses for the purpose of identifying actual or potential sources of microbiological or chemical contamination. The sanitary survey shall also include a description of the water circulation associated with the bathing area, the impact of bather load on the bathing beach area and any natural or artificial physical hazards.

445.020: Operation

No operator shall allow bathing or swimming in bathing water whenever in the opinion of the Board of Health or the Department the bathing water is or may be hazardous or unsafe for bathing or swimming. Bathing and swimming at public and semi-public beaches shall be limited to water areas that meet the requirements of 105 CMR 445.030. Any operator of a public or semi-public bathing beach shall comply with the requirements of 105 CMR 445.000.

445.030: Bathing Water Quality

Bathing or swimming shall not be permitted in any bathing water where the quality of the water does not meet the standards established in 105 CMR 445.030(A), 445.030(B), or 445.030(C), and no bathing or swimming shall be allowed when the bathing water is determined by the Board of Health or the Department to be unfit or so subject to contamination as to constitute a menace to health. Bathing or swimming shall not be permitted in bathing waters when:

(A) Physical Quality.
(1) Sludge deposits, solid refuse, floating waste solids, oils, grease or scum are present; or
(2) There are safety hazards including, but not limited to, fast currents, sharp drop-offs or an unstable bottom in the wading area(s) or lack of water clarity.

(B) Bacteriological Quality.
(1) The results of a sanitary survey or other information indicates that sewage or other hazardous substances may be discharged into the bathing water to a degree considered by the Board of Health or the Department to be of public health significance; or

(2) Epidemiological evidence discloses the prevalence of an infectious disease or other health condition which is considered to be related to the use of the bathing water and is considered by the Board of Health or the Department to be of public health significance; or

(3) The bacteriological quality of the bathing water is unacceptable as determined by laboratory analysis for the appropriate indicator organisms specified in 105 CMR 445.031 and exceeds the standards established therein.

(C) Oil, Hazardous Materials, or Heavy Metals. Oil, hazardous materials, or heavy metals are present in excess of surface water quality standards or guidelines established by the United States Environmental Protection Agency or the Massachusetts Department of Environmental Protection.

445.031: Indicator Organisms

(A) For marine water, the indicator organism shall be Enterococci. No single Enterococci sample shall exceed 104 colonies per 100 ml. and the geometric mean of the most recent five (5) Enterococci levels within the same bathing season shall not exceed 35 colonies per 100 ml.

(B) For fresh water, the indicator organisms shall be E. Coli or Enterococci.
(1) No single E. Coli sample shall exceed 235 colonies per 100 ml. and the geometric mean of the most recent five E. Coli samples within the same bathing season shall not exceed 126 colonies per 100 ml; or
(2) No single Enterococci sample shall exceed 61 colonies per 100 ml. and the geometric mean of the most recent five (5) Enterococci samples within the same bathing season shall not exceed 33 colonies per 100 ml.

445.032: Collection of Bathing Water Samples

(A) Location. The Board of Health, for public and semi-public bathing beaches that are not operated by the Commonwealth, and the Department, for bathing beaches that are operated by the Commonwealth, shall approve sampling locations at each bathing beach in its jurisdiction. Samples of bathing water shall be taken at locations within areas of greatest bather load. Additional samples shall also be obtained at any critical location subject to contamination from business developments, dwellings, streams, sewer outfall pipes or other sources. All required samples shall be obtained from these designated locations.

(B) Sample Collection. Samples shall be obtained in accordance with the procedures recommended by the most recent edition of the Standard Methods for the Examination of Water and Waste Water of the American Public Health Association or as approved by the United States Environmental Protection Agency.

(C) Frequency.
(1) The Board of Health, its agent, or any other authorized person shall collect the bacteriological samples:
(a) Within five days of the opening of the bathing season; and
(b) At least weekly during the bathing season at a time and day approved by the Board of Health or the Department; and
(c) Prior to reopening a beach after closing for any reason.
(2) Testing for oil, hazardous materials, or heavy metals shall only be required if the operator, the Board of Health, or the Department has information indicating possible contamination of the bathing beach or bathing waters from oil, hazardous materials or heavy metals.

(D) Field Data. Physical conditions noted at the time of sampling shall be recorded on a form provided by the Department

(E) Personnel. Samples shall be taken by the Board of Health, the Department, their duly authorized representatives or other qualified persons as determined by the Board of Health or the Department.

