

# **Marine and Freshwater Beach Testing in Massachusetts**

## **Annual Report: 2011 Season**



**Massachusetts Department of Public Health  
Bureau of Environmental Health  
Environmental Toxicology Program  
<http://www.mass.gov/dph/beaches.htm>**

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## **PART ONE: THE MDPH/BEH BEACHES PROJECT**

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## I. OVERVIEW

There are over 1,000 public and semi-public bathing beaches in Massachusetts, both freshwater and marine. 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.<sup>1</sup> 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 2011, bacteria levels that exceeded public health standards were detected on 915 different occasions across the state, resulting in temporary beach closures. This represents 5.8% of all samples collected during the 2011 season.

In Massachusetts, bathing beach water quality is regulated by the Massachusetts Department of Public Health (MDPH) under Massachusetts General Law<sup>2</sup> and the Code of Massachusetts Regulations.<sup>3</sup> 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 during 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). MDPH/BEH utilizes both state and federal Environmental Protection Agency (USEPA) 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.<sup>4</sup> 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

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<sup>1</sup> Cabelli, 1983; USEPA, 1986; Cabelli, 1989; Haile, 1996; Pruss, 1998.

<sup>2</sup> MGL Chapter (C) 111, § Section (S) 5. See Appendix A.

<sup>3</sup> 105 CMR 445.000: Minimum Standards for Bathing Beaches (State Sanitary Code, Chapter VII). See Appendix B.

<sup>4</sup> The address of the MDPH/BEH website can be found on the cover of this report.

decrease to levels below the applicable standard, at which point the postings can be removed and MDPH/BEH is notified of the beach reopening.

## 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.<sup>5</sup> One retrospective study found the relative risk of gastrointestinal (GI) illness among swimmers in polluted waters to be one to three times that of non-swimmers.<sup>6</sup>

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 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.<sup>7</sup>

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,<sup>8</sup> 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/BEH 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.

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<sup>5</sup> Cabelli et al., 1982; Cabelli, 1983; USEPA, 1986; Cabelli, 1989; Coyne and Goldoft, 1989; CDC, 1990-2004; Corbett et al., 1993; Haile, 1996; Pruss, 1998.

<sup>6</sup> Pruss, 1998.

<sup>7</sup> Wade et al., 2003; Wade et al., 2006

<sup>8</sup> California, 1997; Gerba, 2000

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 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.<sup>9</sup>

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 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 16.

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

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<sup>9</sup> 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](http://mass.digitalhealthdepartment.com/public_21/index.cfm).

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).

### 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 state funds and for the 2011 season limited federal funding to contract with a number of laboratories to analyze qualifying communities' public marine beach samples. Since 2003, MDPH/BEH has reimbursed communities over \$750,000 for the analysis of over 40,000 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 2011 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 Enterococcus 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 Enterococcus 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, Enterococcus 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 Enterococcus 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 Enterococcus 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**

Enterococcus 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 Enterococcus in Water, or Enterolert. Method 1600, which was approved and adopted by USEPA in 1997, enables a faster turnaround time for testing of Enterococcus, making it practical for local use. Laboratories contracted by MDPH to perform public, marine beach sample analysis are required to utilize the Modified Enterococcus 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.

### Marine

USEPA (1986) used the relationship between the number of cases of swimming-associated disease and the Enterococcus concentration in bathing water to establish the criteria for Enterococcus 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 Enterococcus 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 Enterococcus 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.<sup>10</sup>

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.

In 2006, the MDPH beaches website was enhanced through the addition of a GIS layer to display maps of beach locations, provide graphs for both single sample and geometric mean data, and improved reliability and efficiency for data entry. These improvements allow the public to quickly find the locations of all beaches through the use of new GIS maps and to view graphical and tabular historical monitoring data.

## **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.

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<sup>10</sup> 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](http://mass.digitalhealthdepartment.com/public_21/index.cfm).

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 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.

## **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 (434 of the 527 marine and 522 of the 528 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 **86** marine beaches and 6 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 may be reclassified as Tier One and monitored more frequently. If the data show that a beach has maintained exceptionally clean water quality, it may be 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, Certified Health Officer, or Registered Environmental Health Specialist. 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 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), other MDPH bureaus (e.g. MDPH's Bureau of Infectious Disease Prevention, Response and Services), or other state agencies.

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. In 2008, MDPH/BEH was one of ten states to be awarded a cooperative agreement from the United States Centers for Disease Control and Prevention to enhance environmental and human illness surveillance related to harmful algae blooms.

# **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 Enterococcus, 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 measured. These are 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 Enterococcus 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).

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 2011 BATHING SEASON**

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## I. MDPH ACCOMPLISHMENTS

In addition to its routine monitoring activities (outlined earlier), MDPH/BEH performed a variety of more specific activities, unique to the 2011 season.

### A. Beaches Website/Data Management

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

Guidance and training was provided to local boards of health, when necessary, to ensure quality assurance for data entry conducted outside of the contract laboratory program.

The beach program's database was again updated for the 2011 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. MDPH has been adding new information associated with beaches, such as waterbody information, latitude/longitude coordinates, and potential pollution sources of freshwater beaches. In 2011, information on more than 150 freshwater beaches was added to the database to provide greater clarity when analyzing bacterial results and also help identify potential exposure points when potential waterborne public health emergencies occur. This information has previously been completed for all marine beaches.

*Forms were distributed to local boards of health in 2011*

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

### B. Trainings

In April 2011, 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 geographically diverse locations across the state. MDPH beaches staff presented information on the most frequently asked questions heard from health agents during the 2010 beach season and provided further clarity on the implementation of the 2009 beach regulation amendments. Informational packets were provided containing the beach sampling field data forms, sanitary survey forms, posting forms, and fact sheets. 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 2011.*

In preparation for the 2011 beach season, MDPH staff personally communicated with bathing beach communities while collecting 2010 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.

### C. 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. MDPH staff also assisted local health officials and laboratories in developing their weekly sampling schedules for the 2011 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.*

### D. Laboratory Program

Since 2003, MDPH/BEH has supported local marine communities for routine monitoring through the services of contract laboratories funded by MDPH. This support continued in 2011. The laboratories funded by MDPH/BEH (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) analyzed over 4,500 marine beach samples from 54 marine beach communities during the 2011 beach season.

*Laboratory contracts were renewed in 2011 and 54 of the 60 marine communities utilized these services.*

During the 2011 beach season, MDPH staff completed audits of the six contract laboratories. The purpose of these audits was to determine compliance with the Bathing Beaches Project QAPP, and included an examination of the facilities, equipment, sample log-in and tracking forms, methodology employed, and quality assurance/quality control procedures. These on-site evaluations included a microbial laboratory check-list that had been adapted by MDPH from certification forms used by the Massachusetts Department of Environmental Protection's Water Quality Lab in Lowell, MA. All six contract laboratories completed their lab audits with no major deficiencies. The laboratories corrected any minor deficiencies that were noted.

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.

## **II. MONITORING**

### **A. Results**

During the 2011 bathing season, 210 of 227 communities in Massachusetts with public or semi-public, marine or freshwater beaches sent water quality data to MDPH/BEH. Fourteen of the seventeen communities that did not submit data had closed their beaches for the 2011 beach season, and hence no beach water quality data were collected in 2011. These beaches were closed mainly due to lack of use or resources (e.g. staff to maintain and collect samples or money to conduct required sampling). Three communities (Hanson, Mendon and Wrentham) did have freshwater beaches open in 2011, but did not submit testing data.

In total, MDPH received water quality data collected from 597 marine and 576 freshwater sampling locations at 527 marine and 528 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 15,752 water samples from marine and freshwater beaches collected during the 2011 beach season. There are 33 communities that have only marine bathing beaches, 167 communities that have only freshwater beaches, and 27 that have both marine and freshwater bathing beaches within their communities (Table 1).

#### **1. MARINE BEACHES**

During the 2011 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. These communities accounted for 597 sampling locations at 527 public or semi-public marine bathing beaches.

A total of 8,140 water samples were collected from marine public and semi-public beaches and reported to MDPH/BEH during the 2011 bathing beach season (Table 2). Bather density data were collected as part of routine sampling. Massachusetts regulations require samples to be taken within the area of greatest bather density (105 CMR 445.000). GPS 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 were 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 Enterococcus as the standard indicator

*99% of communities with open beaches reported data to MDPH in 2011.*

*MDPH received data for 1,100 sampling locations at over 1,000 marine and freshwater beaches in 2011.*

*There are 60 communities with marine beaches in Massachusetts.*

*Over 8,140 samples were collected at marine beaches in 2011 to evaluate bacterial water quality.*

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 Enterococcus as an indicator organism. Enterococcus was the indicator used for all water samples taken at marine beaches in 2011. 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.

Eighty-two 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 semi-public beach, Cedar Cove in Swansea, which, though open, was not being tested with the required weekly frequency. As part of routine quality assurance during the beach season, MDPH staff noticed the inadequate sampling and contacted the Swansea Board of Health. The health agent for the town successfully worked with the beach operator to ensure that, thereafter, they met the regulatory requirement for frequency of testing. The beach was tested weekly starting on August 1, 2011.

Local health departments, independent laboratories, the National Park Service, MDCR, and semi-public operators (camps, hotels, and neighborhood associations, etc.) were responsible for collecting the majority of the marine beach water samples. MDPH/BEH contract laboratories performed the majority of analyses for these samples during 2011. Four communities (Boston, Lynn, Revere, and Salisbury) have marine beaches that are solely managed by MDCR and therefore are not eligible for the contract laboratory system. MDCR coordinates with MDPH for laboratory results to be entered onto the beaches website by the laboratories they utilize. The towns of Kingston and Tisbury opted not to use MDPH/BEH contracted laboratories in 2011. Both of these towns faxed their data to MDPH beach inspectors and these data were subsequently entered directly onto the beaches website for prompt public notification.

The total number of marine beach postings (i.e., verification to MDPH/BEH that a sign was posted at the beach) received in 2011 was 483 (Table 5). The number of postings was greater than the total number of single sample exceedances (481). This could be due to a variety of factors, such as number of precautionary postings issued 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 5.9% in 2011 (Table 6). Of the 597 public or semi-public marine beach locations, 206 (35%) incurred at least one bacterial exceedance (Table 7).

Total rainfall amounts in Massachusetts were higher during the 2011 season compared to 2010 (Tables 8 through 11). The Boston area received 14.54 inches of rain in the 2011 beach season (i.e., June through August), which is above both the 9.65 inches of rain normally received in those months and the 11.59 inches received in 2010. The Chatham area (Brewster, Chatham,

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

*Nearly 100% of all marine beaches were tested as required in 2011.*

*The number of marine beach postings in 2011 was 483.*

*206 marine beaches had at least one exceedance.*

*5.9% of all samples collected exceeded the bacterial standard.*

*Total rainfall in was above normal in both Boston and Chatham.*

Dennis, Eastham, Harwich, and Orleans) received slightly above average rainfall during the beach season.

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 2011, the field forms accompanying 4,357 of the 8,140 marine samples collected (about 53%) included information as to whether potential transient pollution sources had been observed to be present at the sampling location. Of those, 18% recorded the presence of a specific source (e.g. birds, dogs, waste solids, trash), and 11.6% of those samples exceeded the bacterial standard (Table 12). The field forms for 3,571 samples specifically noted the absence of potential pollution sources. Of those, 3.4% exceeded the bacterial standard. The data suggest that potential bacterial sources at the time of sampling presents a higher risk of bacterial exceedances.

There were a large number of samples (3,783) where information on pollution sources (or lack thereof) was not completed on field data forms. For these samples, 7.1% exceeded the bacterial standard. MDPH continues to stress the need to record these potential sources on the field data form. Although some communities have improved in this area, most still do not complete the form.

## 2. FRESHWATER BEACHES

During the 2011 bathing season, 177 of the 194 Massachusetts communities with known public or semi-public freshwater bathing beaches submitted beach monitoring data to MDPH/BEH. Fourteen of the 17 communities that did not report freshwater data for 2011 (Brimfield, Brookfield, Conway, Dartmouth, Duxbury, Medway, Merrimac, New Bedford, Norton, Sheffield, Shirley, Weymouth, Windsor, and Worthington) did not open any freshwater beach in 2011. As mentioned previously, three communities (Hanson, Mendon and Wrentham) did have freshwater beaches open in 2011, but did not submit testing data. The 177 communities that had open freshwater beaches and submitted data to MDPH contain 576 public or semi-public freshwater bathing beaches and collected a total of 7,612 freshwater samples (Table 2).

For bather density (Table 3), the data are 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.

In 2011, local health officials used the approved indicator organism (either *E. coli* or Enterococcus) at 100% of freshwater beaches in Massachusetts, with the majority of beaches using the *E. coli* indicator. Approximately 95% of public and semi-public freshwater beaches in Massachusetts were tested with the minimum required weekly frequency in 2011 (Table 4). Six

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

*7,612 samples were collected at Massachusetts freshwater beaches in 2011.*

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

*95% of freshwater beaches were tested weekly.*

freshwater beaches have Tier Three status and sample every other week or once a month, as approved by MDPH and the local board of health. Five percent of freshwater beaches ( $n = 32$ ) 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 all their beaches with the required frequency have been contacted to review regulatory requirements. Independent laboratories collected the majority of samples to be analyzed from freshwater beaches. Local health departments and MDCR collected the remainder of the samples.

The total number of freshwater beach exceedances detected in 2011 was 434 (5.7%) (Table 5). This was an increase from the number of exceedances of the freshwater water quality standards (235 cfu/100 ml *E. coli* and 61 cfu/100 ml Enterococcus) in 2010 (299 or 4.0%) (Table 6). These data are discussed further in the Analysis of Results section.

The field forms accompanying 4,567 of the 7,612 freshwater samples collected (60%) included information as to whether potential transient pollution sources had been observed to be present at the sampling location. Of those, 19% ( $n=870$ ) recorded the presence of specific source (e.g. birds, dogs, algae, trash), and 7.8% of those 870 samples ( $n=68$ ) exceeded the bacterial standard (Table 12). The field forms for 3,697 samples specifically noted the absence of potential pollution sources. Of those, 5% ( $n=185$ ) exceeded the bacterial standard.

*5.7% of bacterial water quality samples exceeded the freshwater standard.*

*434 bacterial exceedances were reported in 2011.*

## B. Analysis of Results

In 2011, all marine and 99% of freshwater communities with open beaches reported bathing beach water quality data to MDPH/BEH. In 2011, MDPH/BEH received the required notification for all but six exceedances (a total of 481 exceedances for marine waters or 99%). The six missing notifications were for exceedances at beaches in Winthrop and Yarmouth and all exceedances should have resulted in a posting. 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 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.

Posting notifications were not received by MDPH/BEH for 98 of 434 exceedances at freshwater beaches in 2011, which is an increase over 2010, when there were 24 exceedances without posting notifications. For freshwater beaches, MDPH receives the majority of freshwater data after

October 31 each year (the Massachusetts Beach Act requires submittal of data by October 31). Therefore, MDPH staff are not able to remind local health departments to submit the required posting notifications at the time of the exceedances, which may reduce the number of posting notifications received in a given year. 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.

*In 2011, 336 exceedances had corresponding posting notifications at freshwater beaches.*

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 2011. 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 2011 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.

*Environmental pollution sources are being recorded more often.*

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, 7.8% exceeded public health standards, compared to 5.0% for those that actively noted an absence of observed sources. For marine beaches, the percentage of exceedances at beaches where a pollution source was noted (11.6%) was also higher than those where none were noted (3.4%). However, it should be noted that, overall, 47% of marine samples and 40% of freshwater samples were accompanied by a field data form that did not include any information on the presence or absence of pollution sources. 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, from 2001 through 2011, 5.0% of all marine samples collected exceeded the Enterococcus standard. The rate of marine beach exceedances in 2011 was 5.9% which is above the historical average, but below the rate of exceedances for either of the two previous beach seasons. All marine communities that had at least one exceedance in 2011 appear in Figure 1.

Rainfall amounts during the 2011 beach season (Tables 8 - 11) may partly explain the higher than normal exceedance percentage. The Boston area received 14.54 inches of rain in the 2011 beach season (i.e., June through

August) versus 9.65 inches of rain normally received in those months. The rainfall amounts were well above normal in August (+130%). The Chatham area (Brewster, Chatham, Dennis, Eastham, Harwich, and Orleans) received slightly above average rainfall (+7%) for the season. More rainfall in the Boston area likely resulted in greater urban runoff, thereby contaminating beach water and hence causing exceedances.

Another possible factor in a higher than normal exceedance rate in 2011 maybe due to the implementation of the Tiered Monitoring Plan, which has taken place mainly over the past several years. MDPH/BEH has been working with local boards of health to reduce sampling at beaches where there is a low risk for bacterial exceedances allowing for more intense focus on higher risk beaches. Over 90 marine now beaches have Tier 3 status which allows reduced sampling. Meanwhile, sampling at beaches with a higher risk of exceedances (Tier 1 and Tier 2) has remained relatively consistent. Reduced sampling at low risk beaches has reduced the total number of samples collected in a year, even though more beaches are sampled. Thus, a higher percentage of bacterial exceedances may occur because of this recent shift to reducing sampling at low risk beaches. A complete listing of marine beaches sampled during the 2011 beach season, their exceedances, and postings can be found in Table 13.

The beach testing results also show the percentage of exceedances at marine beaches was slightly lower in 2011 than 2010 (5.9% versus 6.2%). It is unusual that the percentage of exceedances in 2011 was lower then 2010 despite higher rainfall in 2011 versus 2010. Rainfall is a major driver of bacterial exceedances in beach water. A likely contributor to this observation is that Tropical Storm Irene dumped nearly two inches of rain in late August throughout the region. As a result, DCR preemptively closed their Boston-area beaches for several days prior to, during, and following the storm. During that period, DCR did not collect daily samples which would have likely demonstrated many exceedances given the volume of rain during this storm event, which would have increased the overall seasonal exceedance rate.

Overall 5.7% of the samples collected at freshwater beaches during 2011 exceeded bacterial standards (Table 6). This percentage of exceedances was higher than the historical average (4.2%). All communities that experienced at least one freshwater exceedance in 2011 can be seen in Figure 5. A complete listing of freshwater beaches sampled during the 2011 beach season, their exceedances, and postings can be found in Table 14.

As shown in Tables 8 through 11, the amount of rainfall was highly variable in four areas around the state (Amherst, Ashburnham, Boston, and Chatham). As noted previously, the Boston and Chatham areas received above average rainfall for the season. At Amherst and Ashburnham, there was above normal rainfall in June and August and rainfall was below average in July. The amount of rainfall in August was the highest recorded in any beach season month (June – August) between 2001 and 2011 at these two locations. It should be noted that these are only four data points

*Exceedance rates were above historical averages for marine beaches in 2011.*

for a large geographical area and therefore localized rainfall totals could be different.

At freshwater beaches, the percentage of exceedances was above the historical average as well. A likely contributor to higher exceedance rates was Tropical Storm Irene which resulted in heavy and prolonged rain, especially in Central and Western Massachusetts. During the week following the storm (August 29 – September 6), 18% of freshwater samples collected exceeded the beach water quality standard. The average rate of exceedances for samples collected at all other times during the 2011 beach season was 5%. Figure 4 shows the number of freshwater exceedances after Tropical Storm Irene, as well as rainfall information and storm path.

Similar to marine beaches, the amount of rainfall and number of exceedances are often correlated at freshwater beaches. Figures 6-8 display rainfall information and the percentage of bacterial exceedances for the months of June, July, and August for three areas: Barnstable, Plymouth, and Westfield. The areas surrounding Barnstable, Plymouth, and Westfield were selected because of the availability of rainfall data in close proximity to a significant number of freshwater beaches.

Figures 9 and 10 show the historical relationship between exceedances at marine and freshwater beaches and the total amount of rainfall between June and August. For both marine and freshwater beaches, exceedances generally rise and fall with rainfall amounts, with some exceptions. For marine beaches, when rainfall decreased in 2005 and then increased significantly in 2006, the percentage of exceedances remained similar across both years and as discussed previously, in 2011 the amount of rainfall increased while the percentage of exceedances decreased slightly from 2010. For freshwater beaches, when rainfall increased in 2009, the percentage of exceedances decreased and the inverse scenario occurred in 2010.

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 11 through 16 show that the majority of beaches that had multiple bacterial exceedances were in areas with high population densities. It should be noted that the population data used in these figures is based on year-round populations and many communities along the coast see large increases in population during the summer. Many Massachusetts communities have addressed combined sewer overflows and stormwater runoff problems in response to USEPA's 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.

Table 15 and Figure 17 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 but one of the 481 exceedances had corresponding rain event information, while for freshwater beaches rain event data were recorded for 309 of the 434 bacterial exceedances in 2011. Sixty-two percent of marine beach exceedances and 45% of freshwater exceedances occurred within 24 hours of a rain event. Figure 17 shows the exponential drop-off in the number of exceedances as the time from rainfall increases.

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 Enterococcus levels. However, as in previous years, more than three-quarters of the marine beach samples (82%) and freshwater beach samples (82%) 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.

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 (Boehm, A. B. and S.B. Weisberg, 2005). This study concluded bacteria levels may be higher during spring-ebb tides (receding tides) compared to all other tidal conditions and that Enterococcus densities were found at beaches during tidal events with no obvious point source. The study suggested that tidally forced sources of Enterococcus may be occurring at beaches. Potential sources for these Enterococcus 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).

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

*Bacterial exceedances are closely tied to rain events.*

*Greater bather use at a beach can increase bacterial levels.*

*Studies have shown spring tides to increase bacterial levels.*

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

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 is working 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. In August 2011, the Atlantic Ocean coastal waters off Chatham, Orleans, Eastham, Wellfleet, Truro, and Provincetown were designated as a no-discharge zone, which makes it illegal for boats to discharge sewage. With the addition of these waters, two-thirds of Massachusetts' coastal waters are no-discharge zones.

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.

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

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

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

## **III. FUTURE PLANS**

### **A. Direct Web-Based Reporting**

In 2012, 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 2012, MDPH/BEH will work in collaboration with the MDPH/BEH Community Sanitation Program and the Massachusetts Health Officers Association to provide four separate training events for local boards of health in five different regions of the state. These trainings focused on informing local health officials of the results from the 2011 beach season and ways to improve data collection. Information was also provided on harmful algae blooms. MDPH/BEH will continue to offer sampling training and provide additional technical assistance to freshwater and marine communities where needed. MDPH/BEH will also provide assistance on the use of the MDPH posting form and the field data forms that are required to be completed each time a sample is taken.

*MDPH conducted four trainings in the spring of 2012 for local health officials.*

### **C. Sanitary Surveys**

MDPH/BEH will continue to facilitate sanitary surveys in support of the Tiered Monitoring Plan and the variance process during 2012. 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 2012 to conduct sanitary surveys that will support the Tiered Monitoring Plan. Data from the 2010 and 2011 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.

*Additional sanitary surveys will be conducted to further the goals of the Tiered Monitoring Plan in 2012.*

MDPH/BEH will be conducting many sanitary surveys at public marine beaches in support of these efforts.

## **IV. SUMMARY**

This report summarizes beach monitoring and testing data from Massachusetts public and semi-public marine and freshwater bathing beaches in the 2011 season. In total, 210 communities with operating bathing beaches reported 15,752 water samples collected at over 1,000 beaches. The beach testing results from the 2011 season show lower percentages of exceedances at marine beaches than the 2010 beach season's averages, but above the historical average. Water quality data at freshwater beaches showed an increase in the percentage of exceedances in 2011 compared to both 2010 and the historical rate. 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. Massachusetts freshwater communities continue to increase their usage of the required field data form, including identifying potential environmental pollution sources.

*Over 15,000 samples were collected at over 1,000 beaches in 2011.*

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.

## **ACKNOWLEDGEMENTS**

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## **TABLES**

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**Table 1**

MA Beaches (2011): 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	167	47.6%
Marine and freshwater beaches	27	7.7%
No beaches	124	35.3%
<b>Total</b>	<b>351</b>	<b>100.0%</b>

**Table 2**

MA Beaches (2011): Water quality testing at marine and freshwater public and semi-public bathing beaches, grouped by community, beach, and sample.

	# communities containing	# communities providing data for	# tested <sup>2</sup>	# samples collected from
<b>Marine Beaches<sup>1</sup></b>	60	60	597	8,140
<b>Freshwater Beaches<sup>1</sup></b>	194	177	576	7,612
		<b>Total:</b>	1,173	15,752

1. For the purposes of this report, a sample location is considered a single beach.
2. Note that this table does not include the number of beaches *not* tested, as data were not compiled to accurately determine this number.

**Table 3**

MA Beaches (2011): 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	6,695	82.2%
10-20	217	2.7%
20-50	125	1.5%
>50	69	0.8%
Not indicated	1,034	12.7%
<b>Total</b>	<b>8,140</b>	<b>100.0%</b>

**Freshwater beaches**

Bather Density (# people)	# Samples	%
0-10	6,191	81.3%
10-20	235	3.1%
20-50	139	1.8%
>50	62	0.8%
Not indicated	985	12.9%
<b>Total</b>	<b>7,612</b>	<b>100.0%</b>

**Table 4**

MA Beaches (2011): Frequency of water quality testing at public and semi-public bathing beaches, grouped by beach and frequency.

**Marine Beaches**

<b>Test frequency</b>	<b># Beaches</b>	<b>%</b>
Daily	13	2.2%
Weekly	492	82.4%
Monthly	86	14.4%
Biweekly	6	1.0%
<b>Total</b>	<b>597</b>	<b>100.0%</b>

**Freshwater Beaches**

<b>Test frequency</b>	<b># Beaches</b>	<b>%</b>
Weekly	552	95.8%
Monthly	1	0.2%
Biweekly	7	1.2%
Twice per week	4	0.7%
One time	3	0.5%
Two times	3	0.5%
Three times	5	0.9%
Unknown	1	0.2%
<b>Total</b>	<b>576</b>	<b>100.0%</b>

**Table 5**

MA Beaches (2011): Number of exceedances and postings at marine and freshwater public and semi-public bathing beaches.

**Marine beaches**

Exceedances, Total (Enterococcus)	481
Postings, Total <sup>1</sup>	483
Postings, Single Sample Exceedance	307
Postings, Geomean Exceedances	33
Postings, Preemptive Rainfall	86
Postings, Preemptive - Hurricane	44
Postings, Preemptive - Other	11
Permanent closures	2

**Freshwater beaches**

Exceedances, Total	434
Exceedances, Enterococcus	183
Exceedances, E. Coli	251
Postings, Total <sup>1</sup>	326
Postings, Enterococcus	146
Postings, E. Coli	93
Postings, Preemptive - Rainfall	14
Postings, Preemptive - Hurricane	56
Postings, Preemptive - Other	10
Postings, Algae	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

**Table 6**  
MA Beaches (2011): Number of samples in which the measured  
Enterococcus concentration (marine beaches)  
or Enterococcus or *E.coli* concentration (freshwater beaches)  
exceeded the respective water quality criterion at public and semi-public bathing beaches.

