

Marine and Freshwater
Beach Testing in Massachusetts

Annual Report
2006 Season



Prepared by

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Bureau of Environmental Health
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I. INTRODUCTION

A. OVERVIEW

Massachusetts has an extensive collection of recreational waters, including both freshwater and marine bathing beaches. These beaches serve as recreational resources to the local communities, and bathing beach water quality is an important public health concern. It is of vital importance to ensure that the beaches meet all current public health standards. Recreational use of waters polluted by microbial contamination can result in human health problems such as sore throat, gastroenteritis, or even meningitis or encephalitis (Cabelli, 1983; USEPA, 1986; Cabelli, 1989; Haile, 1996; Pruss, 1998). As a result, beach water quality is regulated to protect public health. In Massachusetts, bathing beach water quality is regulated by the Massachusetts Department of Public Health (MDPH) under Massachusetts General Law (MGL) Chapter (C) 111, § Section (S)5 and regulations cited as 105 Code of Massachusetts Regulations (CMR) 445.000: Minimum Standards for Bathing Beaches (State Sanitary Code, Chapter VII; Appendix A and B). All public and semi-public (e.g., campgrounds, motels) bathing beaches in Massachusetts must be monitored for bacterial, and on occasion environmental, contamination during the bathing season. The bathing beach season in Massachusetts runs from as early as Memorial Day in some areas, through Labor Day during most years.

Local boards of health (BOH), the Barnstable County Department of Health and the Environment, and the Massachusetts Department of Conservation and Recreation (MDCR) conduct the vast majority of beach water sampling in Massachusetts. Most marine beach samples are analyzed at MDPH contracted laboratories. Most freshwater samples are analyzed at private laboratories, while some are analyzed at municipal facilities.

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 must be posted as unsafe for swimming due to bacterial contamination. The general public is notified of a beach posting via signs posted at access points to that beach. For marine beaches, the

general public is also notified via the MDPH website, which is operated in collaboration with local health officials and MDPH contract laboratories. Local health officials and MDPH contract laboratories collect and analyze the samples and perform a majority of the data entry onto the website. MDPH is notified of exceedences within 24 hours (105 CMR 445.040). Beaches are to remain posted until the levels of bacterial contamination decrease to safe levels, at which point the postings can be removed and the MDPH is notified of the beach opening.

The Massachusetts Beaches Act (Appendix C) was passed in 2000, requiring all public and semi-public beaches to be tested weekly during beach season using standard indicators. In 2000, the U.S. Congress enacted the Beaches Environmental Assessment and Coastal Health (BEACH) Act that amended the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act, or CWA) to improve the quality of coastal recreational waters (Appendix D). The BEACH Act seeks to reduce the risk of disease to users of the nation's marine recreational 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.

Since late 2001, MDPH has received funding from the United States Environmental Protection Agency (USEPA) that partially supports MDPH efforts to (1) develop and maintain an inventory of marine bathing beaches, (2) compile and analyze monitoring data, and (3) to conduct assessments of those beaches identified as high-risk. Based on work through the MDPH Beaches Project, MDPH has been able to make several major accomplishments in support of these goals:

Bathing Beaches Inventory

Prior to 2001, MDPH conducted a survey of Massachusetts municipalities in order to initiate the establishment of an inventory of all public and semi-public marine and freshwater beaches. Through the collection of beach water data and contacts with local boards of health, beach managers, and others, MDPH now has a documented inventory of over 500 marine and over 600 freshwater public and semi-public beaches.

Bathing Beaches Mapping Project

In 2003, a detailed geographic information system (GIS) layer for Massachusetts marine bathing beaches was developed by MDPH with assistance from Applied Geographics, Inc. (AGI), and with considerable information from local health officials. State health officials, working with local health officials, identified the locations and specific boundaries of each known beach, the designations of each beach – public or semi-public (and private if known), the location or locations where the water samples are taken for routine monitoring, the location at each beach where posting (i.e., closure due to bathing water quality violation) would occur in the event it is necessary, and the locations of normal access points and parking lots. All information was validated by MDPH staff, who performed site visits to all marine beaches and converted this information into GIS beach layers by taking in-field readings.

Bathing Beaches Monitoring

MDPH has developed a bathing beaches monitoring database, which includes all reported beach monitoring data and related information. MDPH has been successful at monitoring every public marine beach and most semi-public marine beaches on a weekly basis during the past five beach seasons in Massachusetts. This includes 602 sampling locations at over 500 marine beaches.

Public Notification/Outreach

In 2001, MDPH initiated the development of a system that would enable the public to see which beaches were open or closed on any particular day, the reason behind any closure, and to keep track of a beach's water quality history. This electronic web-based system for public notification of marine beach postings and water quality monitoring data went online in 2003 and was developed by MDPH in conjunction with Garrison Enterprises. The website was developed with funding support from the USEPA BEACH Grant and can be reached from the home page of the MDPH website (<http://www.mass.gov/dph/topics/beaches.htm>) or directly at: http://mass.digitalhealthdepartment.com/public_21/index.cfm

The website allows for reporting of routine water quality monitoring data through a series of password protected data entry pages. The web-based system allows MDPH contract laboratories to enter sampling test results directly to the site. These laboratories are required under the MDPH contract to enter field sampling data and laboratory results into the public notification website as results become available. Data entered on the site provide as near real-time public notification as possible, after which the website automatically generates postings for those samples that exceed single-sample or geometric mean regulatory limits. Display of postings on the public pages occur twice per day, at 9:30 AM and 12:30 PM. Local health officials can view postings shortly before public notification in order to give them an opportunity to post beaches and prepare for public inquiries that may result depending on the most recent data. In 2006, the web-based system was enhanced 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.