445.033: Laboratory Analysis and Reporting

(A) Laboratory Analysis. Laboratory analysis of bathing water as required by 105 CMR 445.000 shall be conducted in accordance with the most recent edition of the Standard Methods for Examination of Water and Waste Water of the American Public Health Association or as approved by the United States Environmental Protection Agency.

(B) Reporting.
(1) Routine Reporting by Operators. Any operator or authorized agent of a public bathing beach, except public bathing beaches operated by the Commonwealth, and any operator or authorized agent of a semi-public bathing beach shall report the certified results of all testing,

monitoring and analysis of bathing water to the Board of Health within five (5) days of receipt of the results from the laboratory.
(2) Reporting by Operators of Levels Exceeding the Established Standards. Any operator or authorized agent of a public or semi-public bathing beach shall immediately report to the Board of Health the results of all testing, monitoring and analysis of bathing water found to exceed the standards established in 105 CMR 445.030.
(3) Reporting by the Board of Health. The Board of Health or its authorized agent shall report the results of all testing, monitoring and analysis of bathing water to the Department no later than October 31 of each year.

445.034: Bathing Beaches Operated by the Commonwealth

State agencies that own or operate a bathing beach shall conduct or cause to be conducted all testing, monitoring, and analysis of bathing water at such bathing beach in accordance with these regulations. If the results of such testing, monitoring and analysis are found to exceed the standards established in 105 CMR 445.030, state agencies shall immediately, and in no event later than 24 hours, report the results of such testing, monitoring and analysis to the Department and the Board of Health in the city or town where the bathing beach is located. All other results shall be reported to the Department no later than October 31 of each year.

445.035: Sampling and Analysis at Semi-Public Beaches

(A) The operators of semi-public bathing beaches shall pay for the costs of testing, monitoring and analysis of bathing waters adjacent to such semi-public bathing beaches.

(B) Operators of semi-public bathing beaches may enter into contractual agreements with the Board of Health to have the testing, monitoring and analysis of bathing water conducted by the Board of Health, the Department or other qualified persons as determined by the Board of Health or the Department.

445.036: Public Request for Testing

Any person may request that the Board of Health, or in the case of a bathing beach operated by the Commonwealth, the state agency or the Department, conduct testing, monitoring, and analysis of public and semi-public bathing waters when there is reasonable basis to believe that an alleged violation of 105 CMR 445.000 has occurred. The Board of Health or the Department, as appropriate, shall promptly review such requests and determine whether any such testing, monitoring, and analysis is necessary to ensure the public health and safety of bathing waters.

445.040: Posting and Reopening Notifications

(A) Posting. Whenever the bathing water quality does not meet the requirements of 105 CMR 445.030 or after any significant rainstorm at a bathing beach where there has been a history of violations of the water quality requirements contained in 105 CMR 445.030, the Board of Health, its agent, or any other authorized person shall immediately, and in no event later than 24 hours, notify the Department, and post or cause to be posted, a sign, or signs, at the entrance to each parking lot and each
entrance to the beach stating:

WARNING! NO SWIMMING
SWIMMING MAY CAUSE ILLNESS

and a graphic depiction of a swimmer in a red circle with a diagonal hatch mark. The sign shall also contain the reason for the warning, the date of the posting and the name and telephone number of the board of health.

(B) Reopening. Prior to reopening bathing water posted due to a violation of the standards established in 105 CMR 445.030, the Board of Health, its agent, or any other authorized person

shall verify that the certified results of the laboratory analysis are less than the standard specified in 105 CMR 445.031. The operator of any state operated bathing beach shall notify the Department and the Board of Health within 24 hours, or the next business day, of the reopening of the bathing water.

445.100: Variance

(A) The Board of Health may grant a variance from the provisions of 105 CMR 445.000 for any public or semi-public bathing beach not operated by the Commonwealth. The Department may grant a variance for any bathing beach operated by the Commonwealth. In granting a variance, the Board of Health and the Department shall review available epidemiological data and a written sanitary survey of the bathing beach, as provided by the operator. The survey shall include:

(1) All possible sources of contamination, both bacterial and chemical, on the watershed tributary to the bathing beach including the location and volume of:
(a) sewage and industrial waste water discharges;
(b) storm water overflows;
(c) bird and animal populations; and
(d) commercial and agricultural drainage.
(2) The volume and quality of the diluting water, water depth, water surface area, tides and confluence of tributaries, water currents and prevailing winds.

(B) Any variance granted by the Board of Health shall specify the required continued bacteriological testing schedule, provided that the frequency of bacteriological testing shall not be less than once prior to the bathing season and at least every 30 days thereafter throughout the duration of the bathing season.