Year	Marine Beaches			Freshwater Beaches		
	Exceedances <sup>1</sup>	Total Samples Analyzed	%	Exceedances <sup>1</sup>	Total Samples Analyzed	%
2001	444	7200	6.2%	336	5651	5.9%
2002	185	6686	2.8%	264	6473	4.1%
2003	320	7439	4.3%	333	6480	5.1%
2004	337	7873	4.3%	267	7313	3.7%
2005	368	8064	4.6%	286	7148	4.0%
2006	405	8367	4.8%	279	7438	3.8%
2007	253	7693	3.3%	236	7977	3.0%
2008	433	7639	5.7%	325	7834	4.1%
2009	571	8119	7.0%	222	7684	2.9%
2010	490	7919	6.2%	299	7490	4.0%
2011	481	8140	5.9%	434	7612	5.7%
<b>Average</b>	<b>390</b>	<b>7740</b>	<b>5.0%</b>	<b>298</b>	<b>7191</b>	<b>4.2%</b>

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

**Table 7**

MA Beaches (2011): 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.

	# beaches with at least one exceedance	Total # beaches reporting	%
<b>Marine</b>	206	597	34.5%
<b>Freshwater</b>	220	576	38.2%

**Table 8**  
MA Beaches (2001-2011): 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	
2001	Total	4.99	2.13	4.14	11.26	
	Dev From Norm	+55%	-30%	+23%	+17%	
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%	
2009	Total	3.22	6.90	3.24	13.36	
	Dev From Norm	0%	+125%	-4%	+38%	
2010	Total	3.18	2.66	5.75	11.59	
	Dev From Norm	-1%	-13%	+71%	+20%	
2011	Total	4.76	2.04	7.74	14.54	
	Dev From Norm	+48%	-33%	+130%	+51%	

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

**Table 9**  
MA Beaches (2001-2011): 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	
2001	Total	3.00	3.35	5.36	11.71	
	Dev From Norm	-13%	-1%	+61%	+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%	
2009	Total	3.55	6.13	4.14	13.82	
	Dev From Norm	+3%	+81%	+24%	+36%	
2010	Total	1.74	1.78	4.43	7.95	
	Dev From Norm	-49%	-47%	+33%	-22%	
2011	Total	3.61	3.76	3.51	10.88	
	Dev From Norm	+5%	+11%	+5%	+7%	

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

**Table 10**  
MA Beaches (2002-2011): 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%	
2009	Total	5.38	9.03	3.52	17.93	
	Dev From Norm	+41%	+129%	-14%	+51%	
2010	Total	3.69	2.98	2.33	9.00	
	Dev From Norm	-3%	-25%	-43%	-24%	
2011	Total	5.84	1.81	10.05	17.70	
	Dev From Norm	+53%	-54%	+145%	+49%	

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

**Table 11**  
MA Beaches (2002-2011): 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%	
2009	Total	7.20	7.03	3.66	17.89	
	Dev From Norm	+77%	+74%	-14%	+44%	
2010	Total	3.19	4.97	3.43	11.59	
	Dev From Norm	-21%	+23%	-20%	-6%	
2011	Total	5.64	1.55	10.23	17.42	
	Dev From Norm	+48%	-61%	+150%	+41%	

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

**Table 12**

MA Beaches (2011): Number of exceedances at public and semi-public beaches which reported environmental sources of pollution.

Pollution Source? <sup>1</sup>	Marine beaches			Freshwater beaches		
	# Exceedances	# Samples	%	# Exceedances	# Samples	%
Yes	91	786	11.6%	68	870	7.8%
Unknown	269	3,783	7.1%	181	3,045	5.9%
No	121	3,571	3.4%	185	3,697	5.0%
<b>Total</b>	<b>481</b>	<b>8,140</b>	<b>5.9%</b>	<b>434</b>	<b>7,612</b>	<b>5.7%</b>

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 (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Aquinnah	Lobsterville	Sampling Point	Monthly	3				
Aquinnah	Moshup Beach	Sampling Point	Monthly	5				
Aquinnah	Philbin Beach	Sampling Point	Weekly	13				
Aquinnah	Red Beach	Sampling Point	Monthly	3				
Barnstable	Cotuit Bay Shores Association	Sampling Point	Weekly	13				
Barnstable	Covell's	Sampling Point	Weekly	14				
Barnstable	Craigville	Sampling Point	Weekly	14				
Barnstable	Craigville Beach Club	Sampling Point	Weekly	15				
Barnstable	Dowses	Sampling Point	Weekly	14				
Barnstable	East (Town) Beach/Eugenia Fortes	Sampling Point	Weekly	14	3	146	690	2
Barnstable	Kalmus Ocean	Sampling Point	Weekly	15	1	220	220	1
Barnstable	Kalmus Yacht	Sampling Point	Weekly	13				
Barnstable	Kennedy Memorial/Veterans	Sampling Point	Weekly	14				
Barnstable	Keyes Beach	Sampling Point	Weekly	16	2	108	214	2
Barnstable	Loops	Sampling Point	Weekly	13				
Barnstable	Millway	Sampling Point	Weekly	14	1	400	400	1
Barnstable	Oyster Harbors Club	Sampling Point	Weekly	13				
Barnstable	Sandy Neck	Sampling Point	Weekly	14				
Barnstable	Seaside Park Improvement Association	Sampling Point	Weekly	13				
Barnstable	Wianno Club (Salt-107 Seaview)	Sampling Point	Weekly	12				
Beverly	Brackenbury	Sampling Point	Weekly	16	4	122	749	2
Beverly	Dane Street	Bathhouse	Weekly	12				
Beverly	Goat Hill	Sampling Point	Weekly	12				
Beverly	Independence Park	Sampling Point	Weekly	14	2	171	199	2
Beverly	Lynch Park	Sampling Point	Weekly	12				
Beverly	Mingo	Sampling Point	Weekly	17	3	148	560	3
Beverly	Obear Park	Sampling Point	Weekly	12				
Beverly	Rice	Sampling Point	Weekly	12				
Beverly	Sandy Point	Sampling Point	Weekly	12				
Beverly	West	Sampling Point	Weekly	12				
Beverly	Woodbury	Sampling Point	Weekly	18	7	108	231	4
Boston	Carson Beach	at Bathhouse	Daily	79	1	173	173	4
Boston	Carson Beach	at I St.	Daily	79	2	177	681	4
Boston	City Point Beach	Sampling Point	Daily	78	1	123	123	2
Boston	Constitution	Middle	Daily	77	6	145	1850	9
Boston	Constitution	North site	Daily	77	6	173	1230	9
Boston	Constitution	Rec Center	Daily	77	6	121	1100	9
Boston	Lovell's Island	Sampling Point	Weekly	9				1
Boston	M Street Beach	Sampling Point	Daily	78	1	109	109	2
Boston	Malibu	Sampling Point	Weekly	16	1	110	110	2
Boston	Pleasure Bay	Sampling Point	Daily	77	4	146	2613	5

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Boston	Savin Hill	Sampling Point	Weekly	16	1	185	185	2
Boston	Spectacle Island	Sampling Point	Weekly	9				1
Boston	Tenean	Sampling Point	Daily	80	12	108	11200	16
Bourne	Barlows Landing	Sampling Point	Monthly	4				
Bourne	Briarwood Marine and Science	Sampling Point	Weekly	13				
Bourne	Cataumet Harbor	Sampling Point	Weekly	16	2	320	386	1
Bourne	Cedar Point Association	Sampling Point	Weekly	13				
Bourne	Electric Avenue	Sampling Point	Monthly	4				
Bourne	Gray Gables	Sampling Point	Weekly	13				
Bourne	Hideaway Village Association	Sampling Point	Weekly	13				
Bourne	Monument	Sampling Point	Monthly	4				
Bourne	Patiusset Beach	Sampling Point	Weekly	13				
Bourne	Pocasset Beach Improvement Association	Sampling Point	Weekly	13				
Bourne	Sagamore	Sampling Point	Weekly	13				
Bourne	Scraggy Neck Recreation Association	Sampling Point	Weekly	12				
Bourne	Tahanto Associates, Inc.	Sampling Point	Weekly	13				
Bourne	Wings Neck Trust Association (North Beach)	Sampling Point	Weekly	13				
Bourne	Wings Neck Trust Association (South Beach)	Sampling Point	Weekly	13				
Braintree	Smith Beach	Sampling Point	Weekly	14	2	135	218	1
Brewster	Breakwater Landing	Sampling Point	Weekly	15	1	260	260	
Brewster	Brewster Dunes	Sampling Point	Weekly	13				
Brewster	Cape Cod Sea Camps (Bay)	Sampling Point	Weekly	13				
Brewster	Crosby Landing	Sampling Point	Weekly	16	2	134	186	1
Brewster	Ellis Landing	Sampling Point	Weekly	14				
Brewster	Ellis Landing Park Condominiums	Sampling Point	Weekly	13				
Brewster	Halliday Acres	Sampling Point	Weekly	13				
Brewster	Linnell Landing	Sampling Point	Monthly	4				
Brewster	Mants	Sampling Point	Weekly	15	1	200	200	
Brewster	Ocean Edge	Condos	Weekly	13				
Brewster	Paines Creek	Sampling Point	Weekly	16	2	134	314	
Brewster	Pilgrim Pine Acres	Sampling Point	Weekly	10				
Brewster	Point of Rocks	Sampling Point	Weekly	13	2	176	186	
Brewster	Saints Landing	Sampling Point	Weekly	14				
Brewster	Sea Pines	Sampling Point	Weekly	13				
Brewster	Sunset Beach Association	Sampling Point	Weekly	13				
Chatham	Andrew Harding Lane Beach	Sampling Point	Weekly	12				1
Chatham	Bucks Creek	Sampling Point	Weekly	12				
Chatham	Chatham Bars Inn	Sampling Point	Weekly	11				
Chatham	Cockle Cove	Sampling Point	Weekly	12	1	344	344	2
Chatham	Cockle Cove Creek	at Parking Lot	Weekly	12	8	111	1184	1
Chatham	Cockle Cove Creek	at Ridgevale Bridge	Weekly	12	3	192	324	1

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Chatham	Forest Street Beach	Sampling Point	Weekly	13	1	150	150	1
Chatham	Hardings	East parking lot	Weekly	13	1	124	124	1
Chatham	Hardings	West parking lot	Weekly	13	1	124	124	1
Chatham	Hawthorne	Sampling Point	Weekly	11				
Chatham	Jackknife Harbor	Sampling Point	Weekly	12				
Chatham	Lighthouse	Sampling Point	Weekly	12				
Chatham	Oyster Pond	Sampling Point	Weekly	12				
Chatham	Pleasant Street	Sampling Point	Weekly	12				1
Chatham	Ridgevale	Sampling Point	Weekly	12				1
Chilmark	Great Rock Bight	Sampling Point	Monthly	4				
Chilmark	Menemsha	Sampling Point	Monthly	4				
Chilmark	Ocean @ Chilmark Pond Preserve	Sampling Point	Weekly	8	1	1553	1553	1
Chilmark	Ocean @ Lucy Vincent Beach	Sampling Point	Weekly	15				
Chilmark	Ocean @ Squibnocket Beach	Sampling Point	Weekly	16	2	114	2420	2
Chilmark	Pond @ Lucy Vincent Beach	Sampling Point	Weekly	18	6	160	400	4
Cohasset	Black Rock	Sampling Point	Weekly	12	1	135	135	1
Cohasset	Sandy	Sampling Point	Weekly	14	2	109	228	2
Cohasset	Sandy Cove	Sampling Point	Weekly	7	1	108	108	
Cohasset	Yacht Club	Sampling Point	Weekly	7				
Danvers	Sandy Beach	West	Weekly	15	4	246	836	3
Dartmouth	Anthony's	Sampling Point	Weekly	12				
Dartmouth	Apponagansett Town Beach	Sampling Point	Weekly	12				
Dartmouth	Bayview	Sampling Point	Weekly	12				
Dartmouth	Demarest Lloyd	Sampling Point	Weekly	15				1
Dartmouth	Hidden Bay	Sampling Point	Weekly	12				
Dartmouth	Jones Town Beach	Sampling Point	Weekly	12				
Dartmouth	Moses Smith Creek	Sampling Point	Weekly	12	2	456	500	2
Dartmouth	Nonquitt	Sampling Point	Weekly	12				
Dartmouth	Oak Hill Shores	Sampling Point	Weekly	12				
Dartmouth	Round Hill	Sampling Point	Weekly	8	1	134	134	1
Dartmouth	Salter's Point East	Sampling Point	Weekly	12				
Dartmouth	Salter's Point South	Sampling Point	Weekly	13	1	258	258	1
Dennis	Bayview	Sampling Point	Weekly	17	4	116	260	2
Dennis	Chapin Memorial	Sampling Point	Weekly	13				
Dennis	Clipper Lane	Sampling Point	Weekly	17	6	112	400	3
Dennis	Cold Storage	Sampling Point	Weekly	13				
Dennis	Corporation	Sampling Point	Weekly	15				
Dennis	Follins Pond	Sampling Point 2	Weekly	14	1	168	168	1
Dennis	Glendon Road	East	Weekly	13				
Dennis	Glendon Road	West	Weekly	13				
Dennis	Haigis	Sampling Point	Weekly	13				

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Dennis	Harborview	Sampling Point	Weekly	13				
Dennis	Howes Street	Sampling Point	Weekly	13				
Dennis	Inman Road	Sampling Point	Weekly	13				
Dennis	Mayflower	Sampling Point	Weekly	15				
Dennis	Raycroft	Sampling Point	Weekly	13				
Dennis	Sea Street (Dennisport)	Dennisport	Weekly	13				
Dennis	Sea Street (East Dennis)	East	Weekly	13				
Dennis	South Village	Sampling Point	Weekly	13				
Dennis	Sullivan (Depot St.)	Sampling Point	Weekly	13				
Dennis	Trotting Park	Sampling Point	Weekly	14	1	146	146	
Dennis	West Dennis	Residential	Weekly	16	1	670	670	1
Dennis	West Dennis	West	Weekly	14				
Dennis	West Dennis	West of snack bar	Weekly	15				
Duxbury	Duxbury Beach @ Bath House	Sampling Point	Weekly	13				
Duxbury	Landing Road	Sampling Point	Weekly	13				
Duxbury	Residents Beach (Duxbury Beach)	Sampling Point	Weekly	13				
Duxbury	Shipyard Lane	Sampling Point	Weekly	15	2	144	231	3
Duxbury	West End	Sampling Point	Weekly	13				
Eastham	Boat Meadow	Sampling Point	Weekly	14				
Eastham	Campground	Sampling Point	Weekly	14				
Eastham	Coast Guard	Sampling Point 1	Weekly	11				
Eastham	Coast Guard	Sampling Point 2	Weekly	11				
Eastham	Cole Road	Sampling Point	Weekly	14				
Eastham	Cook's Brook	Sampling Point	Weekly	14				
Eastham	Dyer Prince	Sampling Point	Weekly	14				
Eastham	First Encounter	Beach	Weekly	15	1	130	130	1
Eastham	First Encounter	Spit River	Weekly	14				
Eastham	Kingsbury	Sampling Point	Weekly	14				
Eastham	Nauset Light	Sampling Point 1	Weekly	11				
Eastham	Nauset Light	Sampling Point 2	Weekly	11				
Eastham	S. Sunken Meadow	Sampling Point	Weekly	14				
Eastham	Salt Pond	Sampling Point	Weekly	6				
Eastham	Silver Springs Association	Sampling Point	Weekly	13				
Eastham	Thumpertown	Sampling Point	Weekly	14				
Eastham	Town Cove	Sampling Point	Weekly	15	1	400	400	1
Edgartown	Bend in the Road	Sampling Point	Monthly	3				
Edgartown	Chappy Beach Club	Sampling Point	Monthly	3				
Edgartown	Chappy Point Beach	Sampling Point	Monthly	6				
Edgartown	East Beach (Chappy)	Sampling Point	Monthly	3				
Edgartown	Fuller Street	Sampling Point	Monthly	3				
Edgartown	Joseph Sylvia State Beach	big Bridge	Monthly	3				

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Edgartown	Norton Point Beach	East ocean	Monthly	3				
Edgartown	Ocean @ Edgartown Great Pond	Sampling Point	Monthly	3				
Edgartown	South Beach State Park	east	Monthly	3				
Edgartown	South Beach State Park	middle	Monthly	3				
Edgartown	South Beach State Park	west	Monthly	3				
Edgartown	Wasque Swim Beach	Sampling Point	Monthly	3				
Essex	Clammer's Beach	Sampling Point	Monthly	4				
Essex	Front Beach	Sampling Point	Monthly	4				
Fairhaven	Fort Phoenix	Sampling Point	Weekly	15				
Fairhaven	Fort Phoenix - Town Beach	Sampling Point	Weekly	12	1	226	226	2
Fairhaven	Knollmere	Sampling Point	Weekly	12				
Fairhaven	Manhattan Avenue	Sampling Point	Weekly	12				
Fairhaven	Raymond Street	Sampling Point	Weekly	12				
Fairhaven	Seaview	Sampling Point	Weekly	12				
Fairhaven	West Island Causeway	Sampling Point	Monthly	3				
Fairhaven	West Island Town Beach	Sampling Point	Monthly	3				
Falmouth	Acapesket Improvement Association	Sampling Point	Weekly	13				
Falmouth	Bikepath Beach (Trunk River)	East	Weekly	14				
Falmouth	Bikepath Beach (Trunk River)	West	Weekly	14				
Falmouth	Bowerman Beach Club	Sampling Point	Weekly	13				
Falmouth	Bristol	East	Weekly	15	1	334	334	1
Falmouth	Bristol	West	Weekly	14				
Falmouth	Chapoquoit	Sampling Point	Weekly	14				
Falmouth	Chapoquoit Associates - Front Beach	Sampling Point	Weekly	13				
Falmouth	Chapoquoit Associates - Little Beach	Sampling Point	Weekly	13				
Falmouth	Falmouth Associates - 564 Surf Drive	Sampling Point	Weekly	12				
Falmouth	Falmouth Heights	East	Weekly	15	1	278	278	1
Falmouth	Falmouth Heights	West	Weekly	14				
Falmouth	Falmouth Yacht Club	Sampling Point	Weekly	13				
Falmouth	Jetty Lane	Sampling Point	Weekly	11				
Falmouth	Little Island Beach Preserve	Sampling Point	Weekly	12				
Falmouth	Megansett	North	Weekly	14				
Falmouth	Megansett	South	Weekly	15	1	166	166	1
Falmouth	Megansett Yacht Club	Sampling Point	Weekly	9				
Falmouth	Menauhant	East	Weekly	14				
Falmouth	Menauhant	West	Weekly	14				
Falmouth	Mill Road	Sampling Point	Weekly	14				
Falmouth	New Silver (Silver Beach Improvement Association)	Sampling Point	Weekly	14	1	400	400	1
Falmouth	Nobska Beach Association	Sampling Point	Weekly	11				
Falmouth	Old Silver 1	Central	Weekly	14				
Falmouth	Old Silver 2	North	Weekly	14				

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Falmouth	Old Silver 2	South	Weekly	14				
Falmouth	Old Silver Beach Estates Assoc.	Sampling Point	Weekly	13				
Falmouth	Quisset Beach Association	Sampling Point	Weekly	10				
Falmouth	Racing Beach Association	Whittemore Rd.	Weekly	12				
Falmouth	Saconessett Hills Association	Sampling Point	Weekly	12				
Falmouth	Seacoast Shores Associates, Inc.	Sampling Point	Weekly	12	1	400	400	1
Falmouth	Seacrest Resort	Sampling Point	Weekly	13				
Falmouth	Sippewissett Highlands Trust	Sampling Point	Weekly	13				
Falmouth	Stoney Beach (MBL)	Sampling Point	Weekly	15	1	318	318	1
Falmouth	Surf Drive	Surf Drive 1	Weekly	14				
Falmouth	Surf Drive	Surf Drive East	Weekly	14				
Falmouth	Surf Drive	Surf Drive Pool	Weekly	14				
Falmouth	Tides Hotel	Sampling Point	Weekly	13				
Falmouth	Wild Harbour Estates	Sampling Point	Weekly	10				
Falmouth	Wood Neck Beach	Sampling Point	Weekly	14				
Falmouth	Wood Neck River	Sampling Point	Weekly	14				
Gloucester	Cressy's	Sampling Point	Monthly	3				
Gloucester	Good Harbor	Sampling Point	Weekly	16				
Gloucester	Good Harbor Creek	Sampling Point	Weekly	16				
Gloucester	Half Moon	Sampling Point	Monthly	3				
Gloucester	Niles	Sampling Point	Monthly	3				
Gloucester	Pavillion Beach	Sampling Point	Monthly	5				1
Gloucester	Plum Cove	Sampling Point	Weekly	14	2	109	384	2
Gloucester	Wingearsheek	Sampling Point	Weekly	16				
Harwich	Allen Harbor	Sampling Point	Weekly	13				
Harwich	Atlantic Avenue	Sampling Point	Monthly	4				
Harwich	Bank Street - Bayview Rd	Sampling Point	Monthly	4				
Harwich	Brooks	Sampling Point	Monthly	4				
Harwich	Earle Road	Sampling Point	Weekly	13				
Harwich	Grey Neck	Sampling Point	Monthly	4				
Harwich	Merkel Beach (Snow Inn Road)	Sampling Point	Monthly	4				
Harwich	Neel Road	Sampling Point	Monthly	4				
Harwich	Old Mill Point Association	Strandway	Weekly	13				
Harwich	Pleasant Bay	Sampling Point	Weekly	13				
Harwich	Pleasant Road	Sampling Point	Monthly	4				
Harwich	Red River	East	Weekly	13				
Harwich	Red River	Middle	Weekly	13				
Harwich	Red River	West	Weekly	13				
Harwich	Seabreeze	Sampling Point	Monthly	4				
Harwich	Stone Horse Yacht Club	Sampling Point	Weekly	13				
Harwich	The Belmont	Sampling Point	Weekly	13				

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Harwich	Wah Wah Taysee Road	Sampling Point	Monthly	4				
Harwich	Wequasett Inn Resort	Sampling Point	Weekly	13				
Harwich	Wychmere Beach Club	Sampling Point	Weekly	13				
Harwich	Zylpha	Sampling Point	Monthly	4				
Hingham	Belair	Sampling Point	Weekly	12	1	132	132	1
Hingham	Kimball	Sampling Point	Weekly	14	3	121	187	3
Hingham	North	Sampling Point	Weekly	12	1	187	187	1
Hingham	Seal Cove	Sampling Point	Weekly	11				
Hingham	Town Beach	Sampling Point	Weekly	11				
Hingham	Wampatuck	Sampling Point	Weekly	12	1	121	121	1
Hingham	Yacht Club	Sampling Point	Weekly	11				
Hull	A Street Bay Side	Sampling Point	Weekly	13	1	201	201	1
Hull	A Street Ocean	Sampling Point	Weekly	12				
Hull	Darcy's	Sampling Point	Weekly	12				
Hull	Edgewater	Sampling Point	Weekly	12				
Hull	Gunrock	Sampling Point	Weekly	12				
Hull	James Ave.	Sampling Point	Weekly	12				
Hull	Kenberma	Sampling Point	Biweekly	6				
Hull	Nantasket	Bathhouse	Weekly	16				1
Hull	Nantasket	North site	Weekly	16				1
Hull	Nantasket	Park St.	Weekly	16				1
Hull	Nantasket	Water St.	Weekly	16				1
Hull	Newport	Sampling Point	Weekly	12				
Hull	XYZ	Sampling Point	Weekly	12				
Ipswich	Clark	Sampling Point	Weekly	16	1	148	148	1
Ipswich	Crane	Head Lifeguard Station	Monthly	4				
Ipswich	Little Neck	Sampling Point	Weekly	16	1	663	663	1
Ipswich	Pavillion	greatest batherload	Monthly	4				
Ipswich	Steep Hill	Steep Hill	Weekly	15				
Kingston	Gray's	Sampling Point	Weekly	13	2	160	160	
Kingston	Rocky Nook	Sampling Point	Weekly	10				
Lynn	Kings	Kimball Road	Weekly	35	6	105	391	6
Lynn	Kings	Ocean Terrace	Weekly	35	10	129	1770	8
Lynn	Kings	Stacy Brook Outlet	Weekly	33	22	119	2700	10
Manchester	Black	Sampling Point	Weekly	17	2	225	284	2
Manchester	Magnolia	Right of Bath & Tennis	Weekly	16	1	439	439	1
Manchester	Magnolia	Sampling Point 1	Weekly	16	1	189	189	1
Manchester	Singing	Right of parking lot	Weekly	15				
Manchester	Singing	Sampling Point 1	Weekly	15				
Manchester	Tuck's Point	Sampling Point	Weekly	18	2	336	359	3
Manchester	West Manchester	Sampling Point	Weekly	18	8	116	292	4

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Manchester	White	Sampling Point	Weekly	16	1	238	238	1
Marblehead	Crocker Park	Sampling Point	Weekly	16	1	471	471	1
Marblehead	Devereux	Sampling Point	Weekly	15				
Marblehead	Gas House	Sampling Point	Weekly	16	1	2723	2723	1
Marblehead	Grace Oliver	Sampling Point	Weekly	16	1	4360	4360	1
Marblehead	Stramski	Sampling Point	Weekly	16	2	211	435	2
Marblehead	Sunset Road	Sampling Point	Weekly	16	1	256	256	1
Marblehead	Village Street	Sampling Point	Weekly	16	1	4160	4160	1
Marion	Beverly Yacht	Sampling Point	Weekly	11				
Marion	Converse Point	Sampling Point	Weekly	11				
Marion	Dexter Lane	Sampling Point	Weekly	11				
Marion	Island Wharf	Sampling Point	Weekly	11				
Marion	Oakdale Avenue	Sampling Point	Weekly	11				
Marion	Piney Point	Sampling Point	Weekly	11				
Marion	Planting Island	Sampling Point	Weekly	11				
Marion	Silver Shell	North Jetty	Weekly	11				
Marion	Silver Shell	South Jetty	Weekly	11				
Marion	Tabor Academy	Sampling Point 1	Weekly	11				
Marion	Tabor Academy	Sampling Point 2	Weekly	11	1	106	106	1
Marshfield	Brant Rock	Sampling Point	Weekly	13	1	197	197	1
Marshfield	Fieldston	9th Road	Weekly	12				
Marshfield	Fieldston	Hartford Rd	Weekly	12				
Marshfield	Green Harbor	Sampling Point	Weekly	12				
Marshfield	Rexhame	Sampling Point	Weekly	14				
Mashpee	Callies Beach	Sampling Point	Monthly	4				
Mashpee	Mashpee Neck Road (Town Landing)	Sampling Point	Weekly	15	1	146	146	1
Mashpee	Maushup Village	Sampling Point	Weekly	13				
Mashpee	Popponesset (Beach Road)	Sampling Point	Weekly	13				
Mashpee	Popponesset (Bluff Ave)	Sampling Point	Weekly	13				
Mashpee	Popponesset (New Seabury Inn)	Sampling Point	Weekly	13				
Mashpee	Seconsett Island Causeway	Sampling Point	Weekly	14				
Mashpee	South Cape Beach	Sampling Point 1	Weekly	15				1
Mattapoisett	Antasawomak	Sampling Point 1	Weekly	10				
Mattapoisett	Antasawomak	Sampling Point 2	Weekly	10				
Mattapoisett	Aucoot	Sampling Point	Weekly	12	1	144	144	1
Mattapoisett	Brant Beach	Sampling Point	Weekly	10				
Mattapoisett	Crescent	Sampling Point	Weekly	11	1	116	116	1
Mattapoisett	Harbor Beach North	Sampling Point	Weekly	10				
Mattapoisett	Harbor Beach South	Sampling Point	Weekly	10				
Mattapoisett	Hollywoods	Sampling Point 1	Weekly	10				
Mattapoisett	Hollywoods	Sampling Point 2	Weekly	10				