Quality Assurance

A Quality Assurance Project Plan (QAPP) for routine monitoring activities and related beaches project implementation was developed, submitted to and approved by USEPA. The QAPP describes the quality assurance, quality control, and related activities, including enforcement aspects that are in place to ensure the results of the project will meet USEPA's published performance criteria.

A Quality Management Plan (QMP) for all beaches activities under the USEPA BEACH grant and other activities specific to bathing beach regulations was finalized. The QMP is a required document that describes how the program will develop, implement, and determine the effectiveness of its quality assurance and quality control policies and procedures.

The Data Submission Plan for Routine Monitoring under the USEPA BEACH grant and other activities specific to bathing beach regulations was developed, submitted to, and approved by USEPA. 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 this information.

Sanitary Surveys

MDPH has developed a sanitary survey form for beaches. The development of this form allows communities to apply for sampling variances according to Massachusetts' regulations (105 CMR 445.100) and helps MDPH to comply with USEPA BEACH Grant requirements for a tiered monitoring approach to sampling.

MDPH developed the Public Health-Based Beach Evaluation, Classification, and Tiered Monitoring Plan in order to ultimately direct water quality monitoring resources to the beaches that pose the greatest health concerns. The plan is intended to facilitate the identification and clean up of pollution problems, while those beaches with more pristine records can be monitored less often than the required weekly routine monitoring through a variance process pursuant to both the Massachusetts and federal beach acts. In this system, every public and semi-public marine bathing beach was classified as "Tier One," "Tier Two," or "Tier Three." 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. Tier Two includes higher use beaches with some pollution. These beaches must be tested once per week. Tier Three beaches are those with no known pollution problems. These beaches are required to be tested once every two weeks or sometimes less frequently, as determined by MDPH through the variance process.

Training

MDPH has held numerous training sessions for local health officials during the life of the BEACH Grant. In addition to training relative to conducting sanitary surveys, topics discussed have included: health concerns related to polluted bathing water, sampling methodology and use of standardized field sampling forms, current federal and state regulations, MDPH's public notification website and an overview of its GPS survey of marine beaches in Massachusetts. MDPH trainings also presented information on identifying actual and/or potential sources of contamination. During the past year, additional technical guidance has been provided through mailings and personal communications to local health officials.

Laboratory Programs

MDPH has used portions of the federal beach funds to provide partial support for routine water quality monitoring at marine beaches in local communities that qualified. Since 2003, over 20,500 samples have been analyzed from over 50 marine beach communities who have taken part in the contract laboratory program.

In 2006, MDPH used BEACH grant funds to contract with four laboratories (i.e., Barnstable County Department of Health and Environment Water Quality Testing Laboratory, Town of Chatham Department of Health and Environment Water Quality Laboratory, Wampanoag Environmental Laboratory, and G&L Laboratories, Inc.) to process regular weekly samples for public, marine beaches in Massachusetts, and to electronically report the data directly to MDPH. The contract laboratories were successfully audited by MDPH staff in 2005 to ensure compliance with the QAPP and Standard Operating Procedures. Local boards of health, as in the past, report all freshwater beaches data. This report presents the results and analysis of these 2006 data from Massachusetts marine and freshwater bathing beaches.

II. BACKGROUND

A. INFORMATION ON BEACH WATER QUALITY

1. Health Effects from Swimming in Marine Waters

Several prospective and retrospective epidemiological studies (Cabelli, 1983; USEPA, 1986; Cabelli, 1989; Haile, 1996; Pruss, 1998) have concluded that swimming in polluted marine water poses health risks to swimmers. This conclusion is based on the observation that there is an increased rate of adverse health effects among swimmers in marine waters as compared to non-swimmers. 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), and constitutional symptoms (e.g., fever, chills). One retrospective study found the relative risk of gastrointestinal illness among swimmers in polluted waters to be 1.0 to 3.0 times the risk of non-swimmers (Pruss, 1998). The epidemiological studies suggest that swimmers may be exposed to pathogens (disease-causing microorganisms) while swimming. Pathogens in marine waters typically have a fecal source. Pathogens associated with human fecal matter (e.g., some strains of *Escherichia coli*) may be present in the water due to a variety of sources, including but not limited to ocean disposal of sewage by boats, sewage treatment plant outfalls, illegal sewage hookups and combined sewer overflows. Bathers may also contribute significantly to pathogen concentrations in recreational waters (California, 1997; Gerba, 2000). Pathogens may be ingested or absorbed while swimming, thereby causing an increased risk of disease among swimmers relative to non-swimmers (Cabelli et al., 1982; Cabelli, 1983; Cabelli, 1989; Coye and Goldoft, 1989; CDC, 1990-2004; Corbett et al., 1993; Haile, 1996).

2. Beach Water Quality Testing Methods - Marine

The pathogens that cause swimming-associated disease are very difficult to measure directly. Furthermore, because of the wide variety of different pathogens that might be present in marine waters, measuring all possible pathogens is not practical for routine testing programs. Therefore, public health officials typically estimate the potential for

pathogens to be present in the water by testing the water for a microorganism or a group of microorganisms whose life cycle(s) mimics that of specific pathogens but which are easier to measure than the pathogens themselves. Because they indicate when pathogens are likely to be present, these microorganisms or groups of microorganisms are called “indicators” (Cabelli, 1983).