(C) Any variance granted by a Board of Health or the Department shall expire*:*
(1) at any time as determined by the Board of Health, but in no instance greater than four years, at which time the operator may apply for an extension, or
(2) at any time the results of bacterial test exceed the levels at 105 CMR 445.031.

(D) No variance from the requirement of weekly testing shall be granted until the applicant provides the Board of Health or the Department with water quality data collected for at least two complete and consecutive bathing seasons.

(E) In granting a variance, the Board of Health or the Department must determine that the enforcement of 105 CMR 445.000 would not serve a significant public health purpose and that the granting of the variance will not conflict with the intent and spirit of these minimum standards. Any variance or other modification authorized to be made by these regulations may be subject to such qualification, revocation, suspension, or other expiration as the Board of Health or the Department expresses in its grant. A variance or other modification authorized to be made by this regulation may otherwise be revoked, modified, or suspended in whole or in part, only after the holder thereof has been notified in writing and has been given the opportunity to be heard.

445.101: Variance to be in Writing

(A)Any variance granted by the Board of Health or the Department shall be in writing. Any denial for a variance shall also be in writing and shall contain a brief statement of the reasons for denial. A copy of each variance shall be conspicuously posted for 30 days following its issuance and shall, while it is in effect, be available to the public at all reasonable hours in the office of the clerk of the city or town, or in the office of the Board of Health and in the case of a variance by the Department, at the Department.

(B) The Board of Health shall submit to the Department a notice of the intent to grant a variance. The Department shall approve, disapprove, or modify the variance within 45 days from receipt thereof. If the Department fails to comment within 45 days, its approval shall be presumed. No alteration of any requirement in these regulations shall be made under any variance until the

Department approves it or 45 days has elapsed without comment, unless the Board of Health certifies in writing to the Department that an emergency exists.

445.300: Severability

In the event that any section of 105 CMR 445.000 is found to be invalid or unconstitutional, the remaining sections shall not be affected and shall remain in full force and effect. To this end, the provisions of this regulation are hereby declared severable.

C. FEDERAL BEACH ACT

PUBLIC LAW 106–284—OCT. 10, 2000

BEACHES ENVIRONMENTAL ASSESSMENT AND COASTAL HEALTH ACT OF 2000

Public Law 106–284
106th Congress

An Act

Oct. 10, 2000
[H.R. 999]

To amend the Federal Water Pollution Control Act to improve the quality of coastal recreation waters, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Beaches Environmental Assessment and Coastal Health Act of 2000.
Inter-governmental relations.
Public health and safety.
33 USC 1251 note.

SECTION 1. SHORT TITLE.

This Act may be cited as the "Beaches Environmental Assessment and Coastal Health Act of 2000".

SEC. 2. ADOPTION OF COASTAL RECREATION WATER QUALITY CRITERIA AND STANDARDS BY STATES.

Section 303 of the Federal Water Pollution Control Act (33 U.S.C. 1313) is amended by adding at the end the following:

"(i) COASTAL RECREATION WATER QUALITY CRITERIA.—

Deadlines.

"(1) ADOPTION BY STATES.—

"(A) INITIAL CRITERIA AND STANDARDS.—Not later than 42 months after the date of the enactment of this subsection, each State having coastal recreation waters shall adopt and submit to the Administrator water quality criteria and standards for the coastal recreation waters of the State for those pathogens and pathogen indicators for which the Administrator has published criteria under section 304(a).

"(B) NEW OR REVISED CRITERIA AND STANDARDS.—Not later than 36 months after the date of publication by the Administrator of new or revised water quality criteria under section 304(a)(9), each State having coastal recreation waters shall adopt and submit to the Administrator new or revised water quality standards for the coastal recreation waters of the State for all pathogens and pathogen indicators to which the new or revised water quality criteria are applicable.

"(2) FAILURE OF STATES TO ADOPT.—

"(A) IN GENERAL.—If a State fails to adopt water quality criteria and standards in accordance with paragraph (1)(A) that are as protective of human health as the criteria for pathogens and pathogen indicators for coastal recreation waters published by the Administrator, the Administrator shall promptly propose regulations for the State setting forth revised or new water quality standards for pathogens and pathogen indicators described in paragraph (1)(A) for coastal recreation waters of the State.

"(B) EXCEPTION.—If the Administrator proposes regulations for a State described in subparagraph (A) under subsection (c)(4)(B), the Administrator shall publish any revised or new standard under this subsection not later than 42 months after the date of the enactment of this subsection. Publication.