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Mattapoisett	Leisure Shores	Sampling Point	Weekly	11	1	280	280	1
Mattapoisett	Mattapoisett Shores Association	Sampling Point	Weekly	10				
Mattapoisett	Ned's Point	Sampling Point	Weekly	11				
Mattapoisett	Peases Point (East)	Sampling Point	Weekly	10				
Mattapoisett	Peases Point (West)	Sampling Point	Weekly	10				
Mattapoisett	Point Connell	Sampling Point	Weekly	10				
Mattapoisett	Shining Tides Reservation	Sampling Point	Weekly	13	2	148	230	2
Mattapoisett	Town Beach	Sampling Point	Weekly	13	2	188	220	2
Nahant	Black Rock	Sampling Point	Weekly	13	1	1670	1670	2
Nahant	Canoe	Sampling Point	Weekly	12				
Nahant	Nahant Beach	Flagpole	Weekly	17	1	1330	1330	3
Nahant	Nahant Beach	N. of bathhouse	Weekly	17	2	143	1200	3
Nahant	Nahant Beach	Parking section 9	Weekly	17	2	129	1300	3
Nahant	Nahant Beach	South site	Weekly	17	1	1200	1200	3
Nahant	Short	Sampling Point	Weekly	13	1	504	504	1
Nahant	Tudor	Sampling Point	Weekly	12				
Nantucket	40th Pole	Sampling Point	Weekly	11				
Nantucket	Children's	Sampling Point	Weekly	12	1	150	150	
Nantucket	Cisco	Sampling Point	Monthly	3				
Nantucket	Cliffside	Sampling Point	Monthly	4				
Nantucket	Cliffside Motel	Sampling Point	Weekly	11	1	400	400	
Nantucket	Dionis	Sampling Point	Weekly	13	2	240	330	2
Nantucket	Jetties	Sampling Point	Weekly	11				
Nantucket	Madaket	Sampling Point	Weekly	12	1	108	108	
Nantucket	Miacomet	Sampling Point	Weekly	4	1	126	126	1
Nantucket	Sconset	Sampling Point	Monthly	3				
Nantucket	Sewerbeds	Sampling Point	Weekly	12	1	400	400	
Nantucket	Surfside 1	Sampling Point	Monthly	3				
Nantucket	Surfside 2	Sampling Point	Monthly	3				
Nantucket	Warren's Landing	Sampling Point	Weekly	12	4	108	216	2
Nantucket	Washing Pond	Sampling Point	Weekly	11				
Nantucket	Washington Street	Sampling Point	Weekly	11				
Nantucket	Wauwinet Bayside	Sampling Point	Weekly	11				
Nantucket	Wauwinet Oceanside	Sampling Point	Weekly	12	1	400	400	
New Bedford	400 North	Sampling Point	Weekly	20	3	106	110	3
New Bedford	400 South	Sampling Point	Weekly	20	4	132	500	3
New Bedford	Davy's Locker	Sampling Point	Weekly	19	2	126	500	3
New Bedford	J. Beach	Sampling Point	Weekly	20	3	110	500	3
New Bedford	Kids Beach	Sampling Point	Weekly	20	3	108	500	3
New Bedford	O'Tools	Sampling Point	Weekly	19	1	500	500	3
New Bedford	Squid	Sampling Point	Weekly	20	4	106	200	3

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
New Bedford	Tabor Park South	Sampling Point	Weekly	20	4	122	310	3
New Bedford	Tower 1	Sampling Point	Weekly	19	1	500	500	3
New Bedford	Tower 4	Sampling Point	Weekly	19	3	116	144	3
Newbury	Plum Island	Sampling Point	Monthly	4				
Newburyport	Plum Island	55th street	Weekly	17	1	256	256	1
Newburyport	Plum Island	end of island 1	Weekly	13	1	189	189	1
Newburyport	Plum Island	end of island 2	Weekly	13	1	231	231	1
Newburyport	Plum Island	Plum Island Point	Weekly	13	1	253	253	1
Oak Bluffs	Eastville Town Beach - Drawbridge	Sampling Point	Weekly	15	3	158	2420	2
Oak Bluffs	Eastville Town Beach - Harbor	Sampling Point	Monthly	3				
Oak Bluffs	Inkwell Beach	Inkwell	Weekly	3	1	2420	2420	2
Oak Bluffs	Joseph Sylvia State Beach	Little bridge	Monthly	3				
Oak Bluffs	Joseph Sylvia State Beach	Sound	Monthly	3				
Oak Bluffs	Marinelli (Jetty) Beach	Sampling Point	Monthly	16				
Oak Bluffs	Medeiros Cove	Sampling Point	Weekly	15	3	150	2420	3
Oak Bluffs	Pay Beach	Sampling Point	Weekly	15	1	2420	2420	2
Orleans	Kent's Point	Sampling Point	Biweekly	8				
Orleans	Little Inn at Pleasant Bay	Sampling Point	Weekly	13				
Orleans	Meeting House Pond	Sampling Point	Weekly	14				
Orleans	Nauset	Sampling Point	Weekly	14				
Orleans	Paw Wah Pond	Sampling Point	Monthly	7				
Orleans	Pleasant Bay	Sampling Point	Weekly	15	1	168	168	1
Orleans	Priscilla's Landing	Sampling Point	Weekly	14				
Orleans	Quanset Harbor Club Association	Sampling Point	Weekly	13				
Orleans	Rock Harbor	Sampling Point	Weekly	16	2	134	400	3
Orleans	Skaket Beach	Sampling Point	Weekly	14	1	280	280	1
Orleans	Skaket Beach Condominiums	Sampling Point	Weekly	14	1	384	384	1
Orleans	Town Cove	Sampling Point	Weekly	17	3	158	400	2
Plymouth	Plymouth Beach	Sampling Point 1	Weekly	14	2	122	262	1
Plymouth	Plymouth Beach	Sampling Point 3	Weekly	13				
Plymouth	Plymouth Beach	Sampling Point 5	Weekly	13				
Plymouth	White Horse	Full Sail	Weekly	13				
Plymouth	White Horse	Hill Top	Weekly	13				
Provincetown	29 Commercial Street	Sampling Point	Weekly	15	1	776	776	1
Provincetown	333 Commercial Street	Sampling Point	Weekly	16	1	800	800	1
Provincetown	451 Commerical Street	Sampling Point	Weekly	15				
Provincetown	593 Commercial Street	Sampling Point	Weekly	18	2	128	160	3
Provincetown	637 Commercial Street	Sampling Point	Weekly	14				
Provincetown	Atkins Lane	Sampling Point	Weekly	14				
Provincetown	Atlantic Avenue	Sampling Point	Weekly	14				
Provincetown	Court Street	Sampling Point	Weekly	15	1	128	128	1

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Provincetown	Herring Cove (National Seashore)	Sampling Point 1	Weekly	11				
Provincetown	Johnson Street	Sampling Point	Weekly	15	1	384	384	1
Provincetown	Kendal Lane	Sampling Point	Weekly	14				
Provincetown	Provincetown Inn Rotary	Sampling Point	Weekly	14				
Provincetown	Race Point (National Seashore)	Sampling Point 1	Weekly	11				
Provincetown	Race Point (National Seashore)	Sampling Point 2	Weekly	11				
Provincetown	Ryder Street	Sampling Point Left	Weekly	26	6	112	800	5
Provincetown	Ryder Street	Sampling Point Middle	Weekly	16	2	288	416	2
Provincetown	Ryder Street	Sampling Point Right	Weekly	16	2	160	800	2
Provincetown	Town Landing - Breakwater	Sampling Point	Weekly	18	2	148	184	1
Provincetown	Town Landing - Snail Road	Sampling Point	Weekly	18	2	272	800	1
Provincetown	Town Landing West of Coast Guard	Sampling Point	Weekly	14				
Provincetown	West End Lot	Sampling Point	Weekly	21	3	120	800	2
Provincetown	Winston Ave	Sampling Point	Weekly	22	6	124	800	4
Quincy	Avalon	Sampling Point	Weekly	15	3	108	5012	3
Quincy	Broady (Baker)	Sampling Point	Weekly	12				
Quincy	Chikatawbot	Sampling Point	Weekly	14	2	110	1106	2
Quincy	Delano Ave.	Sampling Point	Weekly	13	1	1014	1014	1
Quincy	Edgewater	Sampling Point	Weekly	14	3	359	5012	3
Quincy	Germantown Firestation	Sampling Point	Weekly	12				
Quincy	Heron	Sampling Point	Weekly	13	1	1576	1576	1
Quincy	Merrymount	Sampling Point	Weekly	13	1	2723	2723	1
Quincy	Mound	Sampling Point	Weekly	13	1	4160	4160	1
Quincy	Nickerson	Sampling Point	Weekly	14	2	146	246	2
Quincy	Orchard Street	Sampling Point	Weekly	13	1	794	794	1
Quincy	Parkhurst	Sampling Point	Weekly	14	2	272	500	2
Quincy	Rhoda	Sampling Point	Weekly	15	3	148	2280	3
Quincy	Wollaston	Channing Street	Daily	79	11	109	9804	17
Quincy	Wollaston	Milton Street	Daily	79	12	113	8164	16
Quincy	Wollaston	Rice Road	Daily	79	6	133	24200	15
Quincy	Wollaston	Sachem Street	Daily	79	12	108	24200	18
Revere	Revere	at state police	Weekly	18	1	454	454	2
Revere	Revere	Oak Island St.	Weekly	18	3	151	470	2
Revere	Revere	Point of Pines	Weekly	18	1	346	346	2
Revere	Revere	Shirley St.	Weekly	18	1	385	385	2
Revere	Short	Sampling Point	Weekly	15	3	323	408	3
Rockport	Back	Sampling Point	Monthly	3				1
Rockport	Cape Hedge	Sampling Point	Monthly	3				
Rockport	Front Beach	Sampling Point	Monthly	3				
Rockport	Long	Gloucester	Monthly	3				
Rockport	Long	North	Monthly	3				

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Rockport	Old Garden	Sampling Point	Monthly	3				
Rockport	Pebble	Sampling Point	Monthly	3				
Salem	Camp Naumkeag	Sampling Point	Weekly	12				1
Salem	Children's Island - Back	Sampling Point	Weekly	10				
Salem	Children's Island - Dock	Sampling Point	Weekly	10				
Salem	Children's Island - Wally	Sampling Point	Weekly	10				
Salem	Collins Cove	Sampling Point	Weekly	12				
Salem	Dead Horse	Sampling Point	Weekly	12				
Salem	Forest River Point	Sampling Point	Weekly	12				
Salem	Juniper Point	Sampling Point	Weekly	12	3	109	169	2
Salem	Ocean Avenue	Sampling Point	Weekly	14	2	134	471	2
Salem	Osgood	Sampling Point	Weekly	12	1	399	399	1
Salem	Pioneer	Sampling Point	Weekly	12	1	173	173	1
Salem	Steps	Sampling Point	Weekly	12				
Salem	Willow Avenue	Sampling Point	Weekly	12	1	393	393	1
Salem	Willows Pier	Sampling Point	Weekly	12				
Salem	Winter Island (Waikiki)	Sampling Point	Weekly	12				
Salisbury	Salisbury	North Beach	Weekly	15				1
Salisbury	Salisbury	Sampling Point	Weekly	15				1
Sandwich	East Sandwich	Sampling Point	Weekly	14				
Sandwich	Scusset	Sampling Point	Weekly	14				1
Sandwich	Town Neck	End of Boardwalk	Weekly	14				1
Sandwich	Town Neck	Mill Creek	Weekly	20	6	126	400	3
Sandwich	Town Neck (Horizons)	Sampling Point	Weekly	14				
Scituate	Bassing's (Sailing Club)	Sampling Point	Weekly	12	2	160	520	2
Scituate	Egypt	Sampling Point	Weekly	12	1	1722	1722	1
Scituate	Humarock	Sampling Point	Weekly	11				
Scituate	Minot	Sampling Point	Weekly	12	1	1450	1450	1
Scituate	Peggotty	Sampling Point	Weekly	11				
Scituate	Sand Hills	Sampling Point	Weekly	22	7	265	2723	6
Scituate	Scituate Lighthouse	Sampling Point	Weekly	12	1	379	379	1
Somerset	Pierce Beach	Sampling Point	Weekly	16	4	122	457	2
Swampscott	Eisman's	Sampling Point	Weekly	13	1	148	148	1
Swampscott	Fisherman's	Sampling Point	Weekly	13	1	545	545	1
Swampscott	Kings	Sampling Point	Weekly	15	3	160	771	3
Swampscott	Phillips	Sampling Point	Weekly	13	1	121	121	1
Swampscott	Preston	Sampling Point	Weekly	14	2	602	613	2
Swampscott	Whales	Sampling Point	Weekly	12				
Swansea	Cedar Cove	Sampling Point	Weekly	5				
Swansea	Coles River Club off Harbor Rd	Sampling Point	Weekly	14	1	231	231	
Swansea	Leeside	Sampling Point	Weekly	12	1	119	119	

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Swansea	Sandy Beach	Sampling Point	Weekly	16	2	145	288	3
Swansea	Town Beach	Sampling Point	Weekly	17	3	108	393	3
Tisbury	Hilman's Point	Sampling Point	Monthly	4				
Tisbury	Mink Meadows	Sampling Point	Weekly	13				
Tisbury	Owen Little Way	Sampling Point	Weekly	13				
Tisbury	Owen Park	Sampling Point	Monthly	4				
Tisbury	Sound @ Wilfred's Pond Preserve	Sampling Point	Monthly	4				
Tisbury	Tashmoo Beach	Sampling Point	Monthly	3				
Tisbury	Tashmoo Cut	Sampling Point	Weekly	9				
Tisbury	Vineyard Harbor Motel	Sampling Point	Weekly	13				1
Truro	Ballston	Sampling Point	Monthly	13				
Truro	Beach Point Landing	Sampling Point	Weekly	4	1	108	108	1
Truro	Coast Guard Town	Sampling Point	Monthly	15				
Truro	Cold Storage/Pond Village	Sampling Point	Weekly	4				
Truro	Corn Hill	Sampling Point	Monthly	14				
Truro	Cranberry Hill	Sampling Point	Weekly	4				
Truro	Crow's Nest (496 Shore Rd)	Sampling Point	Weekly	8	1	146	146	1
Truro	Dune's Colony (648 Shore Rd)	Sampling Point	Weekly	14	1	108	108	1
Truro	Fisher	Sampling Point	Monthly	14				
Truro	Great Hollow	Sampling Point	Monthly	4				
Truro	Head of the Meadow	Sampling Point	Weekly	4				
Truro	Head of the Meadow (Town)	Sampling Point	Monthly	10				
Truro	Longnook	Sampling Point	Monthly	5				
Truro	Lookout Bluff	Sampling Point	Weekly	4				
Truro	Noon's Landing	Sampling Point	Weekly	15	1	108	108	1
Truro	Pamet Harbor	Sampling Point	Weekly	15	1	324	324	1
Truro	Ryder	Sampling Point	Monthly	4				
Truro	Sunset Village (379 Shore Rd)	Sampling Point	Weekly	13				
Wareham	Briarwood	Sampling Point	Weekly	15				
Wareham	East Boulevard	Sampling Point	Weekly	15				
Wareham	Forbes	Sampling Point	Weekly	15	1	142	142	1
Wareham	Hamilton Beach	Sampling Point	Weekly	15				
Wareham	Indian Mound Beach	Sampling Point	Weekly	15				
Wareham	Little Harbor	Sampling Point	Weekly	15	1	132	132	1
Wareham	North Boulevard	Sampling Point	Weekly	15				
Wareham	Onset	Sampling Point	Weekly	15				
Wareham	Parkwood	Sampling Point	Weekly	15				
Wareham	Pinehurst	Sampling Point	Weekly	15				
Wareham	Point Independence	Sampling Point	Biweekly	8				
Wareham	Riverside Avenue	Sampling Point	Biweekly	8				
Wareham	Shell Point	Sampling Point	Biweekly	8				

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Wareham	Swift's	Sampling Point	Weekly	15				
Wareham	Swift's Neck	Sampling Point	Weekly	15				
Wellfleet	Burton Baker	Sampling Point	Weekly	16	2	180	400	1
Wellfleet	Cahoon Hollow	Sampling Point	Monthly	4				
Wellfleet	Chequesset Yacht and Country Club	Sampling Point	Weekly	13				
Wellfleet	Duck Harbor	Sampling Point	Monthly	4				
Wellfleet	Indian Neck	Sampling Point	Monthly	4				
Wellfleet	Maguires Landing	Sampling Point	Monthly	4				
Wellfleet	Marconi (National Seashore)	Sampling Point 1	Weekly	11				
Wellfleet	Marconi (National Seashore)	Sampling Point 2	Weekly	11				
Wellfleet	Mayo	Sampling Point	Weekly	14				
Wellfleet	Newcomb Hollow	Sampling Point	Monthly	4				
Wellfleet	Omaha Road	Sampling Point	Monthly	4				
Wellfleet	Powers Landing	Sampling Point	Monthly	4				
Wellfleet	The Gut	Sampling Point	Weekly	14				
Wellfleet	White Crest	Sampling Point	Monthly	4				
West Tisbury	Great Pond @ Long Point	Sampling Point	Weekly	19	2	276	2420	1
West Tisbury	Lambert's Cove Beach	North	Weekly	19	4	280	2420	3
West Tisbury	Lambert's Cove Beach	South	Weekly	5	1	548	548	3
West Tisbury	Makonikey Roads and Beach Trust	Capawok	Weekly	17				
West Tisbury	Makonikey Roads and Beach Trust	Naushon	Weekly	8				
West Tisbury	Ocean @ Long Point	Central	Weekly	8	1	2420	2420	2
West Tisbury	Seven Gates Beach	Gray's	Weekly	8	1	291	291	1
West Tisbury	Seven Gates Beach	Saltworks	Weekly	9				1
West Tisbury	Tisbury Great Pond	Sampling Point	Monthly	4				1
Westport	Baker's Beach	Sampling Point	Monthly	3				
Westport	C and K Club	Sampling Point	Weekly	11				
Westport	Cherry & Webb	Sampling Point	Monthly	3				
Westport	East Beach	Sampling Point	Monthly	3				
Westport	Elephant Rock	Sampling Point	Weekly	12				
Westport	Horseneck	Sampling Point	Weekly	15				1
Westport	Spindle Rock	Sampling Point	Monthly	6				
Westport	Town Beach	Sampling Point	Monthly	3				
Weymouth	George E. Lane	Sampling Point	Weekly	13				
Weymouth	Wessagusett (Old Wessagussett)	Sampling Point	Biweekly	9				
Winthrop	Donovans	Sampling Point	Weekly	20	9	134	3282	3
Winthrop	Grandview	Sampling Point	Weekly	19	1	1100	1100	1
Winthrop	Halford	Sampling Point	Weekly	20	3	132	1140	1
Winthrop	Pico	Sampling Point	Weekly	19	1	189	189	1
Winthrop	Winthrop	Sampling Point	Weekly	17	2	146	215	3
Winthrop	Yerrill	Sampling Point	Weekly	19				

**Table 13**  
MA Marine Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Yarmouth	Bass River	East	Weekly	15				
Yarmouth	Bass River	West	Weekly	15				
Yarmouth	Baxter Avenue	Sampling Point	Weekly	15				
Yarmouth	Bay Road	Sampling Point	Weekly	17	2	154	260	1
Yarmouth	Bayview Street	Sampling Point	Weekly	15				
Yarmouth	Colonial Acres	East	Weekly	17	2	170	192	2
Yarmouth	Colonial Acres	West	Weekly	19	4	114	298	4
Yarmouth	Columbus Avenue	Sampling Point	Weekly	15				
Yarmouth	Englewood	Sampling Point	Weekly	15				
Yarmouth	Follins Pond	Sampling Point	Weekly	17	2	108	160	1
Yarmouth	Gray's Beach	Sampling Point	Weekly	16	1	136	136	1
Yarmouth	Malfa Road	Sampling Point	Weekly	15				
Yarmouth	Parkers River East	Sampling Point	Weekly	15	1	106	106	1
Yarmouth	Parkers River West	Sampling Point	Weekly	15				
Yarmouth	Seagull (Center)	East front	Weekly	15				
Yarmouth	Seagull (Left)	back	Weekly	15	1	110	110	1
Yarmouth	Seagull (Right)	West front	Weekly	16	1	140	140	1
Yarmouth	Seaview Ave. Beach	Sampling Point	Weekly	15				
Yarmouth	South Middle	Sampling Point	Weekly	15				
Yarmouth	Thatcher Town Park	Sampling Point	Weekly	15				
Yarmouth	Vernon St.	Sampling Point	Weekly	15				
Yarmouth	Wilbur Park	Sampling Point	Weekly	15				
Yarmouth	Windmill	Sampling Point	Weekly	15				

1 - Multiple instances of beaches may occur due to multiple sampling points.

2 - The number of postings could be greater than the number of single sample exceedances due to the presence of geometric mean exceedances or precautionary postings

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Abington	Island Grove Beach	Sampling Point	Weekly	E. Coli	9				
Acton	NARA Beach	Sampling Point	Weekly	E. Coli	16	1	400	400	1
Agawam	Robinson Pond Beach 1	Sampling Point	Weekly	Enterococci	16	3	108	128	4
Amesbury	Camp Bauercrest	Sampling Point	Weekly	E. Coli	12				
Amesbury	Glen Devin Condominiums	Sampling Point	Weekly	E. Coli	16	1	1100	1100	1
Amesbury	Lake Gardner	Sampling Point	Weekly	E. Coli	15				
Amesbury	Sandy Beach (Lake Attitash)	Dam/Bathing area	Weekly	E. Coli	15				
Amesbury	Tuxbury RV Resort Lagoon	Sampling Point	Weekly	E. Coli	11				
Andover	Camp Maude Eaton	Sampling Point	Weekly	E. Coli	20				
Andover	Pomps Pond	Station 1	Weekly	E. Coli	11	1	1700	1700	1
Andover	Pomps Pond	Station 2	Weekly	E. Coli	11	1	1240	1240	1
Andover	Pomps Pond	Station 3	Weekly	E. Coli	11	1	740	740	1
Arlington	Arlington Reservoir	Sampling Point	Weekly	E. Coli	12				
Arlington	Medford Boat Club	Lower	Weekly	E. Coli	11				
Arlington	Medford Boat Club	Upper	Weekly	E. Coli	13	1	288	288	1
Ashburnham	Camp Collier	Sampling Point	Weekly	E. Coli	10				
Ashburnham	Camp Wellville Beach	Sampling Point	Weekly	E. Coli	5				
Ashburnham	Camp Winnekeag Pond	Sampling Point	Weekly	E. Coli	15				
Ashby	Camp Lapham	Sampling point	Weekly	E. Coli	9				
Ashby	Damon Pond Beach	Sampling Point	Weekly	Enterococci	20	7	70	400	6
Ashfield	Ashfield Park Beach	Sampling Point	Weekly	E. Coli	17	1	2400	2400	
Ashland	Hopkinton Reservoir-Main Beach	Sampling Point	Weekly	Enterococci	17	3	70	114	3
Ashland	Hopkinton Reservoir-Upper Beach	Sampling Point	Weekly	Enterococci	16	1	120	120	3
Athol	Ellis Beach	Sampling Point	Weekly	E. Coli	19	3	270	457	1
Athol	Secret Lake P.O.A Beach	Sampling Point	Weekly	E. Coli	6				
Athol	Silver Pond Beach	Sampling Point	Weekly	E. Coli	19	3	250	602	1
Auburn	Century Sportsmen	Sampling Point	Weekly	E. Coli	15				
Ayer	Ayer Town Beach	Sampling Point	Weekly	E. Coli	16	1	400	400	1
Ayer	Mirror Lake	Sampling Point	Weekly	E. Coli	12				
Barnstable	Fair Acres Country Day School	Sampling Point	Weekly	E. Coli	9	3	392	800	2
Barnstable	Fair Acres Country Day School	Sampling Point	Weekly	Enterococci	3				
Barnstable	Hamblin Pond	Sampling Point	Weekly	E. Coli	10				
Barnstable	Hamblin Pond	Sampling Point	Weekly	Enterococci	3				
Barnstable	Hathaway Pond	Sampling Point	Weekly	E. Coli	10				
Barnstable	Hathaway Pond	Sampling Point	Weekly	Enterococci	3				
Barnstable	Holly Point Assoc.	Sampling Point	Weekly	E. Coli	10				
Barnstable	Holly Point Assoc.	Sampling Point	Weekly	Enterococci	3				
Barnstable	Homestead Homeowner's Association	Sampling Point	Weekly	E. Coli	10	1	312	312	1
Barnstable	Homestead Homeowner's Association	Sampling Point	Weekly	Enterococci	3				
Barnstable	Wequaquet Heights Association	118 Conners Rd	Weekly	E. Coli	10				