In the United States, concern about pathogens in marine waters typically has been centered around those pathogens associated with fecal contamination (Cabelli, 1983). As a result, methods commonly used in this country test for an indication of the degree of fecal contamination of the water. The most accurate indicators of fecal contamination are specific microorganisms (e.g., *Escherichia coli*, *Streptococcus faecalis*, or *Clostridium perfringens*) that are predominantly present in human and animal feces (Cabelli, 1983). Testing for a single indicator species, however, 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, methods that test for groups of microorganisms, such as total coliforms, fecal coliforms, or Enterococci, are frequently used instead (Cabelli, 1983). These tests are usually easier and faster to perform than those that test for specific indicator species. In the case of Enterococci, they also strongly correlate with swimming-associated disease (USEPA, 1986; Pruss, 1998). One disadvantage of using groups of microorganisms as indicators is that these tests can falsely predict the presence of fecal contamination if organisms that are not associated with fecal contamination are detected by the method (NAS, 1977; Cabelli, 1983; Barrell et al., 2000). For public health purposes, however, it is prudent to respond to such indicators to prevent adverse health outcomes.

As of the year 2000, Enterococci are the required indicator organisms for determining levels of contamination at marine bathing beaches in Massachusetts. In the past, total coliforms and fecal coliforms were used as indicators for marine bathing beaches. In 2006, all marine beaches in Massachusetts that reported data used Enterococci as a routine monitoring indicator. The detection methods and criteria for Enterococci are described below. The methods and criteria for fecal coliform and total coliform are also included.

a) *Enterococci Method*

Similar to the total and fecal coliform methods, the Enterococci method detects the number of bacteria that grow under certain laboratory conditions (USEPA, 1985). However, the Enterococci method detects fewer total species than either the fecal or the total coliform methods. The Enterococci method 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). Because some of the species that are detected by this method are not associated with fecal contamination (USEPA, 1985), this method can produce false-positive results, as can the total and fecal coliform methods. In addition, some bacterial pathogens and all viruses are not detected by this method.

In 1986, the USEPA (1986) recommended that Enterococci be used as an indicator of water quality at marine bathing beaches. This recommendation was based on studies by Cabelli (1983) at three locations (New York, NY; Boston, MA; and Lake Pontchartrain, LA). In these studies, Cabelli (1983) found that gastrointestinal symptoms reported by swimmers were strongly correlated with Enterococci levels, but not with levels of total or fecal coliforms. Additionally, in 1997 USEPA approved and adopted *Method 1600: Membrane Filter Test Method for Enterococci in Water* (USEPA, 1997). This method enabled faster turnaround time for testing of Enterococci as an indicator of water contamination, thereby making the method practical for local use. This is the method required by MDPH regulations for use in Massachusetts marine waters. In 2003, USEPA approved and adopted a number of new culture and enzyme-substrate methods (e.g., Enterolert and Colilert) for testing both Enterococci and *E. coli* in ambient water (Jagals et al, 2000; Federal Register, 2003). In some cases, these new methods can provide results in less time than the 24-48 hours currently required. The new methods are expected to come into widespread use over the next several years.

b) *Total Coliform Method*

The most general, but no longer recommended, testing method is the total coliform method. This method measures the number of bacteria in a water sample that will grow under certain laboratory conditions (Cabelli, 1983). A large number of different kinds of organisms are measured by this method, some of which are found exclusively in human and animal intestines (i.e., *Escherichia coli*) (Cabelli, 1983; USEPA, 1985). The

advantages of this testing method are that it can be performed quickly and it is relatively sensitive to the presence of fecal contamination given the large number of species that it can detect. However, this method can falsely predict the presence of fecal pathogens because some of the species that are detected by the method (e.g., some species in the genus *Aeromonas*) are not found exclusively in human and animal feces (NAS, 1977; Cabelli, 1983). Furthermore, some waterborne pathogens (e.g., *Salmonella typhi*) and all viruses (e.g., Hepatitis A) are not detected by this method (NAS, 1977).

c) Fecal Coliform Method

The fecal coliform test is similar to the total coliform test in that it measures the number of bacteria (including *Escherichia coli*) that can grow under certain laboratory conditions. However, the fecal coliform test only measures a subset of the species detected by the total coliform method. As a result, the fecal coliform test detects fewer organisms that are not associated with fecal contamination than the total coliform test, thereby reducing the chance of false-positive results. False positive results are still possible, however, because the fecal coliform method does detect some bacteria that have other sources besides human and animal feces (Cabelli, 1983). The fecal coliform method, like the total coliform method, can fail to detect waterborne pathogens in some cases because it does not detect all waterborne pathogens or viruses.

3. Historical and Current Water Quality Criteria - Marine

Water quality criteria are guidance concentrations that are 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 resulting from swimming. The concentration of a microorganism in water is usually reported as the number of colony forming units (CFU) of indicators per 100 milliliters (ml) of water. For any given measurement of the indicator species in water, the actual health risk from swimming in that water will depend on what pathogens are present in the water. Therefore, to make a decision as to the actual health risk posed by a particular beach, other factors in addition to water quality criteria for an indicator species are important to consider (e.g., recent rainfall patterns, the number of people who use the beach).

a) *Enterococci*

In 1986, USEPA published *Ambient Water Quality for Bacteria – 1986*. In this document, USEPA recommended Enterococci instead of fecal or total coliforms as the indicator of marine water quality and provided a scientific rationale for its use. Rapid laboratory methods became available in the late 1990's to allow for the adoption of this indicator. Enterococcus is currently the mandated indicator organism for routine monitoring of Massachusetts bathing beaches (105 CMR 445.000).