"(3) APPLICABILITY.—Except as expressly provided by this subsection, the requirements and procedures of subsection (c) apply to this subsection, including the requirement in subsection (c)(2)(A) that the criteria protect public health and welfare.".

SEC. 3. REVISIONS TO WATER QUALITY CRITERIA.

(a) STUDIES CONCERNING PATHOGEN INDICATORS IN COASTAL RECREATION WATERS.—Section 104 of the Federal Water Pollution Control Act (33 U.S.C. 1254) is amended by adding at the end the following:

"(v) STUDIES CONCERNING PATHOGEN INDICATORS IN COASTAL RECREATION WATERS.—Not later than 18 months after the date of the enactment of this subsection, after consultation and in cooperation with appropriate Federal, State, tribal, and local officials (including local health officials), the Administrator shall initiate, and, not later than 3 years after the date of the enactment of this subsection, shall complete, in cooperation with the heads of other Federal agencies, studies to provide additional information for use in developing— Deadlines.

"(1) an assessment of potential human health risks resulting from exposure to pathogens in coastal recreation waters, including nongastrointestinal effects;

"(2) appropriate and effective indicators for improving detection in a timely manner in coastal recreation waters of the presence of pathogens that are harmful to human health;

"(3) appropriate, accurate, expeditious, and cost-effective methods (including predictive models) for detecting in a timely manner in coastal recreation waters the presence of pathogens that are harmful to human health; and

"(4) guidance for State application of the crite 104 pathogens and pathogen indicators to be published under section 304(a)(9) to account for the diversity of geographic and aquatic conditions.".

(b) REVISED CRITERIA.—Section 304(a) of the Federal Water Pollution Control Act (33 U.S.C. 1314(a)) is amended by adding at the end the following:

"(9) REVISED CRITERIA FOR COASTAL RECREATION WATERS.— Deadlines.

"(A) IN GENERAL.—Not later than 5 years after the date of the enactment of this paragraph, after consultation and in cooperation with appropriate Federal, State, tribal, and local officials (including local health officials), the Administrator shall publish new or revised water quality criteria for pathogens and pathogen indicators (including a revised list of testing methods, as appropriate), based on the results of the studies conducted under section 104(v), for the purpose of protecting human health in coastal recreation waters. Publication.

"(B) REVIEWS.—Not later than the date that is 5 years after the date of publication of water quality criteria under this paragraph, and at least once every 5 years thereafter,

the Administrator shall review and, as necessary, revise the water quality criteria.".

SEC. 4. COASTAL RECREATION WATER QUALITY MONITORING AND NOTIFICATION.

Title IV of the Federal Water Pollution Control Act (33 U.S.C. 1341 et seq.) is amended by adding at the end the following:

33 USC 1346.

"SEC. 406. COASTAL RECREATION WATER QUALITY MONITORING AND NOTIFICATION.

Deadline. Publication.

"(a) MONITORING AND NOTIFICATION.—

"(1) IN GENERAL.—Not later than 18 months after the date of the enactment of this section, after consultation and in cooperation with appropriate Federal, State, tribal, and local officials (including local health officials), and after providing public notice and an opportunity for comment, the Administrator shall publish performance criteria for—

"(A) monitoring and assessment (including specifying available methods for monitoring) of coastal recreation waters adjacent to beaches or similar points of access that are used by the public for attainment of applicable water quality standards for pathogens and pathogen indicators; and

"(B) the prompt notification of the public, local governments, and the Administrator of any exceeding of or likelihood of exceeding applicable water quality standards for coastal recreation waters described in subparagraph (A).

"(2) LEVEL OF PROTECTION.—The performance criteria referred to in paragraph (1) shall provide that the activities described in subparagraphs (A) and (B) of that paragraph shall be carried out as necessary for the protection of public health and safety.

"(b) PROGRAM DEVELOPMENT AND IMPLEMENTATION GRANTS.—

"(1) IN GENERAL.—The Administrator may make grants to States and local governments to develop and implement programs for monitoring and notification for coastal recreation waters adjacent to beaches or similar points of access that are used by the public.