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Barnstable	Wequaquet Heights Association	118 Conners Rd	Weekly	Enterococci	3				
Barnstable	Wequaquet Heights Association	Jimmy's Beach	Weekly	E. Coli	10				
Barnstable	Wequaquet Heights Association	Jimmy's Beach	Weekly	Enterococci	3				
Barnstable	Joshua's Pond	Sampling Point	Weekly	E. Coli	10				
Barnstable	Joshua's Pond	Sampling Point	Weekly	Enterococci	3				
Barnstable	Long Pond Farms Association	Sampling Point	Weekly	E. Coli	11	1	464	464	1
Barnstable	Long Pond Farms Association	Sampling Point	Weekly	Enterococci	3				
Barnstable	Lovell's Pond	Sampling Point	Weekly	E. Coli	10				
Barnstable	Lovell's Pond	Sampling Point	Weekly	Enterococci	3				
Barnstable	Regency Drive Owners Association	Sampling Point 1	Weekly	E. Coli	10				
Barnstable	Regency Drive Owners Association	Sampling Point 1	Weekly	Enterococci	4	1	86	86	1
Barnstable	Sand Shores Association	Sampling Point	Twice per week	E. Coli	22	1	448	448	1
Barnstable	Sand Shores Association	Sampling Point	Twice per week	Enterococci	6				
Barnstable	Wequaquet Estates	Sampling Point	Weekly	E. Coli	10				
Barnstable	Wequaquet Estates	Sampling Point	Weekly	Enterococci	4	1	164	164	1
Barnstable	Wequaquet Lake Town	Sampling Point	Weekly	E. Coli	10				
Barnstable	Wequaquet Lake Town	Sampling Point	Weekly	Enterococci	3				
Barnstable	Wianno Club (Fresh-Crystal Lake)	Sampling Point	Weekly	E. Coli	9				
Barnstable	Wianno Club (Fresh-Crystal Lake)	Sampling Point	Weekly	Enterococci	3				
Becket	Becket Woods Road District - Beach	Sampling Point	Weekly	E. Coli	17	1	921	921	
Becket	Becket Woods Road District - Dock	Sampling Point	Weekly	E. Coli	17	1	866	866	
Becket	Camp Becket - Iroquois Beach	Sampling Point	Weekly	E. Coli	16				
Becket	Camp Becket Main - Beach	Sampling Point	Weekly	E. Coli	16				
Becket	Camp Greylock - Jr. Beach	Sampling Point	Weekly	E. Coli	11				
Becket	Camp Watitoh Beach	Sampling Point	Weekly	E. Coli	10				
Becket	Center Lake Estates Beach	Sampling Point	Weekly	E. Coli	17				
Becket	Center Pond Beach	Sampling Point	Weekly	E. Coli	17				
Becket	Chimney Corners Camp - Beach	Sampling Point	Weekly	E. Coli	17	2	236	980	
Becket	Crystal Pond Homeowners Assoc Beach	Sampling Point	Weekly	E. Coli	17	1	1120	1120	
Becket	Indian Lake Assoc - Beach #1	Sampling Point	Weekly	E. Coli	17				
Becket	Indian Lake Assoc - Beach #2	Sampling Point	Weekly	E. Coli	16				
Becket	Indian Lake Assoc - Boat Dock	Boat Dock	Weekly	E. Coli	16				
Becket	Indian Lake Assoc - Small Pond Beach	Sampling Point	Weekly	E. Coli	16				
Becket	Mountain Grove Assoc. Beach	Sampling Point	Weekly	E. Coli	17	2	602	816	
Becket	Shawnee Shore Beach	Sampling Point	Weekly	E. Coli	14				
Becket	Sherwood Forest - Excalibur	Sampling Point	Biweekly	E. Coli	9	1	921	921	
Becket	Sherwood Forest - Lancelot Beach	Sampling Point	Biweekly	E. Coli	9	1	501	501	
Becket	Sherwood Forest - Little Robin Beach	Sampling Point	Biweekly	E. Coli	10	2	479	1553	
Becket	Sherwood Forest - Robin Hood #1	Sampling Point	Biweekly	E. Coli	9	1	1553	1553	
Becket	Sherwood Forest - Robin Hood #2	Sampling Point	Biweekly	E. Coli	9	1	870	870	

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Becket	Sherwood Greens Road District Beach	Sampling Point	Weekly	E. Coli	8				
Bedford	Springs Brook Park Bathing Beach	Concession Stand	Weekly	E. Coli	12				
Bedford	Springs Brook Park Bathing Beach	Dock	Weekly	E. Coli	12				
Bedford	Springs Brook Park Bathing Beach	Spray Pad	Weekly	E. Coli	12				
Bedford	Springs Brook Park Bathing Beach	Water Slide	Weekly	E. Coli	12				
Belchertown	Belchertown Town Beach (Lake Arcadia)	Sampling Point	Weekly	E. Coli	11				
Bellingham	Arcand Park	Sampling Point	Weekly	E. Coli	9				
Bellingham	Silver Lake	Sampling Point	Weekly	E. Coli	9				
Billerica	Nutting Lake - Micozzi Beach	North	Weekly	E. Coli	17	4	238	400	3
Billerica	Nutting Lake - Micozzi Beach	South	Weekly	E. Coli	17	3	258	292	3
Bolton	Bolton Town Beach	Sampling Point	Weekly	E. Coli	15				
Bolton	Camp Resolute	Sampling Point 1	Three times	E. Coli	3				
Bolton	Camp Resolute	Sampling Point 2	Three times	E. Coli	3				
Bolton	Camp Virginia Beach	Sampling Point	Weekly	E. Coli	9				
Bolton	Tom Denny Camp	Sampling Point	Weekly	E. Coli	8				
Bourne	Picture Lake	Sampling Point	Weekly	E. Coli	10				
Bourne	Picture Lake	Sampling Point	Weekly	Enterococci	3				
Bourne	Queen Sewell Pond	Sampling Point	Weekly	E. Coli	11	1	384	384	1
Bourne	Queen Sewell Pond	Sampling Point	Weekly	Enterococci	4	1	144	144	1
Boxford	Camp Rotary	Sampling Point	Weekly	E. Coli	11				
Boxford	Camp Stepping Stone	Sampling Point	Weekly	E. Coli	7				
Boxford	Camp Wakanda	Sampling Point	Weekly	E. Coli	14				
Boxford	Danvers YMCA Daycamp	Sampling Point	Weekly	E. Coli	9				
Boxford	Stiles Pond	Sampling Point	Weekly	E. Coli	15				
Braintree	Sunset Lake	dock	Weekly	E. Coli	13	1	860	860	
Brewster	Beechwood Landing/Greenland Pond	Sampling Point	Weekly	E. Coli	10				
Brewster	Beechwood Landing/Greenland Pond	Sampling Point	Weekly	Enterococci	3				
Brewster	Beechwood Landing/Long Pond	Sampling Point	Weekly	E. Coli	10				
Brewster	Beechwood Landing/Long Pond	Sampling Point	Weekly	Enterococci	3				
Brewster	Blueberry Pond	Sampling Point	Weekly	E. Coli	10				
Brewster	Blueberry Pond	Sampling Point	Weekly	Enterococci	3				
Brewster	Camp Favorite	Sampling Point	Weekly	E. Coli	9				
Brewster	Camp Favorite	Sampling Point	Weekly	Enterococci	3				
Brewster	Cape Cod Sea Camps (Long Pond)	Sampling Point	Weekly	E. Coli	7				
Brewster	Cape Cod Sea Camps (Long Pond)	Sampling Point	Weekly	Enterococci	3				
Brewster	Cliff Pond	DYS	Weekly	Enterococci	15				1
Brewster	Cliff Pond	Sampling Point	Weekly	Enterococci	15				1
Brewster	Crossroads for Kids Camp	Sampling Point	Weekly	E. Coli	8				
Brewster	Crossroads for Kids Camp	Sampling Point	Weekly	Enterococci	6	3	134	400	
Brewster	Flax Pond	Sampling Point	Weekly	Enterococci	15				1

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Brewster	Long Pond	Sampling Point	Weekly	E. Coli	11				
Brewster	Long Pond	Sampling Point	Weekly	Enterococci	3				
Brewster	Robinwood Homeowners Association (Owl Pond)	Sampling Point	Weekly	E. Coli	10				
Brewster	Robinwood Homeowners Association (Owl Pond)	Sampling Point	Weekly	Enterococci	5	3	400	400	
Brewster	Sheep Pond	Sampling Point	Weekly	E. Coli	11				
Brewster	Sheep Pond	Sampling Point	Weekly	Enterococci	3				
Brewster	Sheeps Landing	Sampling Point	Weekly	E. Coli	9				
Brewster	Sheeps Landing	Sampling Point	Weekly	Enterococci	3				
Brewster	Slough Pond	Sampling Point	Weekly	E. Coli	11				
Brewster	Slough Pond	Sampling Point	Weekly	Enterococci	4	1	102	102	
Brewster	Upper Mill Pond	Sampling Point	Weekly	E. Coli	11				
Brewster	Upper Mill Pond	Sampling Point	Weekly	Enterococci	3				
Carver	Crystal Lake	Sampling Point	Weekly	E. Coli	9	1	500	500	
Carver	John's Pond	Sampling Point	Weekly	E. Coli	17				
Carver	Sampson's Pond	Sampling Point	Weekly	E. Coli	17				
Charlemont	Cold River Pool	Sampling Point	Weekly	Enterococci	16	5	68	260	5
Charlton	Buffumville Lake	Sampling Point	Weekly	E. Coli	15				1
Charlton	Camp Foskett (YMCA)	Sampling Point	Weekly	E. Coli	11				
Charlton	Camp Joslin	Sampling Point	Weekly	E. Coli	9				
Charlton	Salem Covenant Church Camp	Sampling Point	Once	E. Coli	1				
Chatham	Goose Pond	Sampling Point	Weekly	Enterococci	12				
Chatham	Schoolhouse Pond	Sampling Point	Weekly	Enterococci	12				
Chatham	White Pond	Sampling Point	Weekly	Enterococci	12				
Chatham	White Pond @ 60 White Pond Rd.	Sampling Point	Weekly	Enterococci	9				
Chelmsford	Freeman Lake	North	Weekly	E. Coli	11	3	280	400	2
Chelmsford	Freeman Lake	South	Weekly	E. Coli	12	2	400	400	2
Chelmsford	Heart Pond	Dock	Weekly	E. Coli	9				
Chelmsford	Heart Pond	Ramp	Weekly	E. Coli	9				
Chesterfield	Chesterfield Scout Reservation - BSA	Sampling Point	Weekly	E. Coli	17	1	2419	2419	
Chesterfield	Lake Damon Corporation Beach	Sampling Point	Weekly	E. Coli	17	1	665	665	
Chicopee	Chicopee Beach	Sampling Point	Weekly	Enterococci	16	1	116	116	2
Clarksburg	Mausert Pond - Day use area beach	Sampling Point	Weekly	Enterococci	11	4	62	400	5
Concord	Annursnac Hill Assoc.	Sampling Point	Weekly	E. Coli	16				
Concord	Silver Hill Assoc	Sampling Point	Weekly	E. Coli	18	1	704	704	1
Concord	Walden Pond - Main	Sampling Point	Weekly	Enterococci	16	1	400	400	2
Concord	White Pond Assoc	Sampling Point	Weekly	E. Coli	16				
Cummington	Shire Village Beach	Sampling Point	Weekly	E. Coli	9				
Dennis	Flax Pond	Sampling Point	Weekly	E. Coli	9				
Dennis	Flax Pond	Sampling Point	Weekly	Enterococci	3				

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Dennis	Princess Beach-Scargo Lake	Sampling Point	Weekly	E. Coli	10				
Dennis	Princess Beach-Scargo Lake	Sampling Point	Weekly	Enterococci	3				
Dennis	Scargo Lake	Sampling Point	Weekly	E. Coli	10				
Dennis	Scargo Lake	Sampling Point	Weekly	Enterococci	3				
Douglas	Breezy Picnic Grounds	Sampling Point	Weekly	E. Coli	14				
Douglas	Lake Manchaug Camping	Sampling Point	Weekly	E. Coli	15				
Douglas	Wallum Lake	Sampling Point	Weekly	E. Coli	15				1
Douglas	Wallum Lake Terrace	Sampling Point	Monthly	E. Coli	4				
Dover	Grossman Beach	Sampling Point	Weekly	E. Coli	11				
Dover	Powissett	Sampling Point	Weekly	E. Coli	11				
Dracut	Fleur de Lis	Sampling Point	Weekly	E. Coli	12	2	270	400	
Dracut	Grove	Sampling Point	Weekly	E. Coli	10				
Dracut	Hilltop	Sampling Point	Weekly	E. Coli	10				
Dracut	Mascuppic	Sampling Point	Weekly	E. Coli	10				
Dracut	Passaconaway	Sampling Point	Weekly	E. Coli	10				
Dracut	Richardson	Sampling Point	Weekly	E. Coli	11	1	330	330	
Dudley	Merino Pond	Sampling Point	Weekly	E. Coli	15	1	400	400	1
East Brookfield	Camp Frank A Day	Sampling Point	Weekly	E. Coli	5				
East Brookfield	Lake Lashaway	Sampling Point	Weekly	E. Coli	13	3	340	620	
Eastham	Great Pond	Sampling Point	Weekly	E. Coli	11				
Eastham	Great Pond	Sampling Point	Weekly	Enterococci	3				
Eastham	Herring Pond	Sampling Point	Weekly	E. Coli	11				
Eastham	Herring Pond	Sampling Point	Weekly	Enterococci	4	1	154	154	1
Eastham	Jemima Pond	Sampling Point	Weekly	E. Coli	6				
Eastham	Long Pond (Depot St.)	Sampling Point	Weekly	E. Coli	10				
Eastham	Long Pond (Depot St.)	Sampling Point	Weekly	Enterococci	3				
Eastham	Minister's Pond	Sampling Point	Weekly	E. Coli	12	1	252	252	1
Eastham	Minister's Pond	Sampling Point	Weekly	Enterococci	3				
Eastham	Nauset Haven Lakeside Condo (Minister)	Sampling Point	Weekly	E. Coli	12	2	242	372	1
Eastham	Nauset Haven Lakeside Condo (Minister)	Sampling Point	Weekly	Enterococci	3				
Eastham	Whispering Pines Condo (Muddy Pond)	Sampling Point	Weekly	E. Coli	7				
Eastham	Whispering Pines Condo (Muddy Pond)	Sampling Point	Weekly	Enterococci	4	1	118	118	
Eastham	Wiley Park	Sampling Point	Weekly	E. Coli	11				
Eastham	Wiley Park	Sampling Point	Weekly	Enterococci	3				
Easton	Town Pool	End of 1st dock	Weekly	E. Coli	8				
Egremont	Prospect Lake Park	Sampling Point	Weekly	E. Coli	12				
Erving	Laurel Lake	Sampling Point	Weekly	E. Coli	15				2
Essex	Camp Menorah	Sampling Point	Weekly	E. Coli	11	3	291	866	2
Essex	Centennial Grove	Sampling Point	Weekly	E. Coli	15				
Falmouth	Ashumet Valley Holly Sands	Sampling Point	Weekly	E. Coli	10				

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Falmouth	Ashumet Valley Holly Sands	Sampling Point	Weekly	Enterococci	3				
Falmouth	Cape Cod Camp Resort	Sampling Point	Weekly	E. Coli	10				
Falmouth	Cape Cod Camp Resort	Sampling Point	Weekly	Enterococci	3				
Falmouth	Coonamessett Pond	Sampling Point	Weekly	E. Coli	11				
Falmouth	Coonamessett Pond	Sampling Point	Weekly	Enterococci	3				
Falmouth	Grew's Pond	Sampling Point	Weekly	E. Coli	11				
Falmouth	Grew's Pond	Sampling Point	Weekly	Enterococci	4	1	94	94	1
Falmouth	Jenkins Pond - Pinecrest	Sampling Point	Weekly	E. Coli	10				
Falmouth	Jenkins Pond - Pinecrest	Sampling Point	Weekly	Enterococci	3				
Falmouth	Lochstead Association	Sampling Point	Weekly	E. Coli	9				
Falmouth	Lochstead Association	Sampling Point	Weekly	Enterococci	3				
Falmouth	Mares Pond Association	Sampling Point	Weekly	E. Coli	11	1	800	800	1
Falmouth	Mares Pond Association	Sampling Point	Weekly	Enterococci	3				
Falmouth	Sand Pointe Shores-Rock Hollow	Sampling Point	Weekly	E. Coli	10				
Falmouth	Sand Pointe Shores-Rock Hollow	Sampling Point	Weekly	Enterococci	3				
Falmouth	Sand Pointe Shores-White Cap	Sampling Point	Weekly	E. Coli	10				
Falmouth	Sand Pointe Shores-White Cap	Sampling Point	Weekly	Enterococci	3				
Falmouth	Shady Lane HA-Crooked Pond	Sampling Point	Weekly	E. Coli	8				
Falmouth	Shady Lane HA-Crooked Pond	Sampling Point	Weekly	Enterococci	3				
Falmouth	Water-by Estates Association-Flax Pond	Sampling Point	Weekly	E. Coli	8				
Falmouth	Water-by Estates Association-Flax Pond	Sampling Point	Weekly	Enterococci	3				
Florida	Manice Education Center Beach	Sampling Point	Weekly	E. Coli	16				
Framingham	Cochituate Beach	Sampling Point	Weekly	E. Coli	11	1	400	400	1
Framingham	Learned Beach	Sampling Point	Weekly	E. Coli	10	1	284	284	1
Framingham	Washakum Beach	Sampling Point	Weekly	E. Coli	12	3	340	720	2
Franklin	Chilson Beach	Sampling Point	Weekly	E. Coli	12	4	290	1400	3
Freetown	Cathedral Camp	Sampling point	Weekly	E. Coli	11				
Freetown	Long Pond AKA Town Beach	Sampling Point	Weekly	E. Coli	17	2	440	2000	1
Gardner	Dunn Pond	Sampling Point	Weekly	Enterococci	16	2	130	400	3
Gardner	Lithuanian Outing Assoc.	Sampling Point	Weekly	E. Coli	16				
Georgetown	American Legion Park	Sampling Point	Weekly	E. Coli	10				
Georgetown	Camp Leslie	Sampling Point	Weekly	E. Coli	8	1	709	709	
Georgetown	Lake Shore Drive Beach	Sampling Point	Twice	E. Coli	2				
Goshen	Camp Holy Cross	Sampling Point	Weekly	E. Coli	18	1	548	548	
Goshen	Camp Howe	Sampling Point	Weekly	E. Coli	12				
Goshen	Hammond Acres	Sampling Point	Weekly	E. Coli	17	1	2419	2419	1
Goshen	Upper Highland Lake - Campers Beach	Sampling Point	Weekly	Enterococci	15				2
Goshen	Upper Highland Lake - Day use area beach	Sampling Point	Weekly	Enterococci	15				2
Grafton	Silver Lake Beach	Sampling Point	Weekly	E. Coli	13	1	2000	2000	
Great Barrington	Lake Mansfield	Town beach	Weekly	E. Coli	15				

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Greenfield	Greenfield Municipal Bathing Beach	Sampling Point	Weekly	E. Coli	15	2	236	630	1
Groton	Baby Beach Lost Lake	Sampling Point	Weekly	E. Coli	15				
Groton	Groton Town Beach	Sampling Point	Weekly	E. Coli	15				
Groton	Grotonwood Camp	Sampling Point	Weekly	E. Coli	12	1	400	400	1
Halifax	Annawon Drive	Sampling Point	Weekly	E. Coli	13				1
Halifax	Halifax Beach Association	Sampling Point	Weekly	E. Coli	13				1
Halifax	Holmes Street	Sampling Point	Weekly	E. Coli	13				1
Halifax	Lingan Street	Sampling Point	Weekly	E. Coli	13	1	680	680	2
Harvard	Camp Green Eyrie	Sampling Point	Three times	E. Coli	3				
Harvard	Harvard Town Beach	Sampling Point	Weekly	E. Coli	12				
Harwich	Aunt Edie's Pond	Sandy Shore Way	Weekly	E. Coli	10				
Harwich	Aunt Edie's Pond	Sandy Shore Way	Weekly	Enterococci	3				
Harwich	Buck's Pond	Sampling Point	Weekly	E. Coli	10				
Harwich	Buck's Pond	Sampling Point	Weekly	Enterococci	6	3	64	132	3
Harwich	Clearwater Drive (Great Sands)	Sampling Point 3	Weekly	E. Coli	11	1	240	240	1
Harwich	Clearwater Drive (Great Sands)	Sampling Point 3	Weekly	Enterococci	5	2	192	192	
Harwich	Hinkley's Pond	Sampling Point	Weekly	E. Coli	10				
Harwich	Hinkley's Pond	Sampling Point	Weekly	Enterococci	3				
Harwich	Lakeside Terrace (Great Sands)	Lakeside Terrace	Weekly	E. Coli	2				
Harwich	Long Pond Rte 124	Sampling Point	Weekly	E. Coli	10				
Harwich	Long Pond Rte 124	Sampling Point	Weekly	Enterococci	3				
Harwich	Long Pond-Cahoon St.	Sampling Point	Weekly	E. Coli	10				
Harwich	Long Pond-Cahoon St.	Sampling Point	Weekly	Enterococci	3				
Harwich	Long Pond-Long Pond Drive	Sampling Point	Weekly	E. Coli	10				
Harwich	Long Pond-Long Pond Drive	Sampling Point	Weekly	Enterococci	3				
Harwich	Robbins Pond	Sampling Point	Weekly	E. Coli	10				
Harwich	Robbins Pond	Sampling Point	Weekly	Enterococci	5	2	64	400	2
Harwich	Sand Pond	Sampling Point	Weekly	E. Coli	11	1	800	800	1
Harwich	Sand Pond	Sampling Point	Weekly	Enterococci	3				
Harwich	Seymour Pond	Sampling Point	Weekly	E. Coli	10				
Harwich	Seymour Pond	Sampling Point	Weekly	Enterococci	3				
Harwich	Skinequit Pond	Sampling Point	Weekly	E. Coli	10				
Harwich	Skinequit Pond	Sampling Point	Weekly	Enterococci	3				
Harwich	Vacation Lane (Great Sands)	Sampling Point 2	Weekly	E. Coli	10				
Harwich	Vacation Lane (Great Sands)	Sampling Point 2	Weekly	Enterococci	7	3	62	140	1
Haverhill	Plugs Pond	Sampling Point	Weekly	E. Coli	11				
Heath	Mohawk Estates	Beach	Weekly	E. Coli	16	1	249	249	1
Hinsdale	Camp Ashmere Beach	Sampling Point	Weekly	E. Coli	16	1	687	687	
Hinsdale	Camp Emerson Beach	Sampling Point	Weekly	E. Coli	10				
Hinsdale	Camp Emerson Marina	Sampling Point	Weekly	E. Coli	10				

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Hinsdale	Camp Emerson Marina	Sampling Point	Weekly	Total Coliform	10				
Hinsdale	Camp Romaca	Beach	Weekly	E. Coli	13				
Hinsdale	Camp Taconic Beach	Sampling Point	Weekly	E. Coli	14				
Hinsdale	Dan Duquette Sports Academy	Sampling Point	Weekly	E. Coli	6				
Hinsdale	Plunkett Lake Beach	Sampling Point	Weekly	E. Coli	17	1	435	435	
Holden	Camp Kinneywood Beach	Sampling Point	Weekly	E. Coli	9				
Holden	Eagle Lake	Sampling Point	Weekly	E. Coli	13				
Holland	Craig Road Beach	Sampling Point	Weekly	E. Coli	15				
Holland	Lake Siog (ACE)	Sampling Point	Weekly	E. Coli	15	1	2000	2000	1
Holland	Massaconet Shores	Sampling Point	Weekly	E. Coli	16	1	490	490	1
Holland	PJ's Beach	Sampling Point	Weekly	E. Coli	15				
Holliston	Pleasure Point	Sampling Point	Weekly	E. Coli	15	3	800	920	2
Holliston	Stoddard	Sampling Point	Weekly	E. Coli	12	1	344	344	1
Hopkinton	Sandy Beach	Left	Weekly	E. Coli	13				1
Hopkinton	Sandy Beach	Middle	Weekly	E. Coli	13				1
Hopkinton	Sandy Beach	Right	Weekly	E. Coli	13	1	290	290	1
Hubbardston	Comet Pond Beach	Middle	Weekly	Enterococci	13				2
Hubbardston	Pinecrest Property Owners Assoc.	Sampling Point	Biweekly	E. Coli	8				
Hudson	Hudson Centennial Beach	Sampling Point	Weekly	E. Coli	10				
Huntington	Timothy Hill Children's Ranch	Beach	Weekly	E. Coli	16				
Huntington	YMCA Camp Norwich Beach	Sampling Location	Weekly	E. Coli	12				
Ipswich	Hood Pond-boat ramp	Sampling Point	Weekly	Enterococci	15				
Kingston	Camp Morning Star	Sampling Point	Weekly	E. Coli	8				
Lakeville	Clear Pond	Sampling Point	Weekly	E. Coli	11				
Lakeville	Ted Williams	Sampling Point	Twice	E. Coli	2				
Lancaster	Camp Lowe Beach	Sampling Point	Weekly	E. Coli	9				
Lancaster	Lancaster Town Beach	Sampling Point	Weekly	E. Coli	9				
Lanesborough	Camp Mohawk Beach	Sampling Point	Weekly	E. Coli	8				
Lanesborough	Sunrise Beach	Sampling Point	Weekly	E. Coli	16				
Lee	Goose Pond at Leisure Lee Rd.	Sampling Point	Weekly	E. Coli	14				
Lee	Lee Town Beach	Sampling Point	Weekly	E. Coli	14				
Leicester	Camp Wind-in-the-Pines	Lower beach	Weekly	E. Coli	12				
Leicester	Camp Wind-in-the-Pines	Upper beach	Weekly	E. Coli	2				
Lenox	Lenox Town Beach (Laurel Lake)	Sampling Point	Weekly	E. Coli	14				
Leominster	Ricker's Kindercamp	Sampling Point	Weekly	E. Coli	9				
Lexington	Old Reservoir Swim Area #1	Sampling Point	Weekly	Enterococci	12	2	150	680	
Lexington	Old Reservoir Swim Area #2	Sampling Point	Weekly	Enterococci	12	1	98	98	
Littleton	Littleton Town Beach	Sampling Point	Weekly	E. Coli	18	2	264	400	2
Lowell	Merrimac River - Bath House	Sampling Point	Weekly	E. Coli	17	3	500	650	

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Ludlow	Haviland Pond	Middle of pond	Weekly	E. Coli	15	1	375	375	1
Lunenburg	Hickory Hill (Hemlock Drive)	Sampling Point	Weekly	E. Coli	16	1	400	400	1
Lunenburg	Hickory Hills (Island Rd.)	Sampling Point	Weekly	E. Coli	16	1	288	288	1
Lunenburg	Lake Whalom	Sampling Point	Weekly	E. Coli	6	1	318	318	
Lunenburg	Lunenburg Town Beach	Sampling Point	Weekly	E. Coli	7				1
Lunenburg	Shady Point Campground	Sampling Point	Unknown	E. Coli	5	1	324	324	1
Marlborough	Memorial - Left	Sampling Point	Weekly	E. Coli	13	3	290	420	2
Marlborough	Memorial - Middle	Sampling Point	Weekly	E. Coli	6				1
Marlborough	Memorial - Right	Sampling Point	Weekly	E. Coli	11	1	540	540	2
Mashpee	Attaquin	Sampling Point	Weekly	E. Coli	12	1	256	256	1
Mashpee	Attaquin	Sampling Point	Weekly	Enterococci	3				
Mashpee	Camp Farley - Wakeby Pond	Sampling Point	Weekly	E. Coli	10				
Mashpee	Camp Farley - Wakeby Pond	Sampling Point	Weekly	Enterococci	4	1	90	90	1
Mashpee	Fells Pond	Sampling Point	Weekly	E. Coli	10				
Mashpee	Fells Pond	Sampling Point	Weekly	Enterococci	3				
Mashpee	John's Pond (Briarwood)	Sampling Point	Weekly	E. Coli	10				
Mashpee	John's Pond (Briarwood)	Sampling Point	Weekly	Enterococci	3				
Mashpee	John's Pond (Fred's Beach)	Tim's Beach	Weekly	E. Coli	10				
Mashpee	John's Pond (Fred's Beach)	Tim's Beach	Weekly	Enterococci	3				
Mashpee	John's Pond (North)	Sampling Point	Weekly	E. Coli	10				
Mashpee	John's Pond (North)	Sampling Point	Weekly	Enterococci	3				
Mashpee	John's Pond (Public)	Back Road	Weekly	E. Coli	11				
Mashpee	John's Pond (Public)	Back Road	Weekly	Enterococci	3				
Mashpee	John's Pond (Public)	Brickyard Road	Weekly	E. Coli	11				
Mashpee	John's Pond (Public)	Brickyard Road	Weekly	Enterococci	3				
Mashpee	Mashpee Shores Assoc.	Sampling Point	Weekly	E. Coli	10				
Mashpee	Mashpee Shores Assoc.	Sampling Point	Weekly	Enterococci	4	1	124	124	1
Mashpee	Santuit Pond	Bryant's Neck	Weekly	E. Coli	12				
Mashpee	Santuit Pond	Bryant's Neck	Weekly	Enterococci	7	6	62	400	1
Mashpee	Santuit Pond	Town Landing	Weekly	E. Coli	11				
Mashpee	Santuit Pond	Town Landing	Weekly	Enterococci	5	2	90	118	2
Mashpee	Santuit Pond Estate Assoc. - Santuit Pond	Sampling Point	Weekly	E. Coli	10				
Mashpee	Santuit Pond Estate Assoc. - Santuit Pond	Sampling Point	Weekly	Enterococci	4	1	96	96	1
Mashpee	Trustees of the Reservation (Mashpee Pond)	Sampling Point	Weekly	E. Coli	10				
Mashpee	Trustees of the Reservation (Mashpee Pond)	Sampling Point	Weekly	Enterococci	3				
Mashpee	Trustees of the Reservation (Wakeby Pond)	Sampling Point	Weekly	E. Coli	10				
Mashpee	Trustees of the Reservation (Wakeby Pond)	Sampling Point	Weekly	Enterococci	3				
Medfield	Hinkley	Left	Weekly	E. Coli	9	1	370	370	1
Medfield	Hinkley	Right	Weekly	E. Coli	9	1	430	430	1
Medford	Wrights Pond	Deep End	Weekly	E. Coli	11	2	255	272	