The recommended use of Enterococci was based on studies by Cabelli (1983) that tested many different indicator organisms at several beaches in the United States to see which indicator organism correlated best with the incidence of acute gastrointestinal disease among swimmers. These studies showed that the concentration of Enterococci in marine waters were more strongly correlated with the incidence of swimming-associated gastroenteritis than were the concentrations of other indicators, including total and fecal coliforms. From these data, a relationship between the number of cases of swimming-associated disease and the Enterococci concentration in the water was established. USEPA (1986) used this relationship to establish the criteria for Enterococci in marine waters at 104 CFU per 100 ml for a single sample and 35 CFU per 100 ml for the geometric mean of at least five samples over a 30-day period. These criteria 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 1000 swimmers at marine beaches). MDPH adopted this standard by regulation beginning with the 2000 bathing season.

b) *Fecal Coliform*

In 1968, fecal coliform replaced total coliform as the recommended indicator species for marine water quality, however, as mentioned, fecal coliform is no longer recommended under state regulations. At that time, the National Technical Advisory Council of the Federal Water Pollution Control Administration established criteria for the geometric mean of the fecal coliform count over a 30-day period (for a minimum of five samples) at 200 CFU per 100 ml with no more than 10% of the samples exceeding 400 CFU per 100 ml. These values correlated with a level of risk of no more than 19 cases of acute gastrointestinal illness per 1,000 swimmers in marine waters. USEPA adopted this

standard in 1976. By 1978, the majority of states and territories had adopted this standard as well (Cabelli, 1983; USEPA, 1986).

c) Total Coliform

Formerly, the water quality criterion used by the MDPH was based on the use of total coliforms. Specifically, the total coliform concentration could not exceed 1,000 CFU per 100 ml. After its establishment, this criterion was adopted by the Joint Committee of the American Public Health Association, the State Sanitary Engineers, and many states (Cabelli, 1983).

4. Health Effects From Swimming in Freshwater

Several studies conducted by the USEPA and others (Dufour, 1984; USEPA, 1986; Cabelli, 1989; CDC, 1991-2004) have observed gastrointestinal symptoms (e.g., nausea, vomiting, diarrhea, abdominal pain) as a result of swimming in fresh waters. The results of these studies have suggested that swimmers may be exposed to pathogens while swimming in fresh waters. Pathogens associated with human fecal matter may be present in fresh waters as a result of system failures in human sewage treatment facilities, or rainfall and resulting surface water runoff and other factors. Leachate from septic systems may be a potential source of microbiological contamination as well as animal wastes subject to runoff (e.g., wastes from dogs or farms). Swimmer-to-swimmer contamination is another potential source for microbiological contamination. Swimmers, bathers, waders, surfers, and others who come into full- or most-body contact with swimming water may all contribute to contamination (California, 1997; Gerba, 2000).

5. Beach Water Quality Testing Methods – Freshwater

As indicated in the regulation (105 CMR 445.031) (see Appendix A), the indicator organisms for freshwater bathing beaches are *E. coli* and Enterococcus based on research conducted by USEPA (Dufour, 1984; USEPA, 1986). The Enterococcus method has previously been discussed.

a) *E. coli* Method

Escherichia coli (*E. coli*) is a species of bacteria that is found exclusively 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 particular species. Because *E. coli* is exclusively found in human and animal intestines, this method is a very sensitive indicator of fecal contamination for freshwater beaches (USEPA, 1985).

6. Current Water Quality Criteria – Freshwater

As noted previously, for any given measurement of the indicator species in water, the actual health risk from swimming in that water will depend on what pathogens are present in the water. Therefore, to make a decision regarding the health risk related to a particular beach, other factors must be considered in addition to water quality criteria for indicator species, such as recent rainfall patterns and the number of people who use the beach.

a) *E. coli*

For freshwater, no single *E. coli* 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 criteria established in MDPH regulations (105 CMR 445.031).

b) *Enterococci*

For freshwater, no single Enterococci sample shall exceed 61 CFU per 100 ml and the geometric mean of the most recent five Enterococci samples within the same bathing season shall not exceed 33 CFU per 100 ml. These are the criteria established in the regulations (105 CMR 445.031).

Both *E. coli* and Enterococci standards are based on studies (Dufour, 1984; USEPA, 1986) that showed a strong correlation between levels of *E. coli* and Enterococci and 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 disease per 1,000 swimmers in freshwater beaches.

B. MDPH ACCOMPLISHMENTS - 2006

1. Beaches Website

In 2006, the electronic web-based system for public notification of marine beach postings and water quality monitoring data was updated to take into account additional sample locations and changes to beach names. Internal portions of the web's database were reviewed for accuracy and consistency. Minor corrections and updates were made in preparation for the beach season. Laboratories fulfilled their contract requirements by promptly entering sampling data and laboratory results into the MDPH 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. Local health officials were able to see the postings shortly before the public, allowing them to post beaches in a timely manner and prepare for public inquiries.

To further improve the functionality of the beaches website, MDPH staff reviewed public notification sites from other web-based programs in the country for features that could enhance the beaches website. In addition, BOHs and contracted laboratories provided suggestions to improve the ease and efficiency of data entry into the web-based system. As a result, the MDPH beaches website was enhanced for the 2006 beach season. Some improvements to the beaches website include the addition of a GIS layer to display maps of beach locations, a graphing capability 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. System enhancements also provide for easier viewing of graphical and tabular historical monitoring data.

Local health officials of marine communities opting not to utilize MDPH contracted laboratories were provided with guidance and training, if necessary, to ensure quality assurance for data entry provided outside of the contract laboratory program. Two BOHs were provided limited access to the website for inputting their community's test results. Only one non-contract laboratory provided data entry for one community. For

communities with extremely limited resources, MDPH staff provided data entry assistance.