"(2) LIMITATIONS.—

"(A) IN GENERAL.—The Administrator may award a grant to a State or a local government to implement a monitoring and notification program if—

"(i) the program is consistent with the performance criteria published by the Administrator under subsection (a);

"(ii) the State or local government prioritizes the use of grant funds for particular coastal recreation waters based on the use of the water and the risk to human health presented by pathogens or pathogen indicators;

"(iii) the State or local government makes available to the Administrator the factors used to prioritize the use of funds under clause (ii);

"(iv) the State or local government provides a list of discrete areas of coastal recreation waters that are subject to the program for monitoring and notification for which the grant is provided that specifies any coastal recreation waters for which fiscal constraints

will prevent consistency with the performance criteria under subsection (a); and

"(v) the public is provided an opportunity to review the program through a process that provides for public notice and an opportunity for comment.

"(B) GRANTS TO LOCAL GOVERNMENTS.—The Administrator may make a grant to a local government under this subsection for implementation of a monitoring and notification program only if, after the 1-year period beginning on the date of publication of performance criteria under subsection (a)(1), the Administrator determines that the State is not implementing a program that meets the requirements of this subsection, regardless of whether the State has received a grant under this subsection.

"(3) OTHER REQUIREMENTS.—

"(A) REPORT.—A State recipient of a grant under this subsection shall submit to the Administrator, in such format and at such intervals as the Administrator determines to be appropriate, a report that describes—

"(i) data collected as part of the program for monitoring and notification as described in subsection (c); and

"(ii) actions taken to notify the public when water quality standards are exceeded.

"(B) DELEGATION.—A State recipient of a grant under this subsection shall identify each local government to which the State has delegated or intends to delegate responsibility for implementing a monitoring and notification program consistent with the performance criteria published under subsection (a) (including any coastal recreation waters for which the authority to implement a monitoring and notification program would be subject to the delegation).

"(4) FEDERAL SHARE.—

"(A) IN GENERAL.—The Administrator, through grants awarded under this section, may pay up to 100 percent of the costs of developing and implementing a program for monitoring and notification under this subsection.

"(B) NON-FEDERAL SHARE.—The non-Federal share of the costs of developing and implementing a monitoring and notification program may be—

"(i) in an amount not to exceed 50 percent, as determined by the Administrator in consultation with State, tribal, and local government representatives; and

"(ii) provided in cash or in kind.

"(c) CONTENT OF STATE AND LOCAL GOVERNMENT PROGRAMS.—As a condition of receipt of a grant under subsection (b), a State or local government program for monitoring and notification under this section shall identify—

"(1) lists of coastal recreation waters in the State, including coastal recreation waters adjacent to beaches or similar points of access that are used by the public;

"(2) in the case of a State program for monitoring and notification, the process by which the State may delegate to local governments responsibility for implementing the monitoring and notification program;

"(3) the frequency and location of monitoring and assessment of coastal recreation waters based on—

"(A) the periods of recreational use of the waters;

"(B) the nature and extent of use during certain periods;

"(C) the proximity of the waters to known point sources and nonpoint sources of pollution; and

"(D) any effect of storm events on the waters;

"(4)(A) the methods to be used for detecting levels of pathogens and pathogen indicators that are harmful to human health; and

"(B) the assessment procedures for identifying short-term increases in pathogens and pathogen indicators that are harmful to human health in coastal recreation waters (including increases in relation to storm events);

"(5) measures for prompt communication of the occurrence, nature, location, pollutants involved, and extent of any exceeding of, or likelihood of exceeding, applicable water quality standards for pathogens and pathogen indicators to—

"(A) the Administrator, in such form as the Administrator determines to be appropriate; and

"(B) a designated official of a local government having jurisdiction over land adjoining the coastal recreation waters for which the failure to meet applicable standards is identified;

"(6) measures for the posting of signs at beaches or similar points of access, or functionally equivalent communication measures that are sufficient to give notice to the public that the coastal recreation waters are not meeting or are not expected to meet applicable water quality standards for pathogens and pathogen indicators; and

"(7) measures that inform the public of the potential risks associated with water contact activities in the coastal recreation waters that do not meet applicable water quality standards.

Deadline.

"(d) FEDERAL AGENCY PROGRAMS.—Not later than 3 years after the date of the enactment of this section, each Federal agency that has jurisdiction over coastal recreation waters adjacent to beaches or similar points of access that are used by the public shall develop and implement, through a process that provides for public notice and an opportunity for comment, a monitoring and notification program for the coastal recreation waters that—

"(1) protects the public health and safety;

"(2) is consistent with the performance criteria published under subsection (a);

Reports.

"(3) includes a completed report on the information specified in subsection (b)(3)(A), to be submitted to the Administrator; and

"(4) addresses the matters specified in subsection (c) .