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Medford	Wrights Pond	Shallow End	Weekly	E. Coli	10				
Methuen	Forest Lake: Swimming Beach	Sampling Point	Weekly	E. Coli	9				
Middleborough	Camp Avoda	Sampling Point	Weekly	E. Coli	9				
Middleborough	Camp Yomechas	Sampling Point	Weekly	E. Coli	15				
Middleborough	Woods Pond Cabins	Sampling Point	Weekly	E. Coli	10				
Middleton	Thunderbridge	Sampling Point	Weekly	E. Coli	16	1	240	240	1
Milton	Houghton's Pond @ Bathouse	Sampling Point	Weekly	Enterococci	18	4	68	133	5
Monterey	Benedict Pond Beach	Sampling Point	Weekly	Enterococci	17	2	68	256	3
Monterey	Camp Half Moon	Sampling Point	Weekly	E. Coli	12				
Monterey	Lake Garfield	Sampling Point	Weekly	E. Coli	16				
Monterey	Seven Stones Beach	Sampling Point	Weekly	E. Coli	16				
Mt. Washington	Camp Hi Rock - Bear Rock Beach	Sampling Point	Weekly	E. Coli	16				
Mt. Washington	Camp Hi Rock - Main Beach	Sampling Point	Weekly	E. Coli	16				
Nantucket	Miacomet Pond	Sampling Point	Weekly	E. Coli	8	1	572	572	
Nantucket	Miacomet Pond	Sampling Point	Weekly	Enterococci	4	3	66	400	3
Nantucket	Sesachacha Pond	Sampling Point	Weekly	E. Coli	8				
Nantucket	Sesachacha Pond	Sampling Point	Weekly	Enterococci	3				
Natick	Camp Arrowhead	Sampling Point	Weekly	E. Coli	8				
Natick	Camp Nonesuch	Sampling Point	Weekly	E. Coli	13	2	248	1600	1
Natick	Cochituate Lake-North Beach	Sampling Point	Weekly	Enterococci	16	1	112	112	2
Natick	Dug Pond	Diving	Weekly	E. Coli	11				
Natick	Dug Pond	Kiddie	Weekly	E. Coli	12	1	740	740	1
New Marlborough	Camp Wa Wa Segowea	Sampling Point	Weekly	E. Coli	12				
Newton	Crystal Lake	Sampling Point	Weekly	E. Coli	11				
North Adams	Windsor Lake	Sampling Point	Weekly	E. Coli	17	1	345	345	
North Andover	Frye Pond Beach	Sampling Point	Weekly	Enterococci	16	1	84	84	2
North Andover	Stevens Pond	Sampling Point	Weekly	E. Coli	10				
North Attleboro	Falls Pond	Sampling Point	Weekly	E. Coli	11	2	550	680	3
North Attleboro	Whittings Pond	Sampling Point	Weekly	E. Coli	7	1	240	240	1
North Brookfield	Brooks Pond	Sampling Point	Weekly	E. Coli	11	1	340	340	1
North Brookfield	Camp Atwater	Sampling Point	Weekly	E. Coli	9				
Northampton	Musante Beach	Sampling Point	Weekly	E. Coli	13				
Northbridge	Camp Hickory Hill	Sampling Point	Weekly	E. Coli	4				
Oakham	Lake Dean - Dean Campground	Sampling Point	Weekly	E. Coli	16				
Oakham	Lake Dean - Pine Acres Campground	Sampling Point	Weekly	E. Coli	14				
Oakham	Treasure Valley Scout	East	Weekly	E. Coli	11				
Oakham	Treasure Valley Scout	West	Weekly	E. Coli	11				
Orange	Camp Selah	Sampling Point	Weekly	E. Coli	6				
Orange	Town Beach	Beach	Weekly	E. Coli	16				
Orleans	Crystal Lake	Sampling Point	Weekly	E. Coli	11				

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Orleans	Crystal Lake	Sampling Point	Weekly	Enterococci	3				
Orleans	Pilgrim Lake	Sampling Point	Weekly	E. Coli	11				
Orleans	Pilgrim Lake	Sampling Point	Weekly	Enterococci	3				
Otis	Camp Bonnie Brae	Sampling Point	Weekly	E. Coli	16	1	272	272	
Otis	Camp Overflow Beach	Sampling Point	Weekly	E. Coli	16				
Otis	Larkum Lake	Sampling Location	Weekly	E. Coli	4				
Otis	Otis Reservoir Beach	Sampling Point	Weekly	Enterococci	15				
Otis	Otis Woodlands	Beach	Weekly	E. Coli	17	2	387	659	1
Otis	Otis Woodlands	Beach	Weekly	Total Coliform	17				
Otis	Otis Woodlands	Picnic Grove	Weekly	E. Coli	17	2	272	792	
Otis	Otis Woodlands	Picnic Grove	Weekly	Total Coliform	17				
Otis	Otis Woodlands	Weir	Weekly	E. Coli	17	2	435	629	
Otis	Otis Woodlands	Weir	Weekly	Total Coliform	17				
Oxford	Carbuncle Pond	Sampling Point	Weekly	E. Coli	11				
Pembroke	Little Sandy	Sampling Point	Weekly	E. Coli	13	1	344	344	
Pembroke	Oldham	Sampling Point	Weekly	E. Coli	4				
Pembroke	Stetson	Sampling Point	Weekly	E. Coli	15	5	264	1600	3
Peru	Camp Danbee	Sampling Point	Weekly	E. Coli	17	1	258	258	
Phillipston	Queen Lake Beach	North Beach	Weekly	E. Coli	18	1	727	727	1
Phillipston	Queen Lake Beach	South Beach	Weekly	E. Coli	18	1	1046	1046	2
Pittsfield	[?] Onota Lake - Controy Pavilion	Sampling Point	Weekly	E. Coli	16				
Pittsfield	[?] Onota Lake - Decom Beach	Sampling Point	Weekly	E. Coli	16				
Pittsfield	[?] Pines Beach	Pines	Weekly	E. Coli	16				
Pittsfield	[?] Pontoosuc Lake - Decom Beach	Public Beach	Weekly	E. Coli	16				
Pittsfield	Camp Stevenson/Witawentin	Sampling Point	Weekly	E. Coli	8				
Pittsfield	Camp Winadu	Sampling Point	Weekly	E. Coli	8				
Pittsfield	Country Club of Pittsfield	Sampling Point	Weekly	E. Coli	12				
Pittsfield	CYC Camp St. Michael	Beach	Weekly	E. Coli	7				
Pittsfield	CYC Camp St. Michael	Kiddie Area	Weekly	E. Coli	7				
Pittsfield	Lakeside Christian Camp	Sampling Point	Weekly	E. Coli	14				
Pittsfield	Onota Lake - Public Beach at Burbank Park	Sampling Point	Weekly	E. Coli	16				
Plainfield	Plainfield Pond	Sampling Point	Weekly	E. Coli	16				
Plymouth	Baird Center (Bloody Pond)	Sampling Point	Weekly	E. Coli	13				
Plymouth	Barrett Pond	Sampling Point	Weekly	Enterococci	18	3	82	502	4
Plymouth	Blueberry Hill Camp (Curlew Pond)	Sampling Point	Weekly	E. Coli	15				
Plymouth	Camp Bourndale - Great Herring Pond	Sampling Point	Weekly	E. Coli	7				
Plymouth	Camp Cachalot	Sampling Point	Weekly	E. Coli	9				
Plymouth	Camp Clark YMCA - Hyles Pond	Sampling Point	Weekly	E. Coli	12				

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Plymouth	Camp Massasoit - Elbow Pond	Sampling Point	Weekly	E. Coli	12				
Plymouth	Camp Squanto	Sampling Point	Weekly	E. Coli	9				
Plymouth	Charge Pond	Sampling Point	Weekly	Enterococci	17	2	500	568	3
Plymouth	Clear Pond Motel/Village	Sampling Point	Weekly	E. Coli	7				
Plymouth	College Pond Day Use	Sampling Point	Weekly	Enterococci	19	4	116	526	5
Plymouth	Curlew Pond (DCR)	Sampling Point	Weekly	Enterococci	18	3	222	500	4
Plymouth	Ellis Haven - Ellis Pond	Sampling Point	Weekly	E. Coli	9				
Plymouth	Fearing Pond	1	Weekly	Enterococci	16	2	100	550	2
Plymouth	Fearing Pond	2	Weekly	Enterococci	18	3	112	640	3
Plymouth	Fresh Pond	Left	Weekly	E. Coli	18	5	275	440	
Plymouth	Fresh Pond	Right	Weekly	E. Coli	17	4	400	400	
Plymouth	Hedges Pond	Sampling Point	Weekly	E. Coli	13				
Plymouth	Indian Head Resort	Sampling Point	Three times	E. Coli	3				
Plymouth	Morton Park	Cove (AKA right)	Weekly	E. Coli	14	1	400	400	
Plymouth	Morton Park	Main (AKA left)	Weekly	E. Coli	13				
Plymouth	Pinewood Lodge - Camphouse Beach	Sampling Point	Weekly	E. Coli	12				
Plymouth	Pinewood Lodge - Crew Dock	Sampling Point	Weekly	E. Coli	12				
Plymouth	Pinewood Lodge - Fresh Meadow	Sampling Point	Weekly	E. Coli	12				
Plymouth	Pinewood Lodge - Pinecones Beach	Sampling Point	Weekly	E. Coli	15				
Plymouth	Plymouth Estates	Sampling Point	Once	E. Coli	1				
Plymouth	Sandy Pond Campground	Sampling Point	Weekly	E. Coli	15				
Plymouth	Wind-in-the-Pines Camp	Sampling Point	Weekly	E. Coli	9				
Randolph	Ponkapoag Pond	Sampling Point	Weekly	E. Coli	10				
Richmond	Camp Marion White	Sampling Point	Weekly	E. Coli	16				
Richmond	Camp Russell	Sampling Point	Weekly	E. Coli	13				
Richmond	Richmond Shores - East	Sampling Point	Weekly	E. Coli	16				
Richmond	Richmond Town Beach	Sampling Point	Weekly	E. Coli	16				
Rochester	Perry's Camp	Sampling Point	Weekly	Enterococci	9				
Rochester	S.P.E.N.A. Beach	Sampling Point	Weekly	Enterococci	9	1	476	476	1
Rockland	Hartsuff Park	Sampling Point	Weekly	E. Coli	9				
Rowe	Rowe Beach	Center	Weekly	E. Coli	20	2	412	488	2
Rowe	Rowe Beach	Inlet	Weekly	E. Coli	19	6	278	961	2
Rowe	Rowe Beach	Left	Weekly	E. Coli	14	3	579	2419	1
Rowe	Rowe Beach	Right	Weekly	E. Coli	22	3	330	461	2
Royalston	St. Laurent Camp	Sampling Point	Weekly	E. Coli	14				
Royalston	St. Laurent Camp	Sampling Point	Weekly	Enterococci	14	3	88	100	2
Royalston	Tully Lake Campground	Sampling Point	Weekly	E. Coli	11				2
Russell	H.A. Moses Beach	Sampling Point	Weekly	E. Coli	17	1	344	344	
Russell	Russell Town Beach	Sampling Location	Weekly	E. Coli	13	1	411	411	
Rutland	Whitehall Pond Beach	Sampling Point	Weekly	Enterococci	15				1

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Sandisfield	York Lake Beach	Sampling Point	Weekly	Enterococci	17	2	96	302	4
Sandwich	Camp Burgess	Sampling Point	Weekly	E. Coli	11				
Sandwich	Camp Good News	Sampling Point	Weekly	E. Coli	3	1	736	736	1
Sandwich	Camp Good News	Sampling Point	Weekly	Enterococci	12	3	70	374	3
Sandwich	Camp Hayward	Sampling Point	Weekly	E. Coli	4				
Sandwich	Camp Lyndon	Sampling Point	Weekly	E. Coli	12				
Sandwich	Dunroamin Park & Cottages	Sampling Point	Weekly	E. Coli	5				
Sandwich	Dunroamin Park & Cottages	Sampling Point	Weekly	Enterococci	12				
Sandwich	Hoxie Pond	Sampling Point	Weekly	E. Coli	3				
Sandwich	Hoxie Pond	Sampling Point	Weekly	Enterococci	7				
Sandwich	Lakewood Hills Property Owners Assoc.	Sampling Point	Weekly	E. Coli	6				
Sandwich	Lakewood Hills Property Owners Assoc.	Sampling Point	Weekly	Enterococci	6				
Sandwich	Lawrence Pond	Sampling Point	Weekly	E. Coli	7	1	236	236	1
Sandwich	Lawrence Pond	Sampling Point	Weekly	Enterococci	7	1	112	112	1
Sandwich	Peter's Pond Park (boat ramp)	boat ramp	Weekly	E. Coli	10	1	284	284	1
Sandwich	Peter's Pond Park (boat ramp)	boat ramp	Weekly	Enterococci	3	1	300	300	
Sandwich	Peter's Pond Town Park 1	Sampling Point	Weekly	E. Coli	8	1	240	240	1
Sandwich	Peter's Pond Town Park 1	Sampling Point	Weekly	Enterococci	3				
Sandwich	Pimlico Pond	Sampling Point	Weekly	E. Coli	12	1	268	268	1
Sandwich	Pimlico Pond	Sampling Point	Weekly	Enterococci	3				
Sandwich	Snake Pond	Sampling Point	Weekly	E. Coli	12	1	236	236	1
Sandwich	Snake Pond	Sampling Point	Weekly	Enterococci	3				
Sandwich	Triangle Pond	Sampling Point	Weekly	E. Coli	11				
Sandwich	Triangle Pond	Sampling Point	Weekly	Enterococci	3				
Sandwich	Wakeby Pond	Sampling Point	Weekly	E. Coli	11				
Sandwich	Wakeby Pond	Sampling Point	Weekly	Enterococci	3				
Saugus	Pearce Lake @ Breakheart	Sampling Point	Weekly	Enterococci	22	4	137	280	4
Saugus	Peckham Pond @ Camp Nihan	Sampling Point	Weekly	Enterococci	25	9	64	1030	7
Savoy	North Pond Beach	Sampling Point	Weekly	Enterococci	17	2	110	400	2
Savoy	South Pond Beach	Sampling Point	Weekly	Enterococci	16	1	88	88	2
Sharon	Camp Gannett Beach	Sampling Point	Weekly	E. Coli	9				
Sharon	Camp Wonderland Beach	Sampling Point	Weekly	E. Coli	10	1	1100	1100	1
Sharon	Community Center Beach	Sampling Point	Twice per week	E. Coli	27	4	260	310	4
Sharon	Everwood Day Camp	Sampling Point	Weekly	E. Coli	11				
Sharon	Massapoag Yacht Club	Sampling Point	Weekly	E. Coli	15	1	392	392	1
Sharon	Town Beach	Boat landing	Twice per week	E. Coli	26	3	260	370	1
Sharon	Town Beach	Swimming dock	Twice per week	E. Coli	27	2	280	290	2
Sherborn	Farm Pond	Sampling Point	Weekly	E. Coli	15				
Sherborn	Farm Pond	Sampling Point	Weekly	Enterococci	3	1	2630	2630	1
Shrewsbury	Sunset Beach	Sampling Point	Weekly	E. Coli	10				

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Shrewsbury	Sunset Beach	Sampling Point	Weekly	Total Coliform	10				
Shutesbury	Lake Wyola	Sampling Point	Weekly	Enterococci	16	1	100	100	2
Southwick	South Pond Beach - North	Sampling Point	Weekly	E. Coli	8				
Spencer	Camp Laurelwood	Sampling Point	Weekly	E. Coli	11				
Spencer	Camp Marshall - Thompson	Sampling Point	Weekly	E. Coli	10				
Spencer	Luther Hill Park	Sampling Point	Weekly	E. Coli	11				
Springfield	Bass Pond - Left	Sampling Point	Weekly	E. Coli	18	6	260	727	
Springfield	Bass Pond - Right	Sampling Point	Weekly	E. Coli	19	11	411	1300	
Springfield	Camp Wilder - Left	Sampling Point	Weekly	E. Coli	6	1	1300	1300	
Springfield	Camp Wilder - Right	Sampling Point	Weekly	E. Coli	8	2	921	1553	
Springfield	Five Mile Pond - Left	Sampling Point	Weekly	E. Coli	17	2	261	1046	
Springfield	Five Mile Pond - Right	Sampling Point	Weekly	E. Coli	14	1	272	272	
Springfield	Knights of Columbus - Left	Left	Weekly	E. Coli	15				
Springfield	Knights of Columbus - Right	Right	Weekly	E. Coli	15				
Springfield	Paddle Club - Left	Sampling Point	Weekly	E. Coli	18				
Springfield	Paddle Club - Right	Sampling Point	Weekly	E. Coli	18				
Sterling	Lake Waushacum #1	Sampling Point	Weekly	E. Coli	8				
Stockbridge	Beachwood Assoc.	Sampling Point	Weekly	E. Coli	4				
Stockbridge	Camp Mah-kee-nac	Sampling Point	Weekly	E. Coli	9				
Stockbridge	Kripalu Beach	Sampling Point	Weekly	E. Coli	14				
Stockbridge	Sports School Day Camp	Sampling Point	Weekly	E. Coli	13				
Stockbridge	Tanglewood	Sampling Point	Weekly	E. Coli	8				
Stockbridge	Town Beach (Stockbridge Bowl)	Sampling Point	Weekly	E. Coli	14				
Stockbridge	White Pines Condos (Stockbridge Bowl)	Sampling Point	Weekly	E. Coli	17				
Stoughton	Ames Pond	Sampling Point	Weekly	E. Coli	12				
Stow	Lake Boone	Sampling Point	Weekly	E. Coli	12				
Sturbridge	Italian-American Sporting Club	Sampling Point	Weekly	E. Coli	7				
Sturbridge	Main Beach - Walker Pond Assoc.	Sampling Point	Weekly	E. Coli	8				1
Sturbridge	Oak Cove - Walker Pond Assoc.	Sampling Point	Weekly	E. Coli	8				1
Sturbridge	Pioneer Pond Beach (Outdoor World)	Sampling Point	Weekly	E. Coli	18	2	260	280	1
Sturbridge	Streeter Point	Sampling Point	Weekly	Enterococci	11				
Sturbridge	Sturbridge Host Hotel	Sampling Point	Weekly	E. Coli	13				
Sturbridge	Sturbridge Recreation - Cedar Pond	Sampling Point	Weekly	E. Coli	12	2	310	600	2
Sturbridge	The Trail at Big Alum Lake Association Beach	Sampling Point	Three times	E. Coli	3				
Sturbridge	Wells State Park	Sampling Point	Weekly	Enterococci	16	1	72	72	2
Sutton	Camp Blanchard	Sampling Point	Once	E. Coli	1				
Sutton	King's Campground	Sampling Point	Weekly	E. Coli	21	1	260	260	
Sutton	Marions Camp	Sampling Point	Weekly	E. Coli	12				
Sutton	Old Holbrook Campground	Sampling Point	Weekly	E. Coli	14	1	1390	1390	

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Sutton	Sutton Falls Camp	Sampling Point	Weekly	E. Coli	21	5	260	2000	
Taunton	Watsons Pond	Sampling Point	Weekly	Enterococci	16	1	444	444	2
Templeton	Beamans Pond	Sampling Point	Weekly	Enterococci	17	2	66	98	3
Templeton	Beamans Pond Campground	Sampling Point	Weekly	Enterococci	18	3	116	400	3
Templeton	Pinewood Shores	Sampling Point	Weekly	Enterococci	6				
Templeton	Templeton Fish and Game Club	Sampling Point	Weekly	Enterococci	6				
Tolland	Camp Kinderland Beach	Sampling Point	Weekly	E. Coli	11				
Tolland	Camp Timbertrails	Sampling Point	Weekly	E. Coli	14				
Tolland	Wildwood - Fox Den	Sampling Point	Weekly	E. Coli	17	1	313	313	
Tolland	Wildwood - Lakeside	Sampling Point	Weekly	E. Coli	17	1	548	548	
Tolland	Wildwood - Main Beach	Sampling Point	Weekly	E. Coli	17	1	291	291	
Tolland	Wildwood - Meadow	Sampling Point	Weekly	E. Coli	17				
Tolland	Wildwood - Otter Pond Beach	Sampling Point	Weekly	E. Coli	17	1	1300	1300	
Topsfield	Hood's Pond	Sampling Point	Weekly	E. Coli	10				
Townsend	Pearl Hill Pond Beach	Sampling Point	Weekly	Enterococci	19	5	74	150	5
Tyngsborough	Berry's Grove Campground	Sampling Point	Weekly	E. Coli	7				
Tyngsborough	Town Beach	Sampling Point	Weekly	E. Coli	13				
Tyningham	Tyningham Park Beach	Sampling Point	Weekly	E. Coli	15				
Upton	Kiwanis Beach	Sampling Point	Weekly	E. Coli	11	1	270	270	
Uxbridge	Fairwoods	Sampling Point	Weekly	E. Coli	15	3	350	800	3
Uxbridge	Pout Pond	Sampling Point	Weekly	E. Coli	13				
Uxbridge	West Hill Park (USACE)	Sampling Point	Weekly	E. Coli	17	3	600	960	8
Wales	Cordially	Sampling Point	Weekly	E. Coli	12				
Wales	Lake Land	Sampling Point	Weekly	E. Coli	14				
Wales	Sichols	Sampling Point	Weekly	E. Coli	14				
Wales	Wales Town Beach	Sampling Point	Weekly	E. Coli	15	1	404	404	
Walpole	Sharon Country Day Camp Brook	Sampling Point	Weekly	E. Coli	9				
Walpole	Sharon Country Day Camp Pond	Sampling Point	Weekly	E. Coli	9				
Wareham	Shangri-La	Sampling Point	Weekly	E. Coli	13	1	560	560	1
Wareham	Shangri-La	Sampling Point	Weekly	Enterococci	5	4	66	256	1
Wareham	Wareham Lake Shores	Sampling Point	Weekly	E. Coli	12				
Wareham	Wareham Lake Shores	Sampling Point	Weekly	Enterococci	3				
Wareham	White Island Association	Sampling Point	Weekly	E. Coli	12				
Wareham	White Island Association	Sampling Point	Weekly	Enterococci	3				
Warren	Comin's Pond	Sampling Point	Weekly	E. Coli	12				
Warwick	Moores Pond Beach	Sampling Point	Weekly	E. Coli	16				
Wayland	Dudley Pond	Sampling Point	Weekly	E. Coli	8	1	332	332	
Wayland	Town Beach	Left Buoy (deep)	Weekly	E. Coli	1				
Wayland	Town Beach	Left Shallow	Weekly	E. Coli	13				
Wayland	Town Beach	Middle	Weekly	E. Coli	13				

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Wayland	Town Beach	Right Shallow	Weekly	E. Coli	14				
Webster	Beacon Park	Sampling Point	Weekly	E. Coli	12				
Webster	Birch Island	Sampling Point	Weekly	E. Coli	12				
Webster	Colonial Park	Sampling Point	Weekly	E. Coli	12				
Webster	Indian Ranch	Sampling Point	Weekly	E. Coli	17				
Webster	Kildeer Island	Sampling Point	Weekly	E. Coli	12				
Webster	Lakeside	Sampling Point	Weekly	E. Coli	12				
Webster	Memorial Beach #1	Sampling Point	Weekly	E. Coli	12				
Webster	Memorial Beach #2	Sampling Point	Weekly	E. Coli	12				
Webster	Nipmuc Cove	Sampling Point	Weekly	E. Coli	12				
Webster	Treasure Island	Sampling Point	Weekly	E. Coli	12				
Wellesley	Morses Beach - Shallow	Sampling Point	Weekly	E. Coli	14				
Wellfleet	Duck Pond	Sampling Point	Weekly	E. Coli	12				
Wellfleet	Duck Pond	Sampling Point	Weekly	Enterococci	3				
Wellfleet	Great Pond	Sampling Point	Weekly	E. Coli	12				
Wellfleet	Great Pond	Sampling Point	Weekly	Enterococci	3				
Wellfleet	Gull Pond	Sampling Point	Weekly	E. Coli	14				
Wellfleet	Gull Pond	Sampling Point	Weekly	Enterococci	5	3	62	120	2
Wellfleet	Gull Pond (2)	Sampling Point	Weekly	E. Coli	13				
Wellfleet	Gull Pond (2)	Sampling Point	Weekly	Enterococci	4	2	182	210	1
Wellfleet	Higgins Pond	Sampling Point	Weekly	E. Coli	13				
Wellfleet	Higgins Pond	Sampling Point	Weekly	Enterococci	9	7	110	400	1
Wellfleet	Long Pond	Sampling Point	Weekly	E. Coli	11				
Wellfleet	Long Pond	Sampling Point	Weekly	Enterococci	3				
Wendell	Ruggles Pond	Sampling Point	Weekly	Enterococci	15				1
Wenham	Gull Pond	Sampling Point	Weekly	E. Coli	5				
Wenham	Pleasant Street Pond	Sampling Point	Weekly	E. Coli	9	1	1203	1203	
West Brookfield	Lake Wickabog - Main Beach	Center	Weekly	E. Coli	15				
West Stockbridge	Card Pond Beach	Sampling Point	Weekly	E. Coli	16				
West Stockbridge	Crane Lake Camp	Sampling Point	Weekly	E. Coli	13				
West Tisbury	Ice House Pond	Sampling Point	Weekly	Enterococci	13	1	97	97	1
West Tisbury	Long Cove (fresh)	Sampling Point	Weekly	Enterococci	14	3	63	2420	3
West Tisbury	Seth's Pond Beach #1	Focus	Weekly	Enterococci	9				
West Tisbury	Seth's Pond Beach #1	Town Beach	Weekly	Enterococci	19	6	70	229	4
Westborough	Lake Chauncy Beach #1	Sampling Point	Weekly			9			
Westfield	Kingsley Beach	Sampling Point	Weekly	Enterococci	21	5	66	400	2
Westfield	Lamberts Beach	Sampling Point	Weekly	Enterococci	15				1
Westford	East Boston Camps - Boys Beach	Sampling Point	Weekly	E. Coli	16				
Westford	East Boston Camps - Day Care	Sampling Point	Weekly	E. Coli	16				
Westford	East Boston Camps - Girls Beach	Sampling Point	Weekly	E. Coli	16				