During the beach season, the website can be reached from MDPH's Beaches and Water page (<http://www.mass.gov/dph/beaches>) by clicking on "Beach Water Quality Locator" or directly at (http://mass.digitalhealthdepartment.com/public_21/index.cfm). Beach postings and current/historical data can be viewed by clicking on a series of maps to select an individual community (Figures 1 and 2). Once the community is selected, a listing of all marine beaches in that community is displayed along with the status of the beaches (Figure 3). The website automatically generates postings as samples are entered for those that exceed single-sample or geometric mean regulatory limits. The data displayed on the website are updated twice daily during the beach season.

All MDPH standardized forms related to beach monitoring are made available for download on the MDPH Beaches website via the Publications and Reports hyperlink. These include the Field Sampling Form, Postings Fax Form, Posting Sign Form and Tier III Sanitary Survey Form.

2. Public Health Emergency Preparedness

During 2006, several incidents required immediate responses to address potential impacts on bathing beaches. Algal blooms along the Charles River, at Lake Monomonac in Winchendon, and at White Island Pond in Plymouth were reported. Algae blooms can be indicative of poor water quality and can pose health concerns to bathers and other recreational users. Although there are no bathing beaches on the Charles River, MDCR requested assistance from MDPH in evaluating the bloom in the context of potential public health impacts. MDPH/CEH recommended that an advisory be issued because exposure to algal toxins can occur from boating, sailing, and other recreational activities. MDPH/CEH determined that there were no public or semi-public bathing beaches on Lake Monomonac, which is located in both New Hampshire and Massachusetts. MDPH developed fact sheets and provided other information to the Winchendon Board of Health for public distribution. Up until 2006 no beaches were reported to exist on White Island Pond. However when MDPH was contacted for assistance with the algae bloom it became clear that there are several semi-public beaches on this water body which are required to be tested. MDPH worked with the local boards of health to ensure the

neighborhood association was aware of the potential health issues related to algae blooms.

Many Portuguese man-of-wars were sighted at beaches on Cape Cod, the Islands, and in the Buzzards Bay area in the 2006 beach season. This type of jellyfish is usually found in waters warmer than those off the Massachusetts coast and can cause painful stings from tentacles that can reach 30-40 feet in length. MDPH provided information and fact sheets about the jellyfish to Boards of Health in marine communities through the Health and Homeland Alert Network.

Finally, in late summer 2006, an outbreak of cryptosporidiosis occurred among campers at Hale Reservation, a camp located in Westwood and Dover, Massachusetts. Hale Reservation is a private, non-profit organization that manages about 1100 acres of land, including ponds and trails for public use, in Westwood and Dover, Massachusetts. From August 9, 2006 to August 23, 2006, six children became ill with gastrointestinal symptoms and were subsequently confirmed (by laboratory analysis of samples) to have *Cryptosporidium parvum*. Extensive testing of multiple water sources by various environmental health programs at MDPH resulted in positive tests for *Cryptosporidium* oocysts in two pond water samples and *E. Coli* levels above the bathing beaches bacterial standard in water samples taken from multiple sites in the North Beach area at the reservation. As of August 30, 2006, North Beach was closed to swimming due to a bacterial exceedance during routine beach water testing and remained closed for the remainder of the year while investigations were being conducted. As part of the investigation to determine likely sources of the *Cryptosporidium* at the camp, MDPH Environmental Toxicology and Community Sanitation staff conducted a sanitary survey of the entire pond and its surrounding area. Additionally, an audit of the laboratory which analyzed water samples at bathing beaches at Noanet Pond for the past several years was successfully conducted to ensure the laboratory was fully compliant with the Beaches Project QAPP. No deficiencies were found during this audit. MDPH's Bureau of Communicable Disease Control, Epidemiology Program investigated the possible routes of transmission that caused the outbreak and released their findings on March 9, 2007. Also, MDPH Environmental Toxicology staff are currently working with the Westwood Board of Health and Hale Reservation to alleviate any possible sources of the *Cryptosporidium* at the reservation to prepare for the 2007 beach season as well as working together to reduce the bacterial concentrations at the two beaches.

3. Training

In preparation for the 2006 beach season, MDPH beaches staff conducted numerous outreach efforts to local boards of health to review the beaches regulations and their responsibilities under the regulations, as well as providing them with any technical assistance or forms needed. MDPH staff contacted all boards of health and discussed reporting deficiencies and updated MDPH's internal database based on these conversations. These efforts likely enhanced reporting, as nearly all communities in the state reported beach testing results summarized in this report.

MDPH gave presentations to local health officials at seminars held by the Massachusetts Health Officers Association (MHOA) and MDPH's Division of Community Sanitation at four locations throughout the state in April 2006. MDPH beaches staff presented an overview and update of the current regulations, definitions, and posting procedures and handed out informational packets containing the 105 CMR 445.000 regulations, beach sampling field data forms, sanitary survey forms, and posting information forms. MDPH also presented an in-depth review of sanitary surveys and their uses. MDPH staff discussed criteria for conducting a sanitary survey, components of the MDPH downloadable sanitary survey form, and potential sources of pollution entering waterways. Time was also allocated for health agents to provide feedback and pose any questions they had regarding forms and procedures.