Public information.

"(e) DATABASE.—The Administrator shall establish, maintain, and make available to the public by electronic and other means a national coastal recreation water pollution occurrence database that provides—

"(1) the data reported to the Administrator under subsections (b)(3)(A)(i) and (d)(3); and

"(2) other information concerning pathogens and pathogen indicators in coastal recreation waters that—

"(A) is made available to the Administrator by a State or local government, from a coastal water quality monitoring program of the State or local government; and

"(B) the Administrator determines should be included.

"(f) TECHNICAL ASSISTANCE FOR MONITORING FLOATABLE MATERIAL.—The Administrator shall provide technical assistance to States and local governments for the development of assessment and monitoring procedures for floatable material to protect public health and safety in coastal recreation waters.

"(g) LIST OF WATERS.—

"(1) IN GENERAL.—Beginning not later than 18 months after the date of publication of performance criteria under subsection (a), based on information made available to the Administrator, the Administrator shall identify, and maintain a list of, discrete coastal recreation waters adjacent to beaches or similar points of access that are used by the public that— Deadline.

"(A) specifies any waters described in this paragraph that are subject to a monitoring and notification program consistent with the performance criteria established under subsection (a); and

"(B) specifies any waters described in this paragraph for which there is no monitoring and notification program (including waters for which fiscal constraints will prevent the State or the Administrator from performing monitoring and notification consistent with the performance criteria established under subsection (a)).

"(2) AVAILABILITY.—The Administrator shall make the list described in paragraph (1) available to the public through— Public information.

"(A) publication in the Federal Register; and Federal Register, publication.

"(B) electronic media.

"(3) UPDATES.—The Administrator shall update the list described in paragraph (1) periodically as new information becomes available.

"(h) EPA IMPLEMENTATION.—In the case of a State that has no program for monitoring and notification that is consistent with the performance criteria published under subsection (a) after the last day of the 3-year period beginning on the date on which the Administrator lists waters in the State under subsection (g)(1)(B), the Administrator shall conduct a monitoring and notification program for the listed waters based on a priority ranking established by the Administrator using funds appropriated for grants under subsection (i)—

"(1) to conduct monitoring and notification; and

"(2) for related salaries, expenses, and travel.

"(i) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated for making grants under subsection (b), including implementation of monitoring and notification programs by the Administrator under subsection (h), $30,000,000 for each of fiscal years 2001 through 2005.".

SEC. 5. DEFINITIONS.

Section 502 of the Federal Water Pollution Control Act (33 U.S.C. 1362) is amended by adding at the end the following:

"(21) COASTAL RECREATION WATERS.—

"(A) IN GENERAL.—The term 'coastal recreation waters' means—

"(i) the Great Lakes; and

"(ii) marine coastal waters (including coastal estuaries) that are designated under section 303(c) by a State for use for swimming, bathing, surfing, or similar water contact activities.

"(B) EXCLUSIONS.—The term 'coastal recreation waters' does not include—

"(i) inland waters; or

"(ii) waters upstream of the mouth of a river or stream having an unimpaired natural connection with the open sea.

"(22) FLOATABLE MATERIAL.—

"(A) IN GENERAL.—The term 'floatable material' means any foreign matter that may float or remain suspended in the water column.

"(B) INCLUSIONS.—The term 'floatable material' includes—

"(i) plastic;

"(ii) aluminum cans;

"(iii) wood products;

"(iv) bottles; and

"(v) paper products.

"(23) PATHOGEN INDICATOR.—The term 'pathogen indicator' means a substance that indicates the potential for human infectious disease.".

SEC. 6. INDIAN TRIBES.

Section 518(e) of the Federal Water Pollution Control Act (33 U.S.C. 1377(e)) is amended by striking "and 404" and inserting "404, and 406".

33 USC 1375a.

SEC. 7. REPORT.

Deadline.

(a) IN GENERAL.—Not later than 4 years after the date of the enactment of this Act, and every 4 years thereafter, the Administrator of the Environmental Protection Agency shall submit to Congress a report that includes—

(1) recommendations concerning the need for additional water quality criteria for pathogens and pathogen indicators and other actions that should be taken to improve the quality of coastal recreation waters;

(2) an evaluation of Federal, State, and local efforts to implement this Act, including the amendments made by this Act; and

(3) recommendations on improvements to methodologies and techniques for monitoring of coastal recreation waters.