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Westford	Edwards Town Beach	Sampling Point	Weekly	E. Coli	10				
Westford	Forge Village Beach	Sampling Point	Weekly	E. Coli	10				
Westford	Lakeside Meadows	Sampling Point	Weekly	E. Coli	15				
Westford	Marylou's Beach (NIA)	Sampling Point	Weekly	E. Coli	15				
Westford	Nabnasset American Legion	Sampling Point	Weekly	E. Coli	14				
Westford	Nashoba Valley Ski Resort: Camp Pond	Sampling Point	Weekly	E. Coli	10				
Westford	Nashoba Valley Ski Resort: Function Pond	Sampling Point	Weekly	E. Coli	13				
Westford	Nashoba Valley Swim Club	Sampling location	Twice	E. Coli	2				
Westford	North Beach (NIA)	Sampling Point	Weekly	E. Coli	15				
Westford	Sandy Beach (NIA)	Sampling Point	Weekly	E. Coli	15				
Westford	Summer Village Main Beach	Sampling Point	Weekly	E. Coli	15				
Westminster	Crocker Pond	Sampling Point	Weekly	E. Coli	16				
Westminster	Crow Hill Pond Beach	Sampling Point	Weekly	Enterococci	18	3	96	280	5
Weston	River Day Camp	Sampling Point	Weekly	E. Coli	13	2	280	1600	1
Weston	Valley Pond	Swim Pond	Weekly	E. Coli	15				
Westport	Sawdy Pond	Sampling Point	Weekly	Enterococci	12	1	134	134	
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	270	270	
Westwood	North Beach	Middle	Weekly	E. Coli	17	2	340	360	
Westwood	North Beach	North	Weekly	E. Coli	17	1	310	310	
Westwood	North Beach	South	Weekly	E. Coli	17	2	280	380	
Whately	Tri-Town Beach	Sampling Point	Weekly	E. Coli	21	5	700	5000	1
Wilbraham	Spec Pond Beach	Sampling Point	Weekly	E. Coli	10	1	360	360	1
Williamstown	Margaret Lindley Park	Sampling Point	Biweekly	E. Coli	8				1
Wilmington	Baby Beach	Sampling Point	Weekly	E. Coli	11				
Wilmington	Town Beach	Center	Weekly	E. Coli	11				
Wilmington	Town Beach	Left	Weekly	E. Coli	5				
Wilmington	Town Beach	Right	Weekly	E. Coli	6				
Winchendon	Lake Dennison State Park	Day Use Area	Weekly	Enterococci	14				1
Winchendon	Lake Dennison State Park	Sampling Point	Weekly	Enterococci	15	1	162	162	3
Winchester	Shannon Beach @ Upper Mystic	Sampling Point	Weekly	Enterococci	22	7	81	354	5
Winchester	Wedge Pond	North (aka left)	Weekly	Enterococci	13	1	300	300	2
Winchester	Wedge Pond	South (aka right)	Weekly	Enterococci	13	1	360	360	2
Worcester	Bell Pond Beach	Sampling Point	Weekly	E. Coli	8				
Worcester	Coes Pond Beach (Mill St.)	Sampling Point	Weekly	E. Coli	8	1	360	360	
Worcester	Indian Lake Public Beach (Sherburne Ave)	Sampling Point	Weekly	E. Coli	8				
Worcester	Indian Lake Shore Park	Sampling Point	Weekly	E. Coli	8				
Worcester	Lake Quinsigamond-Lake Park Beach	Sampling Point	Weekly	Enterococci	16	2	104	400	4
Worcester	Lake Quinsigamond-Regatta Point Beach	Sampling Point	Weekly	Enterococci	17	3	76	400	5

**Table 14**  
MA Freshwater Beaches (2011): Water quality data for public and semi-public bathing beaches.

Community	Beach Name <sup>1</sup>	Sample Location	Testing Frequency	Indicator	# Tests	# Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	# Postings <sup>2</sup>
Yarmouth	Big Sandy Pond	Sampling Point	Weekly	E. Coli	10				
Yarmouth	Big Sandy Pond	Sampling Point	Weekly	Enterococci	4	1	64	64	1
Yarmouth	Camp Greenough - Boy Scouts	Sampling Point	Weekly	E. Coli	5				
Yarmouth	Camp Greenough - Boy Scouts	Sampling Point	Weekly	Enterococci	3				
Yarmouth	Camp Wingate	Sampling Point	Weekly	E. Coli	10				
Yarmouth	Camp Wingate	Sampling Point	Weekly	Enterococci	3				
Yarmouth	Dennis Pond	Sampling Point	Weekly	E. Coli	12				
Yarmouth	Dennis Pond	Sampling Point	Weekly	Enterococci	3				
Yarmouth	Flax Pond	Sampling Point	Weekly	E. Coli	12				
Yarmouth	Flax Pond	Sampling Point	Weekly	Enterococci	3				
Yarmouth	Halcyon Condos	Sampling Point	Weekly	E. Coli	10				
Yarmouth	Halcyon Condos	Sampling Point	Weekly	Enterococci	3				
Yarmouth	Horse Pond	Sampling Point	Weekly	E. Coli	12				
Yarmouth	Horse Pond	Sampling Point	Weekly	Enterococci	3				
Yarmouth	Little Sandy Pond	Sampling Point	Weekly	E. Coli	12				
Yarmouth	Little Sandy Pond	Sampling Point	Weekly	Enterococci	3				
Yarmouth	Long Pond - Indian	Sampling Point	Weekly	E. Coli	13	1	296	296	1
Yarmouth	Long Pond - Indian	Sampling Point	Weekly	Enterococci	4	1	66	66	1
Yarmouth	Long Pond - Lyman	Sampling Point	Weekly	E. Coli	12				
Yarmouth	Long Pond - Lyman	Sampling Point	Weekly	Enterococci	3				

1 - Multiple instances of beaches may occur due to multiple sampling points.

2 - The number of postings could be greater than the number of single sample exceedances due to the presence of geometric mean exceedances or precautionary postings

**Table 15**

MA Beaches (2011) Exceedances reported based on number of days since last rainfall at public and semi-public bathing beaches

**Marine beaches**

# Days Since Rain	# Exceedances	%
0	298	62.1%
1	38	7.9%
2	50	10.4%
3	41	8.5%
4	16	3.3%
5	6	1.3%
6	11	2.3%
7	10	2.1%
8	1	0.2%
9	2	0.4%
10	0	0.0%
10+	7	1.5%
<b>Total</b>	<b>480</b>	<b>100.0%</b>

\* - Out of 481 bacterial exceedances. One exceedance had no corresponding rainfall information.

**Freshwater beaches**

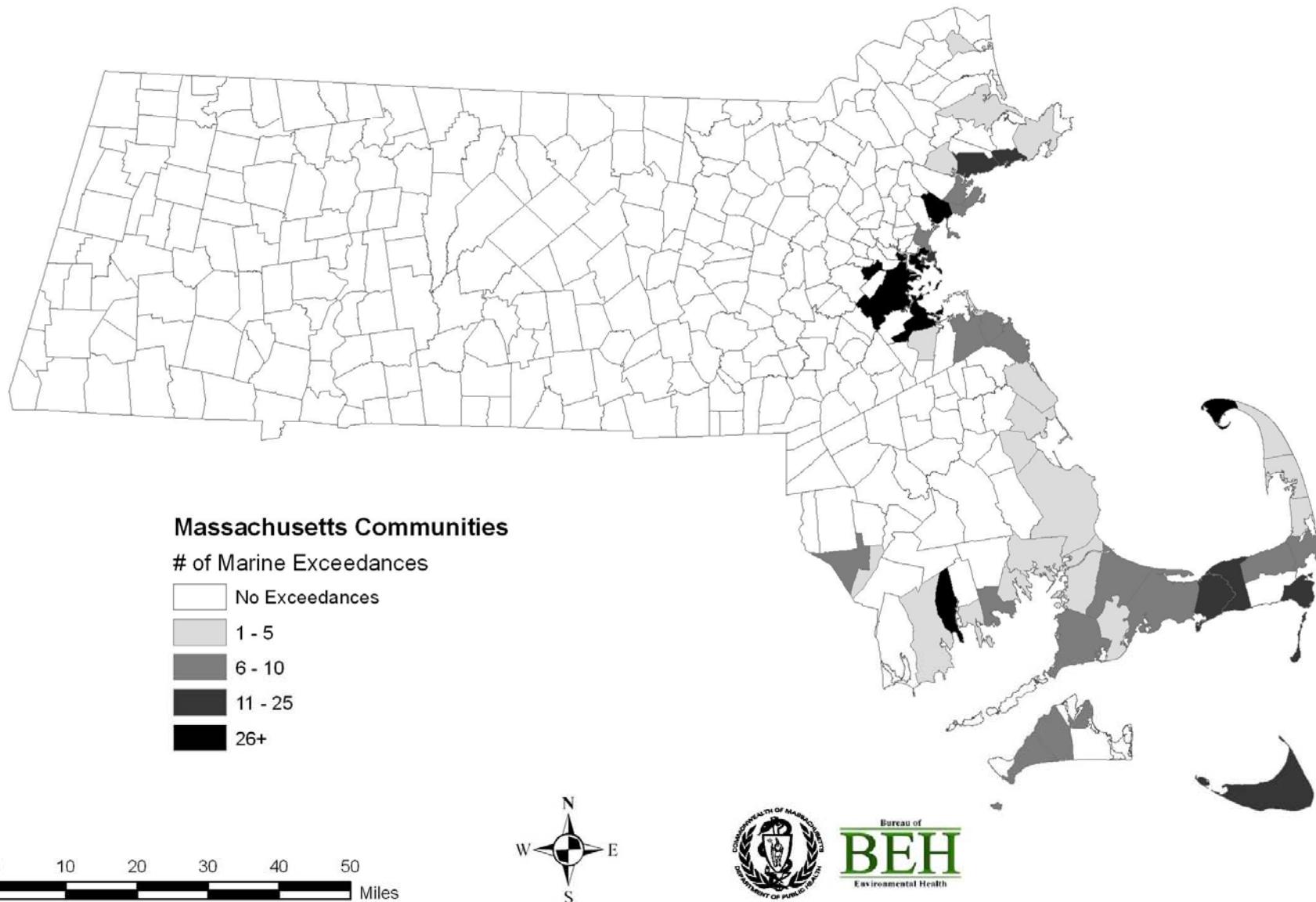
# Days Since Rain	# Exceedances	%
0	140	45.3%
1	66	21.4%
2	49	15.9%
3	16	5.2%
4	12	3.9%
5	8	2.6%
6	3	1.0%
7	6	1.9%
8	6	1.9%
9	1	0.3%
10	1	0.3%
10+	1	0.3%
<b>Total</b>	<b>309*</b>	<b>100.0%</b>

\* - Out of 434 bacterial exceedances. One hundred twenty one exceedances had no corresponding rainfall information.

## **FIGURES**

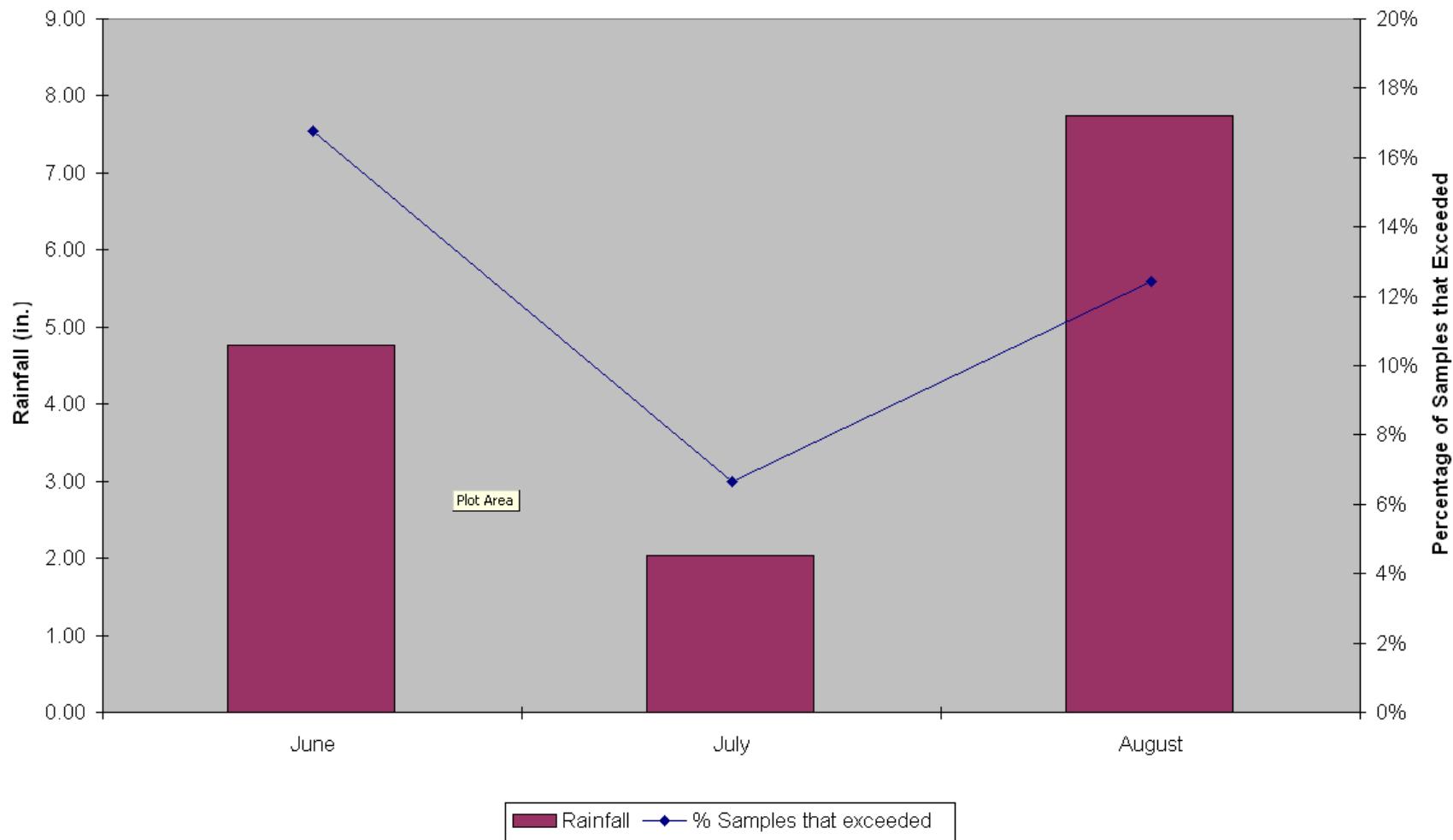
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**Figure 1 - MA Marine Beaches, 2011: Exceedances per Community**



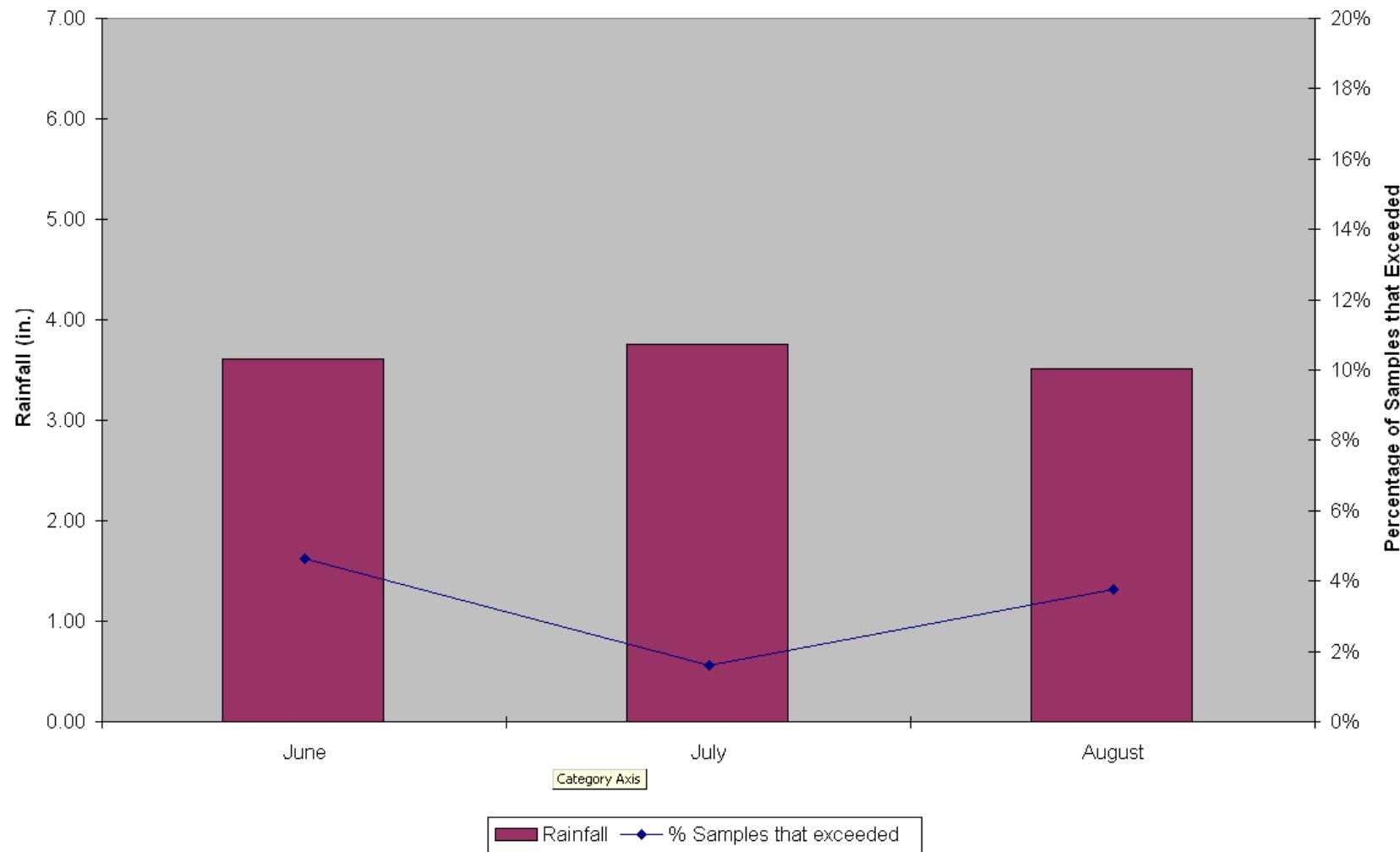
**Figure 2 - Rainfall and Marine Exceedances in Boston Area (2011)**

Boston area constitutes the communities of Boston, Braintree, Lynn, Quincy,



**Figure 3 - Rainfall and Marine Exceedances in Chatham Area (2011)**

Chatham area constitutes the communities of Brewster, Chatham, Dennis, Eastham, Harwich, and Orleans



**Figure 4 - MA Freshwater Beaches, 2011: Exceedances per Community**

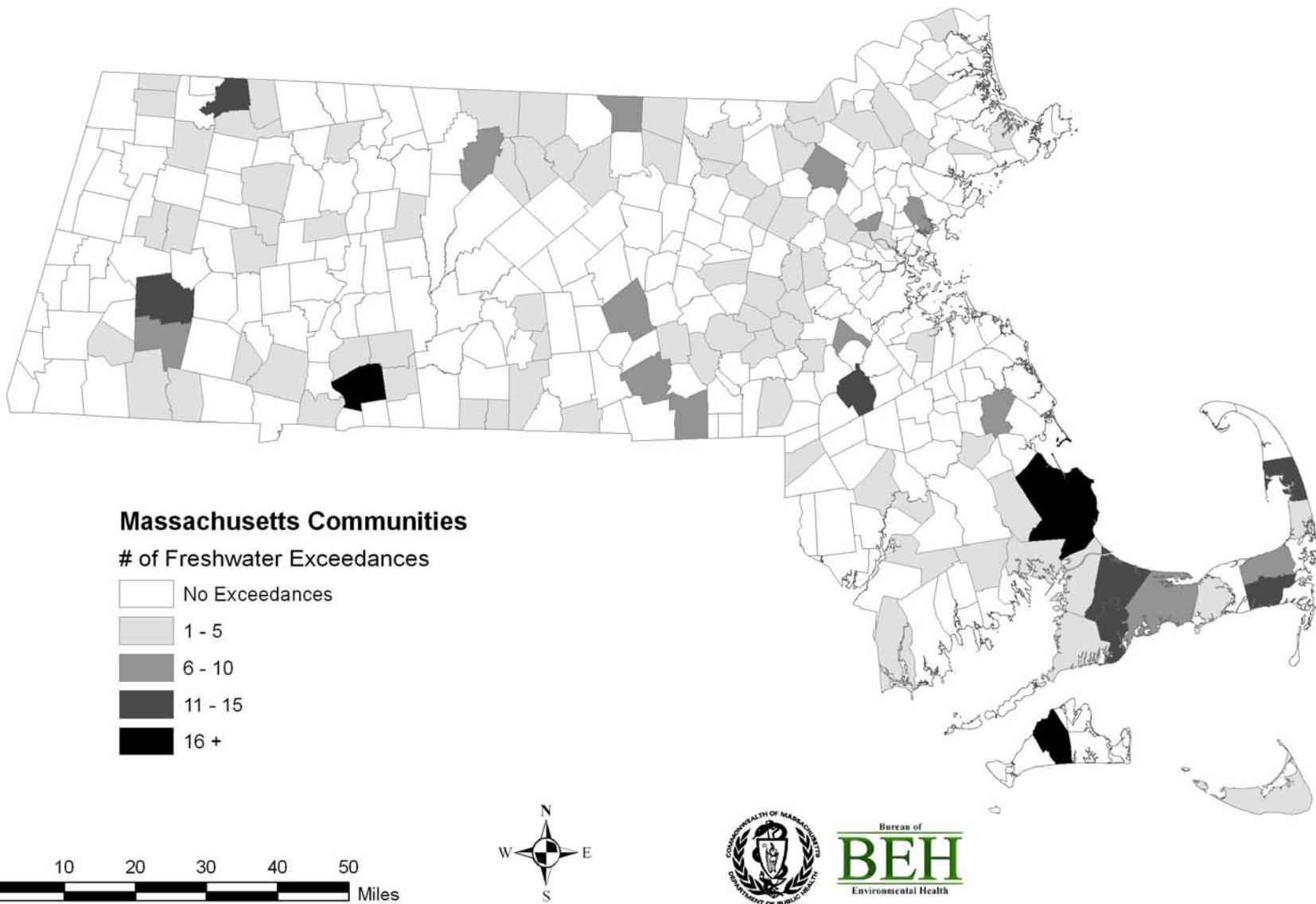
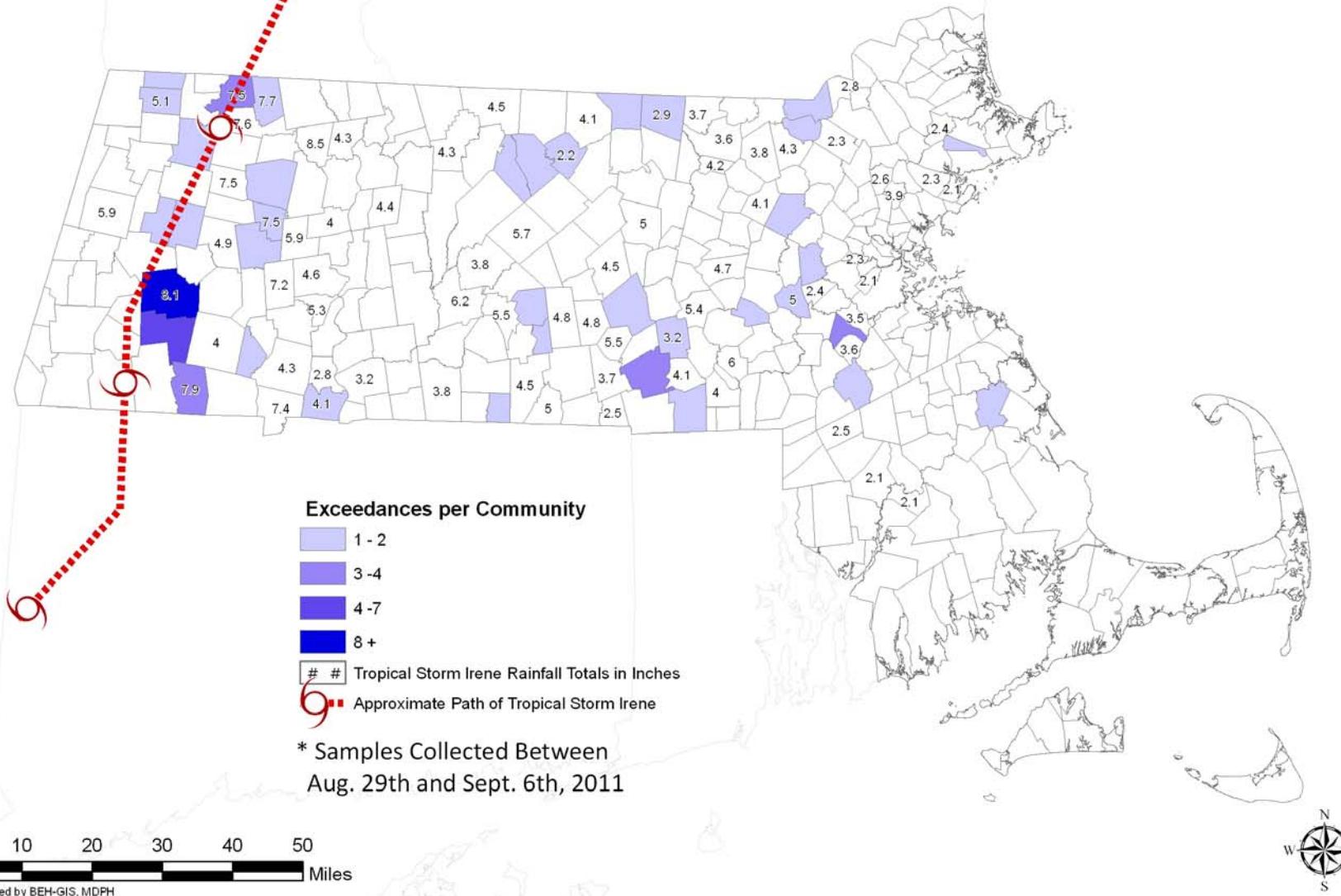