4. Laboratory Programs

In 2006, MDPH again provided funding support to local marine communities for routine monitoring as required under Massachusetts regulations 105 CMR 445.000, Minimum Standards for Bathing Beaches, State Sanitary Code Chapter VII. Enlisting the services of contract laboratories provided this funding. MDPH Requests for Responses (RFR) were posted in 2002 on the Commonwealth Procurement Access and Solicitation System (Comm-PASS) professional services open solicitation section. The evaluation criteria were grouped into sample collection, management, and value. The contract awards were based on the outcome of this process. The contracts are renewable on a yearly basis for a maximum of three additional years. MDPH received responses and proposals from seven laboratories and awarded four contracts. These contracts were originally awarded in 2004 and were renewed with each of the laboratories for the 2006 beach season. The laboratories selected were 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., and Wampanoag Environmental Laboratory. These laboratories analyzed 5,628 marine beach samples from 50 marine beach communities during the 2006 bathing beach season.

5. Press Event

On June 30, 2006, MDPH and USEPA sponsored a press event at Carson Beach in Boston, Massachusetts. At this event, the USEPA spoke about its Clean New England Beaches initiative and announced the award of an additional grant, under the authority of the Federal BEACH Act, to the MDPH to continue its bathing beach project. MDPH spoke about its accomplishments, including announcing the release of its annual beach monitoring data report. Speakers included Ken Moraff, the USEPA Deputy Director of the Office for Ecosystem Protection, Suzanne Condon, MDPH Associate Commissioner and Director of the Center for Environmental Health, and other state and local officials. The event generated widespread public interest and press coverage.

6. Sanitary Surveys

In July 2006, MDPH announced to local health officials in all eligible marine communities the availability of technical assistance to help communities implement bathing beach sanitary surveys as part of MDPH's *Public Health-Based Beach Evaluation, Classification, and Tiered Monitoring Plan*. The goal of the Tiered Monitoring Plan is to ultimately direct water quality monitoring resources to beaches identified as those in greatest need of remediation of pollution problems. Those beaches that are more pristine based on sampling results and sanitary surveys can be monitored less often than the initially required weekly routine monitoring pursuant to both the Massachusetts and federal beach acts. This is accomplished in Massachusetts through the variance process.

The Plan includes an explanation of the three-tiered classification plan for marine beaches (see www.mass.gov/dph for document). In this system every beach is classified as "Tier One", "Tier Two", or "Tier Three".

- Tier One – Heavily used beaches which have pollution problems. These beaches must be tested at least twice per week.
- Tier Two – Beaches with some pollution. These beaches must be tested once per week (the standard frequency).
- Tier Three – Beaches with no known pollution problems. These beaches are eligible for waivers upon completion of a sanitary survey and can then be tested less frequently (e.g., every two weeks to once per month).

Following the 2006 beach season, MDPH used funds from the USEPA grant to hire a contractor to assist with conducting sanitary surveys in 27 marine communities at public beaches that were eligible for Tier 3 status. Eligible beaches had not had any exceedances in the past two or more beach seasons, and had no known pollution problems. The sanitary surveys were reviewed by local officials, who in most cases granted a sampling variance.

At the end of 2006, MDPH also offered to conduct a second round of sanitary surveys in communities that had additional Tier 3-eligible beaches, with those surveys scheduled to be completed in 2007 by MDPH beaches staff. Currently 54 beaches have gained tier 3 status through this process.

7. Quality Assurance

MDPH submitted a revised Quality Assurance Project Plan (QAPP) to USEPA for review in April 2006. The revisions were made due to many changes occurring in the Beaches Project since the original QAPP was approved in 2003 (e.g., new approved methods, personnel changes, website completion). USEPA reviewed the QAPP and returned it to MDPH with comments, which were addressed by MDPH prior to resubmittal to USEPA.

8. Beaches Inventory

In the summer of 2006, an MDPH intern began compiling a comprehensive inventory of public freshwater beaches Bristol, Essex, Middlesex, Norfolk, Plymouth, and Worcester counties. During this process several freshwater beaches were added into MDPH's

inventory. The method of inventorying the beaches consisted of visiting the site, obtaining GPS coordinates, and photographing the beach area. Eventually a GIS datalayer will be created from all the GPS points that will be similar to the public marine beach datalayer that MDPH has already created. An inventory of semi-public marine beaches was also initiated on the Cape and Islands using the same methods. MDPH plans to coordinate efforts in other counties during the 2007 beach season.

9. EPA National Beaches Conference

The USEPA National Beaches Conference, a 3-day conference sponsored by USEPA in collaboration with the Great Lakes Beach Association, took place in Niagara Falls, NY, from October 11-13, 2006. The conference served as a forum for the discussion of beach water quality issues, exchange of information, and coordination of efforts in research and decision-making. Attendees included beach water quality managers, public health and environmental groups, researchers, and the general public. MDPH's Bathing Beach Coordinator gave a presentation entitled "Sanitary Surveys at Three Beaches in Massachusetts" and also displayed a poster entitled "MDPH Beaches Website – An Interactive Exhibit" at the poster session.

III. METHODS

A. SAMPLE COLLECTION

State agencies that operate bathing beaches and local boards of health from the communities in Massachusetts that have public and semi-public bathing beaches are required to submit to MDPH beach field data and laboratory results for bathing beaches under their jurisdiction. The data collected by each community are recorded on a beach sampling field data collection form (Appendix E) developed by MDPH. For communities having public, marine beaches and using MDPH-contracted laboratories, these data were submitted electronically to MDPH via a secure Internet connection. Data were then displayed on the beaches website in near real-time for public notification of beach closures and test results. Several marine beach communities opted to use non-MDPH contracted laboratories in 2006. These communities were Ipswich, Kingston, Manchester-by-the-Sea, Mattapoisett, New Bedford, and Rockport. The Boards of Health or Health Departments of Ipswich, Kingston, Manchester-by-the-Sea, and Rockport either faxed the data to MDPH beach inspectors, who entered the data, or entered the data themselves directly onto the beaches website for prompt public notification. MDPH staff provided training to local health officials on how to use the website for data reporting.