(b) COORDINATION.—The Administrator of the Environmental Protection Agency may coordinate the report under this section with other reporting requirements under the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.).

SEC. 8. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to carry out the provisions of this Act, including the amendments made by this Act, for which amounts are not otherwise specifically authorized to be appropriated, such sums as are necessary for each of fiscal years 2001 through 2005.

Approved October 10, 2000.

LEGISLATIVE HISTORY—H.R. 999 (S. 522):

HOUSE REPORTS: No. 106–98 (Comm. on Transportation and Infrastructure).
SENATE REPORTS: No. 106–366 accompanying S. 522 (Comm. on Environment and Public Works).
CONGRESSIONAL RECORD:
Vol. 145 (1999): Apr. 22, considered and passed House.
Vol. 146 (2000): Sept. 21, considered and passed Senate, amended.
Sept. 26, House concurred in Senate amendment.
WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 36 (2000):
Oct. 10, Presidential statement.

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APPENDIX

D. MASSACHUSETTS' BEACH ACT

Chapter 248 of the Acts of 2000

AN ACT RELATIVE TO MINIMUM STANDARDS FOR PUBLIC BATHING WATERS.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

SECTION 1. Chapter 111 of the General Laws is hereby amended by inserting after section 5R the following section:-

Section 5S. (a) As used in this section, the following words shall have the following meanings:-

"Bathing water", fresh or salt water adjacent to any public bathing beach or semi-public bathing beach in the commonwealth.

"Department", the department of public health.

"Public bathing beach", a beach open to the general public, whether or not an entry fee is charged, that permits access to bathing waters.

"Semi-public bathing beach", a bathing beach used in connection with a hotel, motel, trailer park, campground, apartment house, condominium, country club, youth club, school, camp or similar establishment where the primary purpose of the establishment is not the operation of the bathing beach, and where admission to the use of the bathing beach is included in the fee paid for use of the premises. A semi-public bathing beach shall also include a bathing beach operated and maintained solely for the use of members and guests of an organization that maintains such a bathing beach.

(b) The department, in consultation with local health officers, shall establish minimum sanitation standards to protect bathing waters from contamination from the following: (1) sludge deposits and solid refuse; (2) floating solid, grease or scum wastes; (3) oil, hazardous material, and heavy metals; and (4) bacteria, including but not limited to, total coliform, fecal coliform and enterococci bacteria.

(c) Such standards shall establish safe levels of human exposure to such contaminants, and shall further incorporate, at a minimum, the following provisions:-

(1) An officer or an agent of a local board of health shall test, monitor and analyze all bathing waters within its municipality. Every local board of health shall report the results from all testing, monitoring and analysis of bathing waters to the department. The department shall establish such reporting requirements and shall keep public records thereof. The department shall issue an annual report on the state of beach water quality using data that has been reported to the department. The department shall make such data available to the public upon written request.

(2) The department shall determine at which sites to conduct testing and monitoring of bathing waters. The department shall consider, but not be limited to, the following factors in determining at which sites to conduct testing and monitoring of bathing waters: (i) prior testing results pursuant to this section for such bathing waters; (ii) the number of people who use the bathing beach annually; and (iii) whether the beach is located adjacent to a storm water drain, sewage, industrial and commercial wastewater discharges, or commercial, industrial and agricultural drains.

(d) The department shall determine at what frequency to conduct testing, monitoring and analysis of bathing waters. Testing, monitoring and analysis shall be conducted on at least a weekly basis during the bathing season, and at such times and under such conditions as shall be sufficient to protect public health and safety. The department may grant a variance from the weekly testing requirement for a public or semi-public bathing beach only where there is a documented history of no sources of pollution, both point and non-point, at the bathing beach, or where such pollution sources at the beach have been fully and completely remediated.

(e) The department shall require the posting of conspicuous warning signs to notify the public whenever there is a threat to human health or safety in bathing waters. Signs shall be posted at locations on the beach that are visible to the public in order to inform the public of the nature of the problem and the possibility of a threat to human health and safety. Signs shall be posted immediately after significant rainstorms at bathing beach locations where there has been a chronic history of violations of the department's minimum sanitation standards for bathing beaches after such rainstorms. When an officer or agent of a local board of health discovers a violation of such minimum sanitation standards, the officer or agent shall notify the department immediately, and in no event not later than 24 hours after such discovery. The local board of health shall also post signs immediately, and in no event not later than 24 hours after such a discovery.