Fig. 5 Number of Fresh Water Exceedances Following Tropical Storm Irene\*

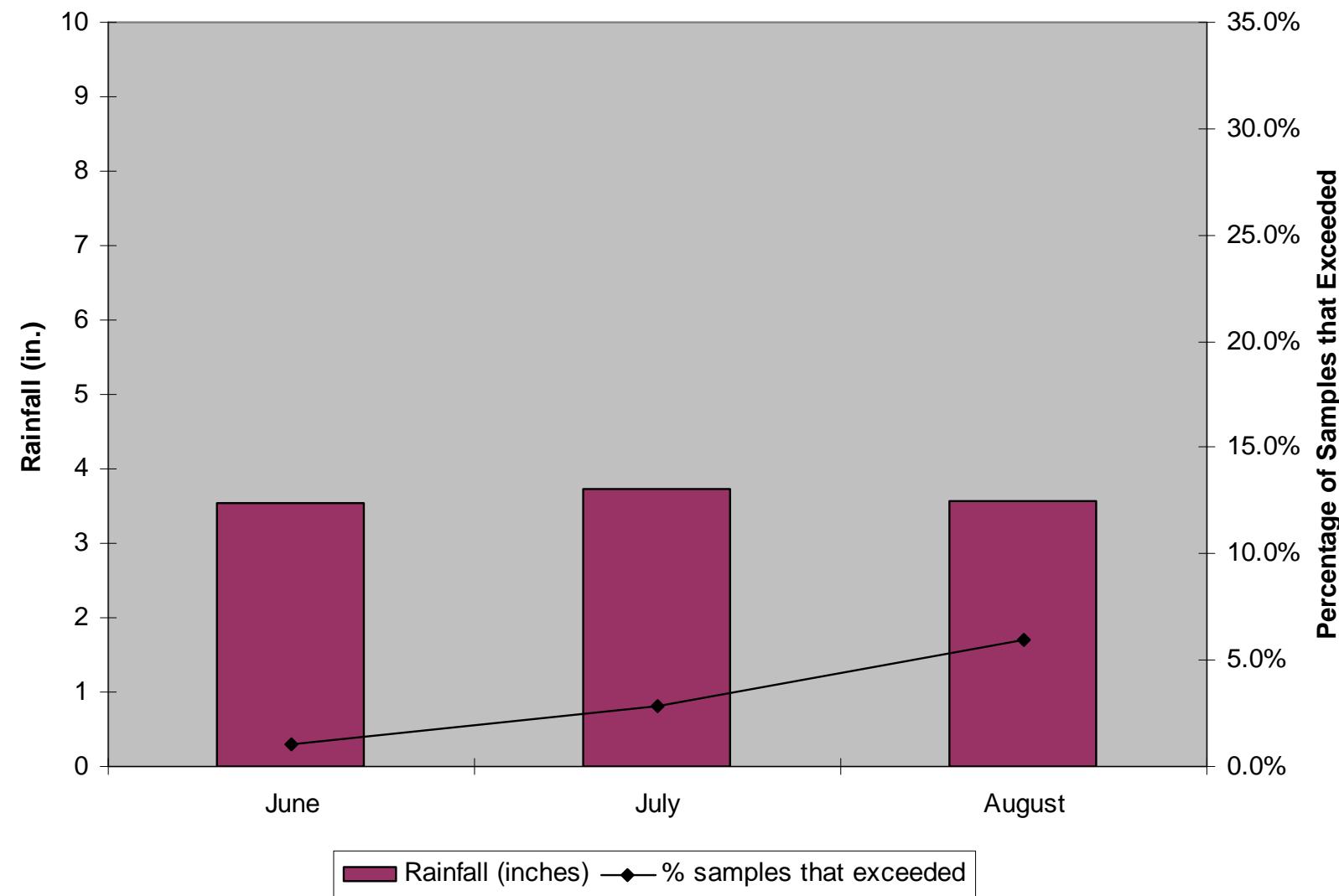
Bureau of  
**BEH**  
Environmental Health



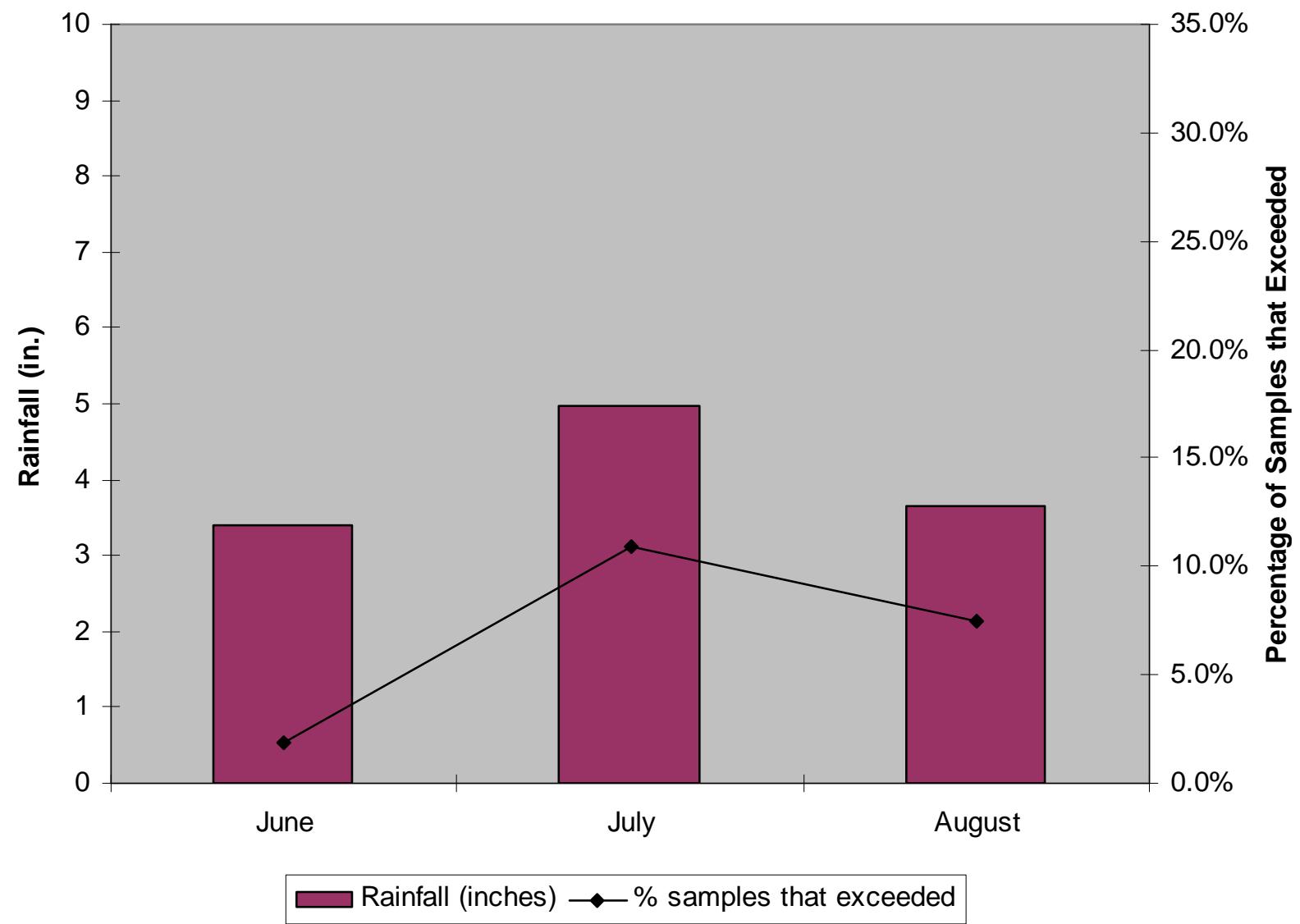
**Figure 6**

Rainfall and Freshwater Exceedances in the Barnstable Area (2011)

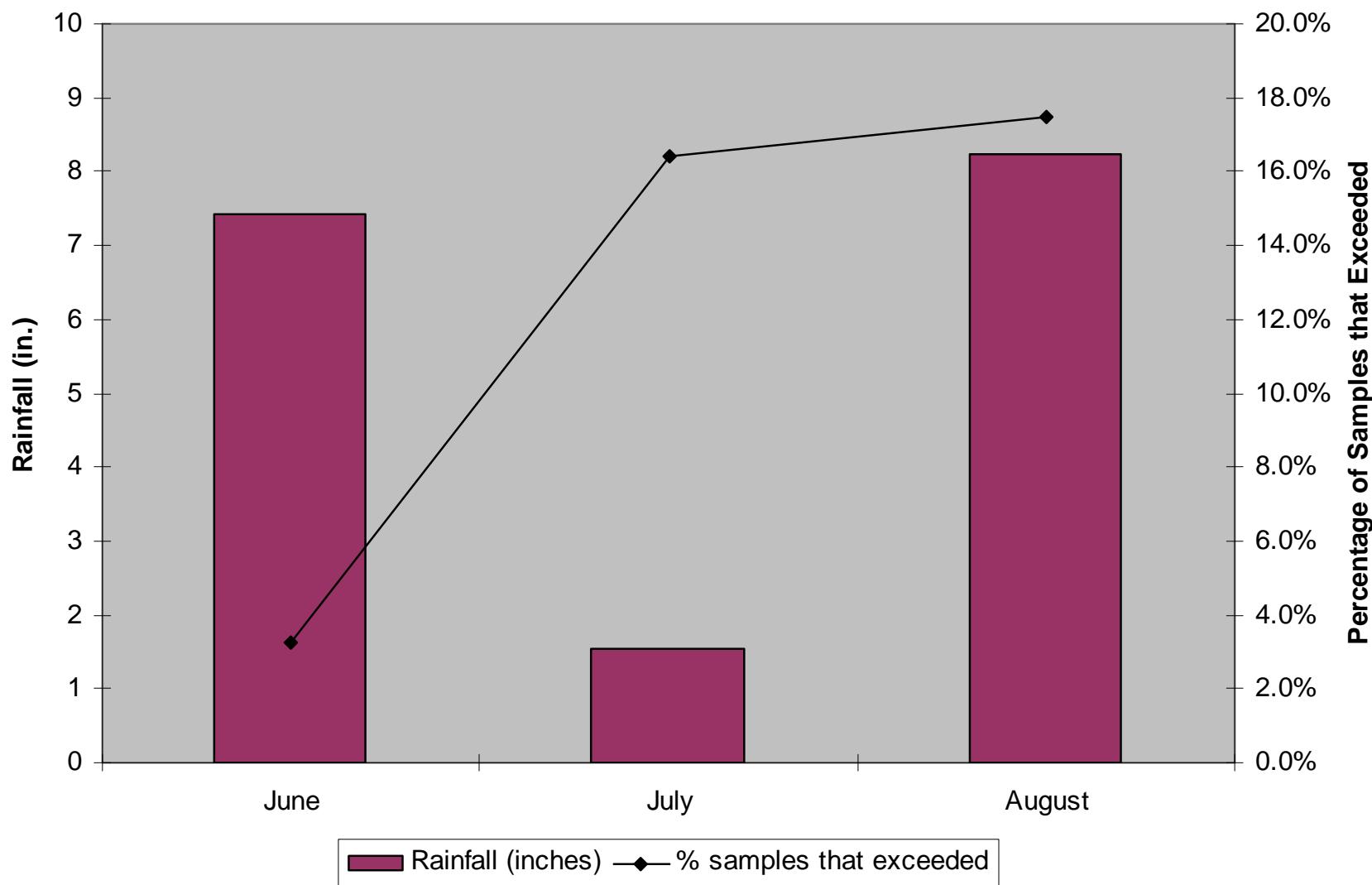
Area comprises Barnstable and Yarmouth



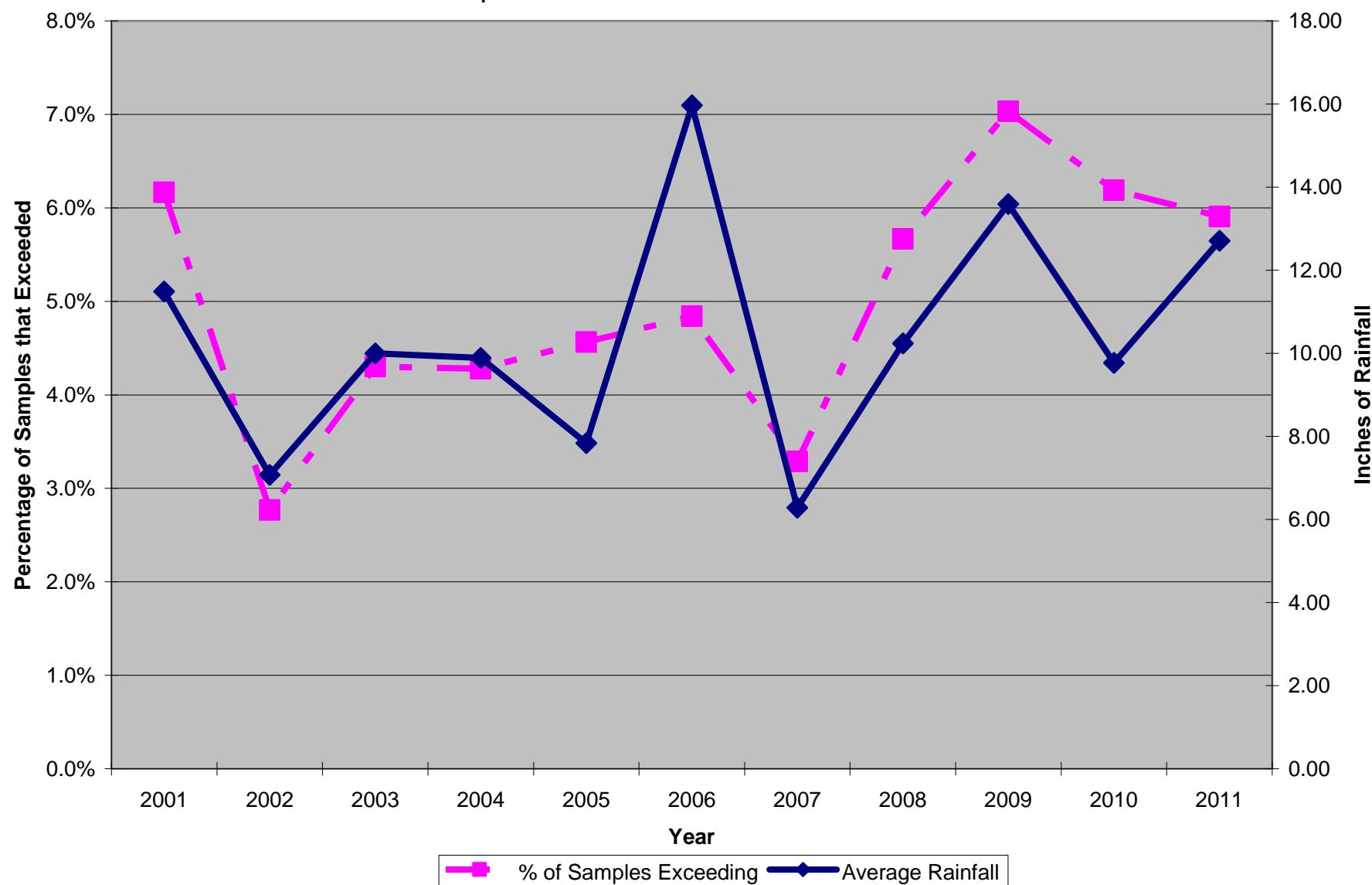
**Figure 7**  
Rainfall and Freshwater Exceedances in Plymouth Area (2011)  
Area comprises Carver, Kingston, and Plymouth



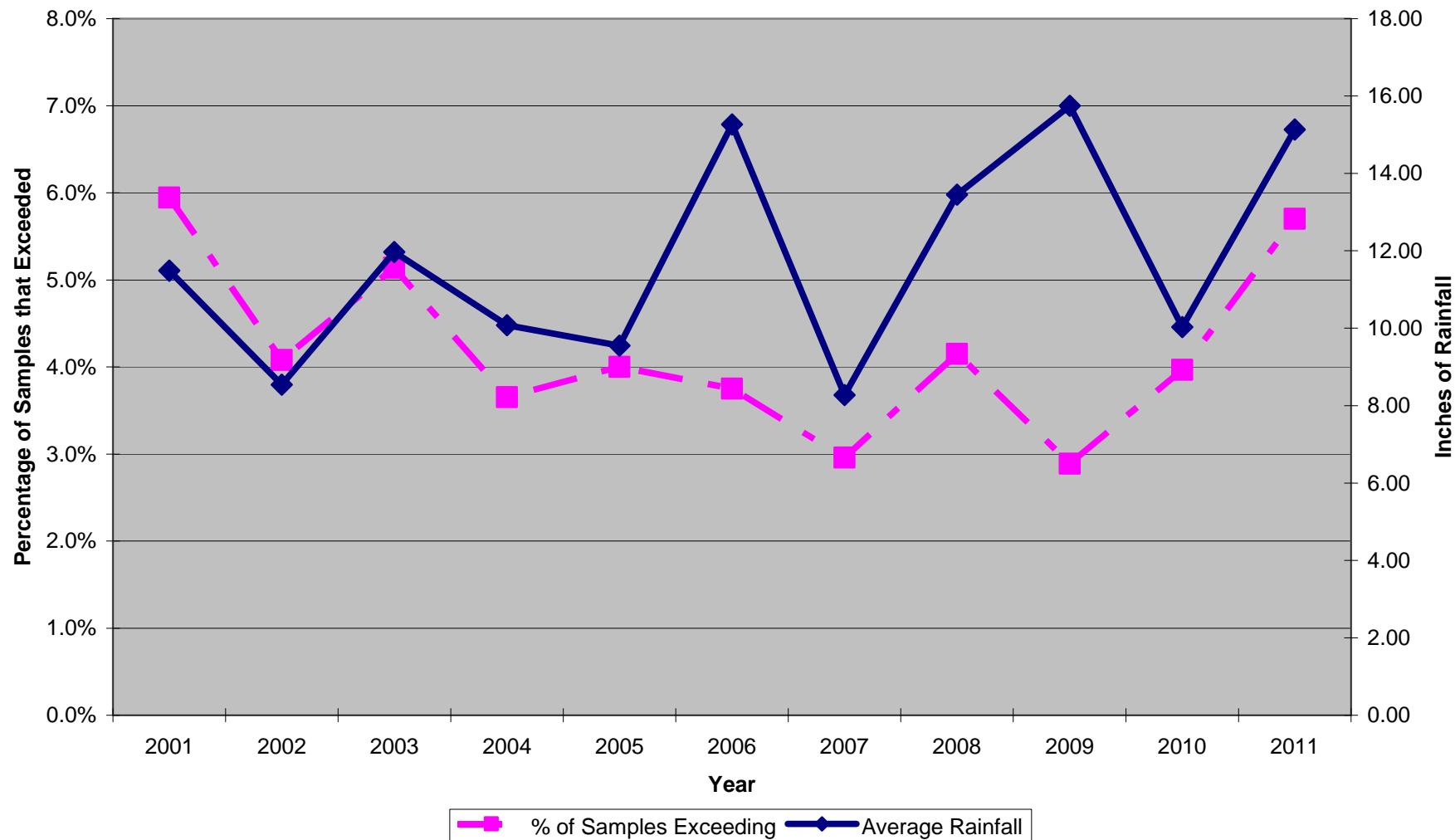
**Figure 8**  
Rainfall and Freshwater Exceedances in Westfield/Springfield Area (2011)  
Area comprises Agawam, Chicopee, Southwick, Springfield, and Westfield



**Figure 9**  
Historical Relationship between Rainfall and Exceedances at Marine Beaches

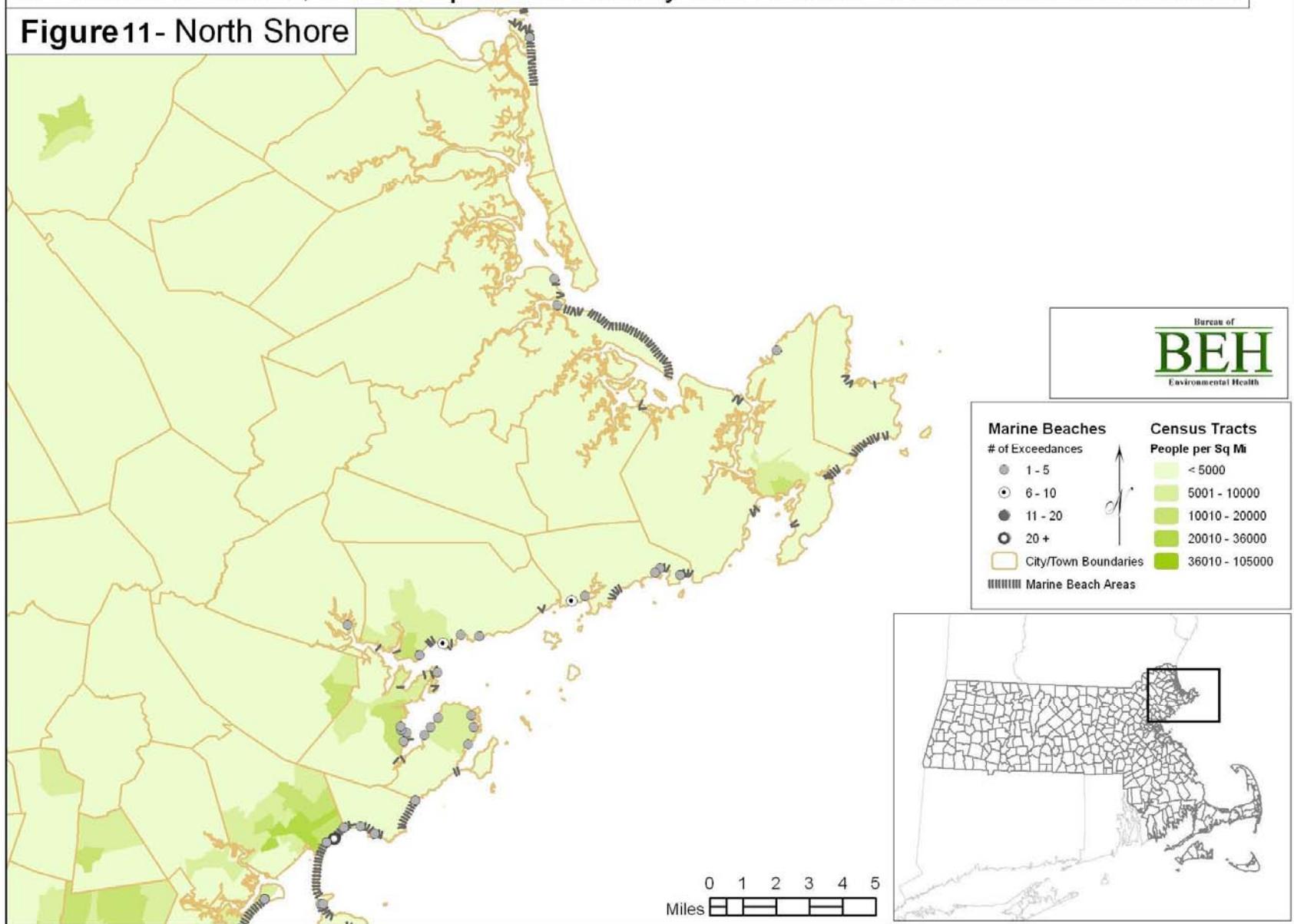


**Figure 10**  
Historical Relationship Between Rainfall and Exceedances at Freshwater Beaches



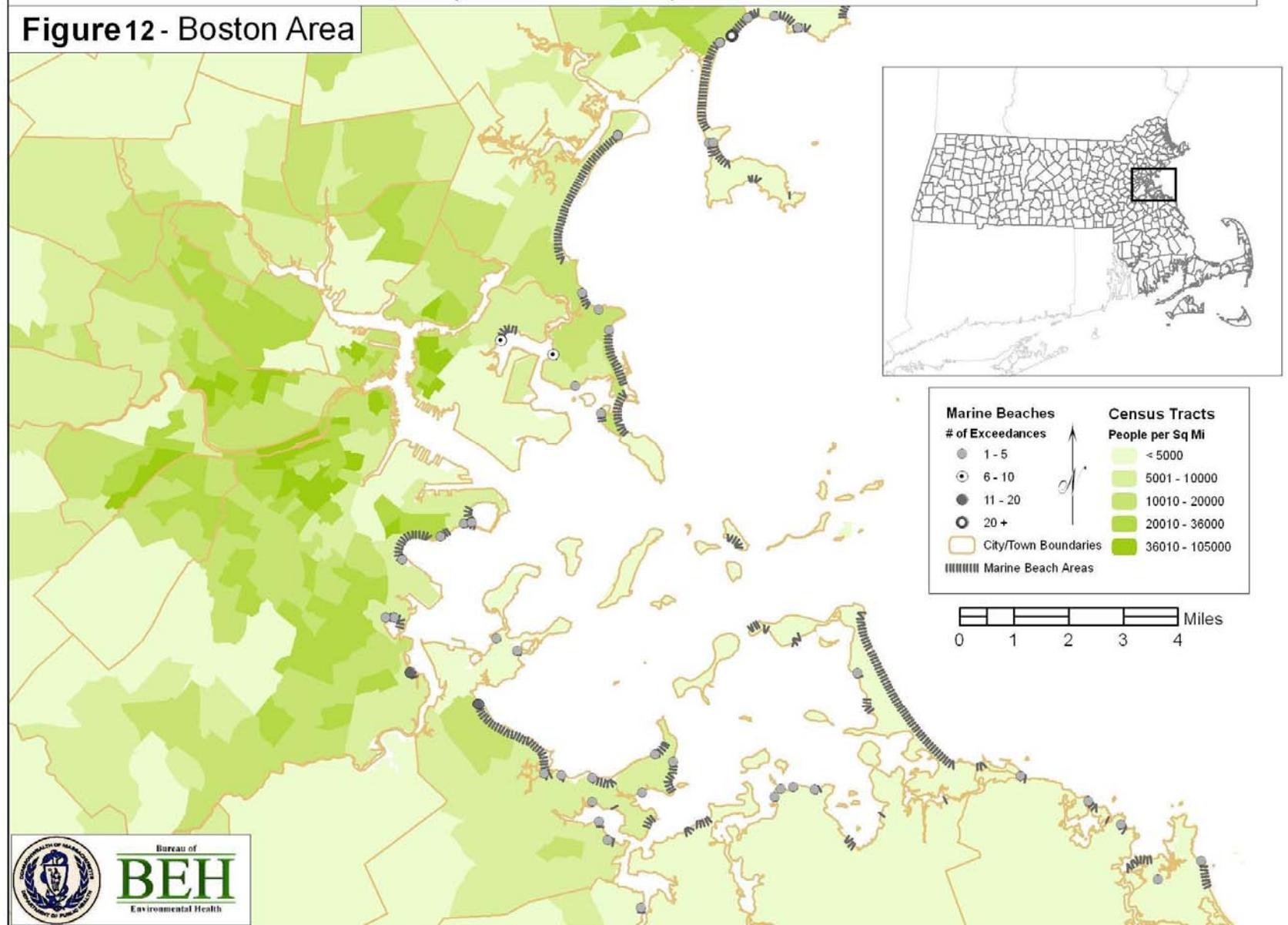
## MA Marine Beaches, 2011: Population Density and Number of Bacterial Exceedances