Sample collection was 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. The information collected included:

- Name of beach
- Community where beach is located
- Number of postings at each beach
- Beach designation (public, semi-public, or private)
- Sample identification number
- Date of sample collection
- 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 from end of most recent rainfall to sample collection day
- Amount of most recent rainfall
- Sampling agency (e.g., local board of health, DCR, outside laboratory, other)
- Known pollution sources (e.g., boats, wildlife, septic systems, outflow pipes, streams)
- Beach type (marine or freshwater)
- Bather density (i.e., number of people in the water)
- Water temperature
- Water clarity
- Observations (e.g., trash, sludge deposits, oils, algae, fish die-off, jellyfish, birds)
- Indicator (Enterococci for marine, Enterococci or *E. coli* for freshwater; note, two communities with freshwater beaches still used the fecal coliform and total coliform indicator, which is not in compliance with the 105 CMR 445.031)
- Indicator level in colony forming units (CFU) of bacteria per 100 mL of water
- Exceedance (i.e., indicator levels greater than 104 CFU / 100 mL for Enterococci in marine waters, 61 CFU / 100 mL for Enterococci in fresh waters, or 235 CFU / 100 ml for *E. coli* in fresh waters)
- Comments

B. LABORATORY ANALYSIS

Laboratory analysis of samples was 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. Laboratories that were contracted by MDPH to perform public, marine beach sample analysis were further required to utilize the Modified Enterococci Method (Method 1600) as described in the USEPA's March 2000 document (EPA/821/R-97/004), "Improved Enumeration Methods for the Recreational Water Quality Indicators: Enterococci and *Escherichia coli*". These laboratories were required to report exceedances of bacterial water quality standards to MDPH and local boards of health as soon as analyses were completed and results available.

C. DATA REPORTING

MDPH-contracted laboratories electronically entered information from the field sampling forms and analytical results for marine beaches as soon as results were available for the majority of marine communities in Massachusetts. The electronic data were posted on

the MDPH public notification website in order to provide public notification of marine bathing beach water quality and beach closings in near real-time. Some local BOHs that did not utilize MDPH contract laboratories faxed their sampling results to MDPH staff who entered the data onto the beaches website or had other laboratories input the data for them. Local health officials faxed bacterial exceedances and corresponding beach postings, as well as pre-emptive beach postings to MDPH within 24 hours of occurrence. In accordance with 105 CMR 445.000, freshwater sampling forms and analytical results were faxed or e-mailed to MDPH by local health officials. This information was due by October 31st. MDPH staff entered all of these data into a database for inclusion in this annual report, as well as in support of USEPA reporting requirements under the 2006 BEACH Grant. The USEPA BEACH Grant mandates that MDPH must electronically report all routine monitoring sampling data and laboratory results, as well as beach postings, on an annual basis.

D. DATA VALIDATION

All data were validated and checked for completeness by MDPH personnel using faxed copies of field and laboratory reports sent by local boards of health. Local boards of health and laboratories were contacted directly, as necessary, to resolve questions and discrepancies in the reports.

E. PUBLIC NOTIFICATION

Under Massachusetts law (MGL C 111, § 5S), the local board of health is required to post signs at the entrance(s) to a beach within 24 hours of being notified that the beach did not meet water quality standards. In addition, the local board of health is required to notify MDPH that the beach has been posted and that standard signs have been put up at key access points to the beach within 24 hours. In 2003, using funding provided as part of the USEPA BEACH Grant, MDPH established a website for displaying sampling results and beach postings for all public, marine beaches in the state. Starting in 2004, MDPH-contracted laboratories have entered data from the field sampling forms and analytical results for marine beaches electronically as soon as results were available. In addition, notification that a public marine beach had been posted (i.e., signs put up) is entered electronically via the beaches website if there has been an exceedance of Enterococci. The analytical results and beach posting information were displayed on the

public website in near real-time. Verification of the posting was sent on a standard posting form by fax to MDPH by local health officials within 24 hours of occurrence.

F. LIMITATIONS

The ability of MDPH 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 that, although strongly supported in the recent literature, has some uncertainties; and analytical techniques that require 24 hours for results, thereby potentially leaving beach users at risk. The electronic reporting system and public beaches website has vastly improved the accuracy and quality of marine data submitted. In 2006, Massachusetts has once again achieved 100% compliance in the use of the state and federally mandated Enterococci indicator organism testing among 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.

For the 2006 beach season, MDPH was successful in collecting data from 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, each community utilizes 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 within 24 hours, freshwater beach data are normally reported once during the year, after the end of the beach season. As a result, MDPH personnel can only review the data for proper sample collecting and testing techniques. MDPH 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 assayed. The use of indicators implies that water meeting the

criteria may harbor disease-causing microorganisms and also that water considered unsafe may not carry any disease-causing microorganisms (e.g., Polo et al., 1998; Moore et al., 2001; Prieto et al., 2001; Schindler, 2001). This is an inherent limitation of using indicators as a test of water quality, in Massachusetts and elsewhere. However, it does need to be emphasized that a substantial body of scientific research generally supports the use of these indicators as described earlier in this document (Cabelli, 1983; USEPA, 1986).

The criteria developed for each indicator are set at a specific level of risk of an adverse health effect, in this case gastrointestinal (GI) illness, not at a no-risk level. The indicator limits recommended by USEPA for Enterococci in marine waters are associated with a risk level of 19 GI illnesses / 1000 swimmers (EPA, 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 source of contamination back to its origins, as it may dissipate before an investigation begins (Evaluation of New Methods, SCCWRP).