(f) A person may request that a local board of health conduct testing, monitoring and analysis of bathing waters when there is a reasonable basis to believe that an alleged violation of such minimum sanitation standards established by this section has occurred. Local boards of health shall promptly review such requests and determine whether any such testing, monitoring and analysis is necessary to ensure the public health and safety in bathing waters.

(g) The owners of semi-public bathing beaches shall be required to pay for the costs of testing, monitoring and analysis of bathing waters adjacent to such semi-public bathing beaches.

(h) Local boards of health may enter into contractual agreements with owners of semi-public bathing beaches where the local board of health conducts testing, monitoring and analysis of such bathing waters.

(i) A municipality or state agency may adopt sanitation standards and testing, monitoring, and analysis requirements for bathing waters within its jurisdiction that are stricter than the standards adopted by the department. In any case where a municipality

or state agency adopts such stricter standards, any warning signs required by this section shall display the results of such stricter standards relative to the standards of the department.

(j) The testing, monitoring and analysis of bathing waters that are under the control of any state agency shall be conducted by that state agency. All such state agencies shall meet the requirements set forth by this section and the regulations promulgated by the department.

(k) The department may, subject to appropriation, award competitive grants to local boards of health in the form of a 50 per cent reimbursement for the testing, monitoring and analysis of bathing waters and to otherwise carry out the provisions of this section and the regulations promulgated there under. The department shall enter into a contractual agreement with a sole provider of testing services to be utilized by any state agency, and which may be utilized by any local board of health, to comply with the provisions of this section.
The department shall also ensure that the provisions of this section and the regulations promulgated there under are implemented in a cost effective manner by encouraging, where possible, regional approaches or other cost effective means of carrying out the purposes of this section.

(l) The department shall enforce the provisions of this section in accordance with the penalty and enforcement provisions of section 127A.

SECTION 2. The department of public health shall promulgate the regulations required by section 5S of chapter 111 of the General Laws not later than March 1, 2001.

SECTION 3. The division of local mandates, in the office of the state auditor, through the legislative review program, pursuant to the last paragraph of section 6B of chapter 11 of the General Laws, shall make a comprehensive report on sections 1 and 2 of this act. The report shall determine the financial impact on cities and towns of such sections and shall prepare a preliminary cost study and cost benefit analysis. The report shall be filed with the clerk of the House of Representatives not later than December 1, 2000.

SECTION 4. Sections 1 and 2 of this act shall take effect on February 1, 2001.
Approved August 11, 2000.

APPENDIX

E. MDPH BEACH SAMPLING DATA FORM

Beach Sampling Field Data Form

Town/City of Collection: **Date Collected:** **Collected By:**	**Time Delivered to Lab:** **Delivered By:** **Relinquished To:**

Instructions: Collect sample(s) in areas of greatest bather load and at locations subject to contamination at a uniform depth of 3 feet. Collect samples 12 inches below water surface. Do not collect samples within 6 inches of bottom.

Sample ID	**Sample Location** (Note beach and sampling location)	**Marine or Fresh**	**Sample Time**	**Water Clarity**	**Water Temp** (°F)	**Days Since Rain** ('0' if w/in 24 hrs.)	**Bather Density (in water)** (Circle appropriate # range)				**Observations of bathing water**
				Clear Cloudy/Murky			0-10	11-20	20-50	>50	
				Clear Cloudy/Murky			0-10	11-20	20-50	>50	
				Clear Cloudy/Murky			0-10	11-20	20-50	>50	
				Clear Cloudy/Murky			0-10	11-20	20-50	>50	
				Clear Cloudy/Murky			0-10	11-20	20-50	>50	
				Clear Cloudy/Murky			0-10	11-20	20-50	>50	
				Clear Cloudy/Murky			0-10	11-20	20-50	>50	
				Clear Cloudy/Murky			0-10	11-20	20-50	>50	
				Clear Cloudy/Murky			0-10	11-20	20-50	>50	
				Clear Cloudy/Murky			0-10	11-20	20-50	>50	

Observations: **T=**Trash **WS**=Waste Solids **SD**=Sludge Deposit **O**=Oils **A**=Algae **F**=Fish die-offs **J**=Jellyfish **B**=Birds **D**=Dogs **N**=None

Current Weather Condition: **C**loudy/Overcast **S**unny **R**ainy **F**oggy **W**indy **Air Temp: _____°F** **Wind Direction: _____**

Comments: _____

_____

_____

Please Note: This form MUST be utilized upon collection of samples and filled out in its entirety. For reporting purposes, a copy must be submitted to MDPH with any lab results.