**Figure 11- North Shore**



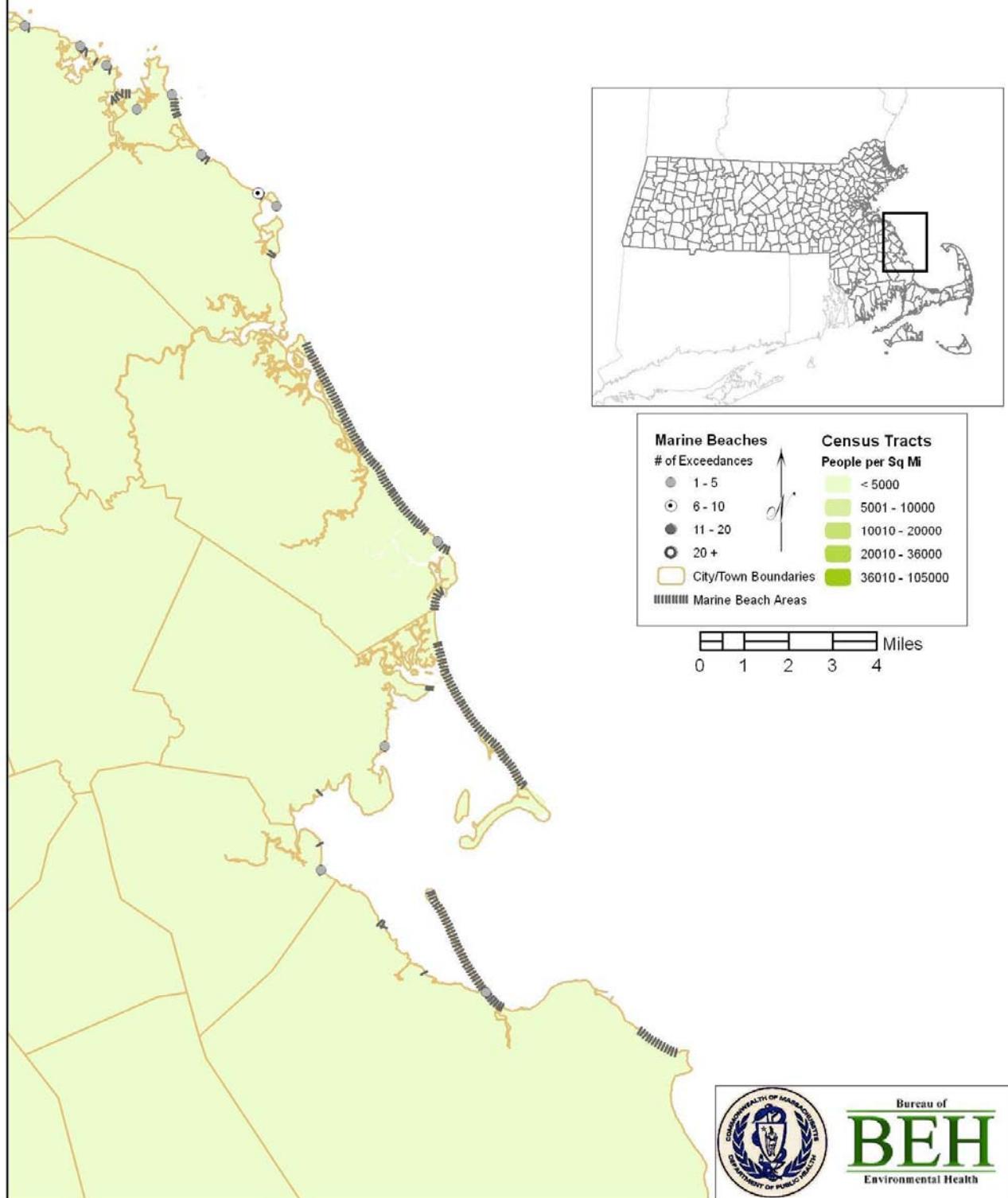
## MA Marine Beaches, 2011 : Population Density and Number of Bacterial Exceedances

**Figure 12 - Boston Area**



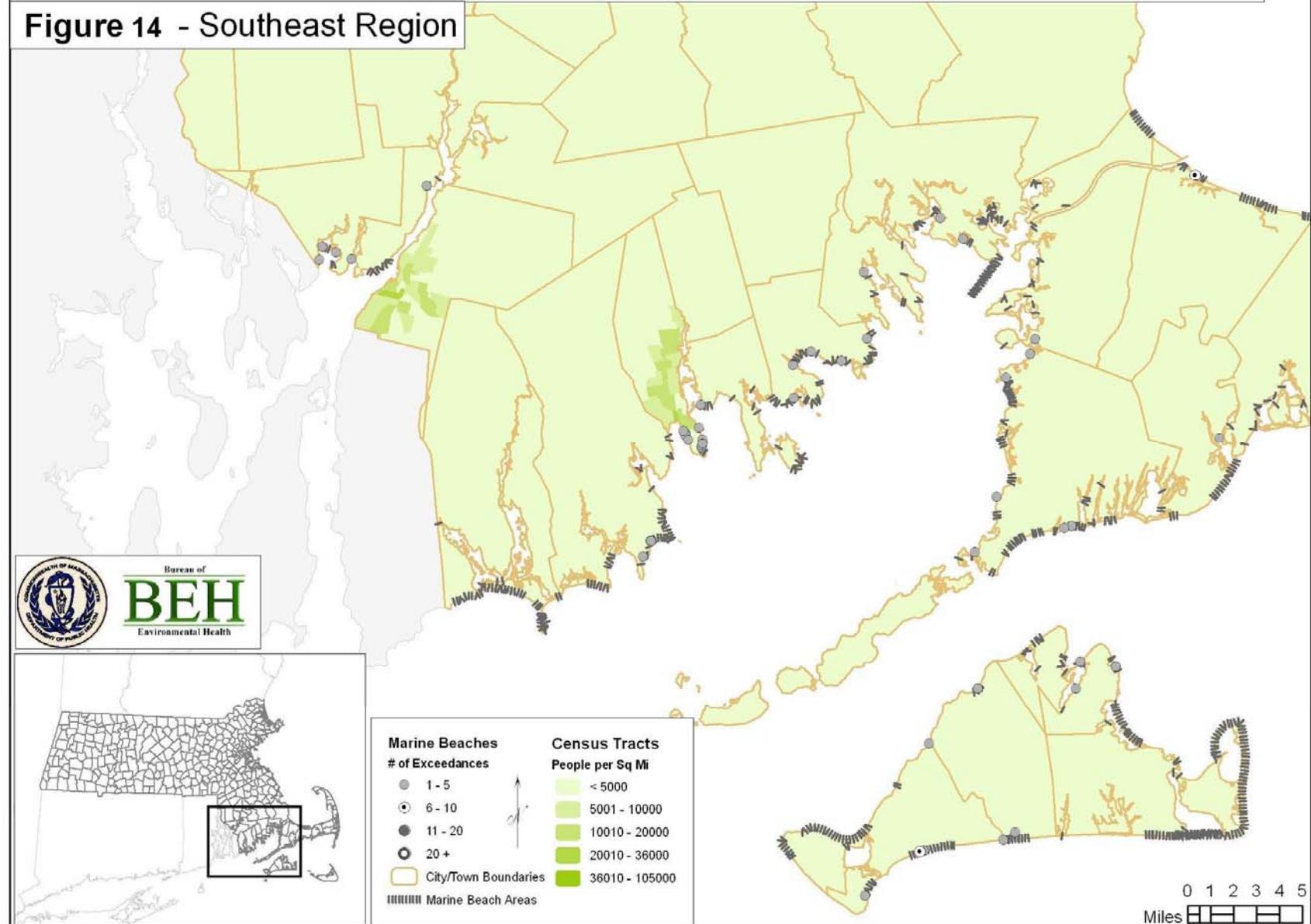
## MA Marine Beaches, 2011: Population Density and Number of Bacterial Exceedances

**Figure 13 - Plymouth Area**



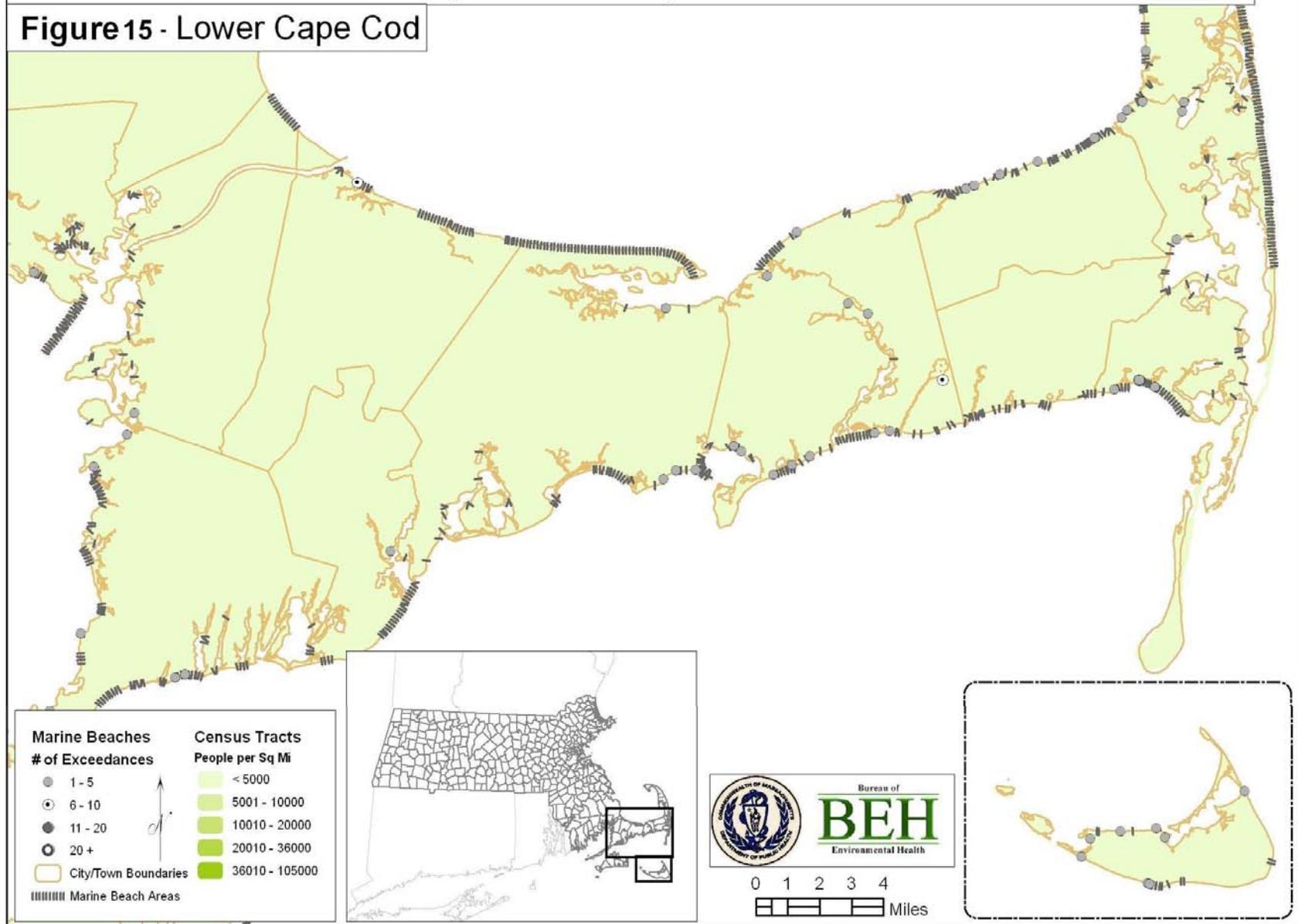
## MA Marine Beaches, 2011 : Population Density and Number of Bacterial Exceedances

**Figure 14 - Southeast Region**



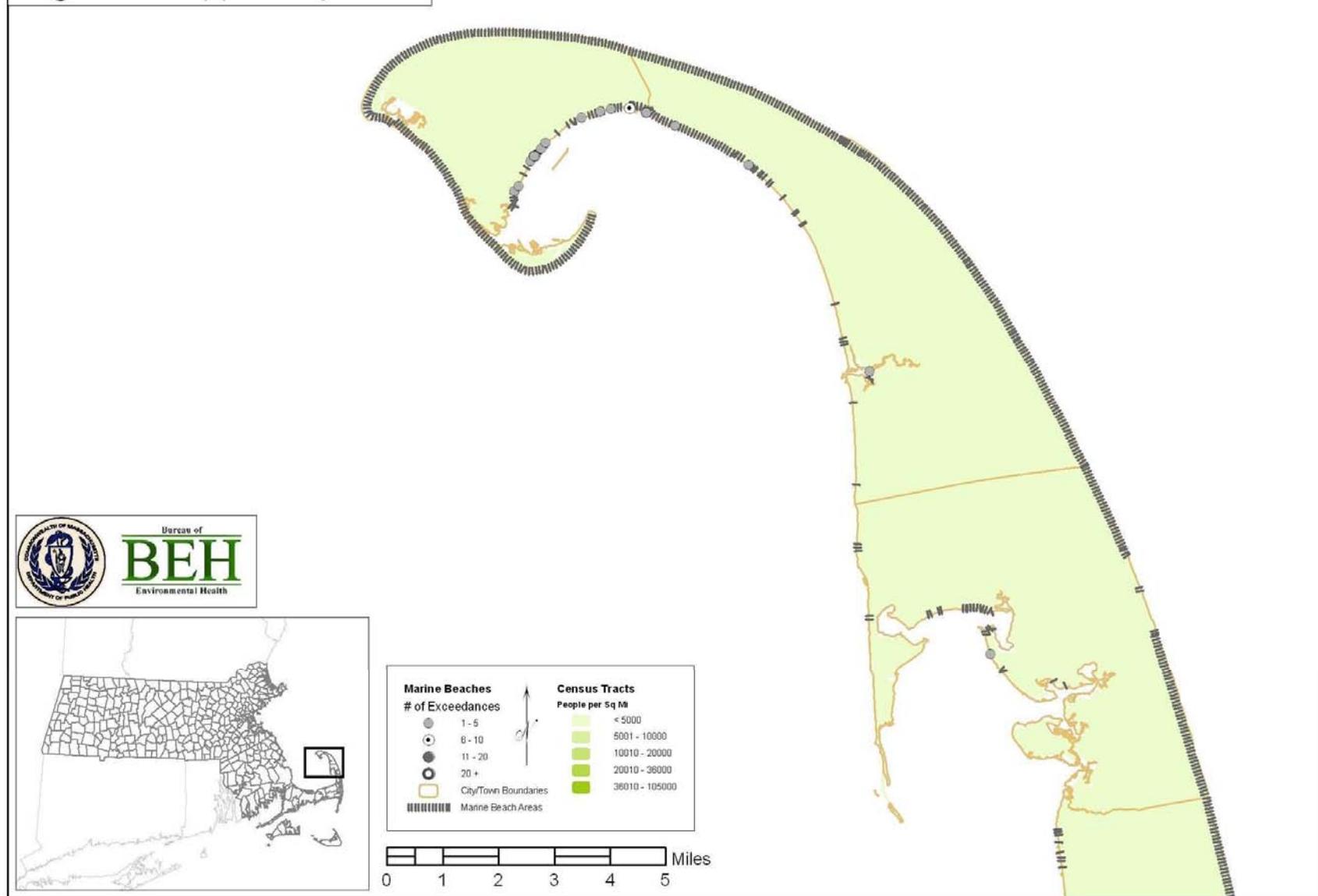
## MA Marine Beaches, 2011: Population Density and Number of Bacterial Exceedances

**Figure 15 - Lower Cape Cod**

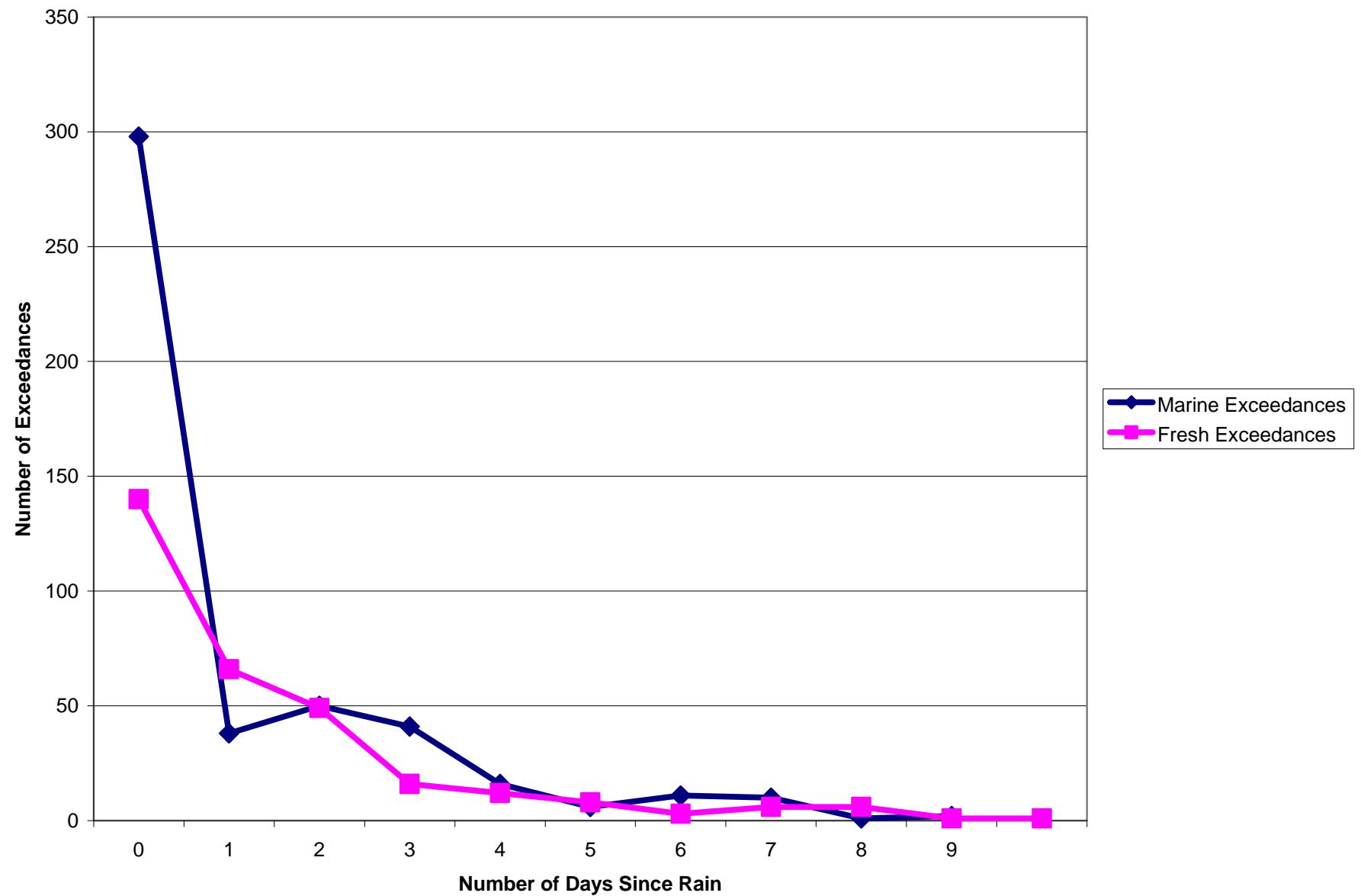


## MA Marine Beaches, 2011: Population Density and Number of Bacterial Exceedances

**Figure 16 - Upper Cape Cod**



**Figure 17**  
MA Beaches (2011): Relationship Between Bacterial Exceedances and Days Since Last Rainfall



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## **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

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## **APPENDIX**

### **A. GENERAL LAWS OF MASSACHUSETTS**

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# **GENERAL LAWS OF MASSACHUSETTS**

## **PART I. ADMINISTRATION OF THE GOVERNMENT**

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### **TITLE XVI. PUBLIC HEALTH**

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#### **CHAPTER 111. PUBLIC HEALTH**

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##### **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.

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## **APPENDIX**

### **B. MASSACHUSETTS STATE REGULATIONS**

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# **105 CMR 445.000: MINIMUM STANDARDS FOR BATHING BEACHES (STATE SANITARY CODE, CHAPTER VII)**

## **Section**

445.001:	Purpose
445.002:	Authority
445.003:	Citation
445.004:	Scope
445.010:	Definitions
445.020:	Operation
445.030:	Bathing Water Quality
445.031:	Indicator Organisms
445.032:	Collection of Bathing Water Samples
445.033:	Laboratory Analysis and Reporting
445.034:	Bathing Beaches Operated by the Commonwealth
445.035:	Sampling and Analysis at Semi-Public Beaches
445.036:	Public Request for Testing
445.040:	Posting and Reopening Notifications
445.100:	Variance
445.101:	Variance to be in Writing
445.300:	Permit Required to Operate
445.400:	General Administration
445.500:	Severability

### **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**

These regulations 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 semi-public 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 community, 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

- (a) 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
- (b) 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 that has common access and/or common use by a group or organization, which includes

- (a) 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 or consideration paid or given for the primary use of the premises.
- (b) any bathing beach used in connection with a neighborhood or residential association
- (c) any 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 semi-public 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.

- (A) After May 15, 2010 no bathing beach shall be operated without a permanent sign posted at the entrance to each parking lot and/or each entrance to the beach. At minimum, the sign must state the dates of operation, the name and telephone number for the beach operator, permit number, and note that the beach is not monitored for bacteria outside of the specified date range.
- (B) The bathing beach operator is responsible for providing and maintaining the sign required in 105 CMR 445.020 (A).

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.

- (1) 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.
  - (1) 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.
  - (1) The Board of Health, for public and semi-public bathing beaches that are not operated by the Commonwealth shall approve sampling locations at each bathing beach in its jurisdiction. (2) The Department, for bathing beaches that are operated by the Commonwealth, shall approve sampling locations at each bathing beach in its jurisdiction.
  - (3) Samples of bathing water shall be taken at locations within areas of greatest bather load.
  - (4) Additional samples shall also be obtained at any critical location subject to contamination from business developments, dwellings, streams, sewer outfall pipes or other sources.
  - (5) At locations where there are multiple beach operators within 500 meters of shoreline, the beach operators may designate a single sampling location, known as a surrogate sampling point, which will provide sufficient protection to public health as approved by the local Board of Health. These locations must meet the following criteria:
    - (a) Bathing beaches must not be physically separated from the surrogate sampling point by natural or man-made formations. These may include:
      - (I) embayments or peninsulas
      - (II) streams, rivers, or creeks
      - (III) jetties or other bounding structures
      - (IV) stormwater or combined-sewer overflow outfalls
    - (b) At any time the results of a bacterial test exceed the levels in 105 CMR 445.030, all beach operators using a surrogate sampling point must comply with 445.040.
    - (c) Each beach operator utilizing a surrogate sampling point will be equally responsible for the costs of testing, monitoring and analysis.
    - (d) Thirty days prior to the beginning of the beach season, the local Board of Health must notify the Department of the beach operators utilizing a surrogate sampling point, their location, and the location of the surrogate sampling point.

(e) The local Board of Health or the Department may require any or all of the beach operators to discontinue the use of surrogate sampling points at any time the bathing waters are found to be unfit, subject to contamination as to constitute a menace to public health, or do not provide sufficient protection to protect public health.

**(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 bacteriologic samples:
  - (a) Within the five days immediately preceding 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 closure due to the presence or suspected presence of any of the conditions specified in 105 CMR 445.030(B).
- (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 at the time of sampling shall be noted and 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 and in no event later than 12 hours after the results are

validated 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 12 hours, report the results of such testing, monitoring and analysis to the Department and the Board of Health in the community 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, 105 CMR 445.032, 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. For conditions solely related to physical hazards, the word "injury" may be substituted for "illness" in the required notification.

(B) **Reopening.** Prior to reopening bathing water posted due to a violation or an assumption of a violation of the standards established in 105 CMR 445.030(B), 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. Prior to reopening bathing water posted due to a violation or an assumption of a violation of the standards established in 105 CMR 445.030(A) or 105 CMR 445.030(C), the Board of Health, its agent, or any other authorized person shall confirm by analytic testing or other verifiable means that conditions no longer constitute a threat to human health or safety. 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 wastewater 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 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 or the Department, 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 testing exceed the levels specified in 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 community, 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: Permit - Issuance

(A) Permit Required to Operate. After May 28, 2010 no person shall commence the operation of, or continue to operate, a bathing beach unless the operator is the holder of a valid permit issued by the Board of Health or the Department.

(B) Application. By no later than April 26, 2010, any person currently operating a bathing beach desiring to continue operating said beach shall file a written application for a permit with the Board of Health, on forms prepared by the Department and obtained from the Board of Health. Any information as required by the Board of Health and payment of any fee required by local bylaw, ordinance or regulation shall accompany the application.

(C) Permit. Upon receipt of a completed application form and any applicable fee, the Board of Health shall review the information to determine if the beach meets the criteria established in 105 CMR 445.000. If so, the Board of Health shall make a determination within 30 days for existing applicants or 60 days for new applicants whether to issue a permit to the operator or the proposed operator to operate a bathing beach, on a form provided by the Department.

(D) Expiration and Renewal of Permit.

(1) A permit shall expire no later than two years from the date issued.

- (2) A bathing beach permit may be renewed by applying at least 30 days prior to the expiration of the permit. Renewal application forms prepared by the Department shall be obtained from the Board of Health.
- (3) Upon receipt of a completed renewal application form and any applicable fee, the Board of Health shall issue a renewal permit, provided that the conditions for operation set forth in 105 CMR 445.000 are satisfied. The Board of Health may suspend, revoke, or refuse to renew a permit to an operator who is in repeated non-compliance with 105 CMR 445.000.
- (4) If a permit expires while a timely filed application for renewal is pending, the bathing beach shall continue to operate under the expired permit until a new permit is issued or the renewal application is denied.

**445.400: General Administration**

The provisions of 105 CMR 400.000 shall govern the administration and enforcement of 105 CMR 445.000.

**445.500: 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.

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## **APPENDIX**

### **C. FEDERAL BEACH ACT**

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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.

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

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

**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.—

“(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:

Deadlines.

**“(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—

“(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 criteria for 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:

Deadlines.

Publication.

**“(9) REVISED CRITERIA FOR COASTAL RECREATION WATERS.**—

**“(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.

**“(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,

Deadline.  
Publication.

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:

**“SEC. 406. COASTAL RECREATION WATER QUALITY MONITORING AND NOTIFICATION.**

**“(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.

“(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);

“(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).

“(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—

Deadline.

Reports.

Public  
information.

“(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.

Deadline.

#### **SEC. 7. REPORT.**

(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.).

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114 STAT. 877

**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.

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**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**

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## **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.

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**APPENDIX**

**E. MDPH BEACH SAMPLING DATA FORM**

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# Beach Sampling Field Data Form

<b>Town/City of Collection:</b> <b>Date Collected:</b> <b>Collected By:</b>				<b>Time Delivered to Lab:</b> <b>Delivered By:</b> <b>Relinquished To:</b>							
<b>Instructions:</b> 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	

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: Cloudy/Overcast   Sunny   Rainy   Foggy   Windy   Air Temp: \_\_\_\_\_ °F   Wind Direction: \_\_\_\_\_

<b>Comments:</b> _____ _____ _____
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**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.