Development of a reliable rapid testing method continues. This new method would expedite obtaining results in the laboratory, in turn expediting the transmission of results to beach managers. Ideally, beach managers would be able to sample in the morning and receive results that same day, minimizing both exposures and unwarranted closures. A modified method of polymerase chain reaction (PCR), quantitative PCR (QPCR), detects in real time specific DNA sequences that originate from a particular organism, like fecal indicator bacteria such as Enterococcus (Haugland, 2005). QPCR can measure indicator bacteria levels in recreational water samples and give results in 2 hours or less (Wade et al., 2006). In freshwater studies, a significant correlation was shown between water quality as measured by QPCR and swimming-related gastroenteritis (Wade et al., 2005). Because the rapid indicator method has been shown to accurately predict health effects in much less time, its use may reduce instances of

illness and erroneous beach closings (Wade et al., 2006). More studies will need to be completed before QPCR can be considered to replace the current indicator methods.

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.

IV. RESULTS

During the 2006 bathing season, all marine and nearly all freshwater (183 out of 191) communities in Massachusetts with public and semi-public beaches sent water quality data to MDPH (Table 1). In total, MDPH received water quality data collected from 602 marine and 591 freshwater sampling locations in 221 Massachusetts communities. Due to the length of some beaches in Massachusetts, multiple sampling locations are necessary to distinguish specific areas of water quality. Based upon 1,062 (525 marine and 537 freshwater) public and semi-public beaches there are a total of 1,193 marine and freshwater beach sample locations. For the purposes of this report, a sample location is considered a single beach. In total, MDPH received 15,808 water samples from marine and freshwater beaches collected during the 2006 beach season. These data represent approximately 98 percent of the 221 Massachusetts communities that have marine and/or freshwater beaches. There are 33 communities that have only marine bathing beaches, 164 communities that have only freshwater beaches, and 27 that have both marine and freshwater bathing beaches within their limits. The remaining 127 communities have no public or semi-public bathing beaches (Table 2 and Figure 1). Private marine or private freshwater bathing beaches are not covered by the regulations and thus are not included in the scope of this report.

Summaries and analyses of the marine and freshwater bathing beach data are presented in Tables 1 – 26 and Figures 1 – 22. The data are divided by type of beach (marine vs. freshwater) to allow easy comparison to earlier reports that analyzed marine bathing beaches only (e.g., MDPH, 1997) and to accommodate the different testing criteria for the two types of beaches (see Background section). The data were analyzed according to type of beach, presence or absence of data, bather density, pollution source, bacterial indicator, frequency of testing, organization that performed testing, exceedances based on current Massachusetts criteria, and beach postings. Data are grouped according to either community, beach, or individual water sample in order to facilitate understanding and interpreting the results. For example, bather density at a given beach changes during the day and season, so it makes sense to express these data in terms of bather density at the time an individual water sample was taken. Alternatively, testing frequency only makes sense in terms of a given beach. The data are presented in tabular (Tables 1- 26), pie graph and chart (Figures 4 – 12, 15 - 18, 20, and 22), and map (Figures 13-14, 19, and 21) forms.

A. MARINE BEACHES

During the 2006 bathing season, all of the 60 Massachusetts coastal communities with known public or semi-public marine bathing beaches submitted beach monitoring data to MDPH (Tables 3 and 4, Figure 5). Ten Massachusetts coastal communities do not have public or semi-public marine bathing beaches: Chelsea, Everett, Fall River, Freetown, Berkeley, Dighton, Gosnold, Peabody, Rowley and Saugus (Table 3). The 60 communities which have known public and semi-public marine bathing beaches accounted for 602 sampling locations at 525 public or semi-public marine bathing beaches.

A total of 8,370 water samples were collected from public and semi-public beaches and reported to MDPH during the 2006 bathing beach season (Table 4). Bather density data were collected as part of routine sampling during 2006. 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 in 2003 and subsequent observations by MDPH 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. Given the time needed to collect and analyze samples, a majority of the samples were collected at times where bather density consisted of 10 individuals or less (Table 5 and Figure 6). Most samples are collected before noon when the batherload is generally low, even in high-use areas.

As part of routine sampling, environmental observations are recorded on a field data form and reported to MDPH. In 2006, ten percent (n=802) of the forms accompanying marine samples recorded a potential transient pollution source (Table 6). These are potential sources of contamination, such as birds, dogs, algae, trash, sludge deposits, waste solids, and oils. These sources are not always present at the beach and thus are recorded at the time of sampling. The potential sources most commonly noted were the presence of birds (36%, n=341), trash (19%, n=177), and dogs (19%, n=176) (Table 7). The remaining 90% (n=7,568) of samples collected had no indication of potential sources. It should be noted that the field data form does not specifically ask the observer to note "no environmental sources present." Hence, it is not known whether these samples actually had no environmental sources present or whether the observer did not

record the presence of environmental sources. Field data forms are being updated for the 2007 beach season to enhance this information.

With the passage of the Massachusetts Beaches Act in 2000, the state adopted the USEPA recommended Enterococci as the standard indicator for water quality monitoring at marine beaches. Since the institution of the MDPH contract laboratories and website, Boards of Health in Massachusetts marine communities have all adopted the use of Enterococci as an indicator organism (Table 8). Enterococci were the indicator used for all 8,370 water samples taken at marine beaches in 2006 (Figure 7). The use of MDPH contracted laboratories for analyzing public marine beach water samples has likely played a major role in achieving uniform compliance with the MDPH regulation for marine beaches.

More than 99% of the marine beaches were tested daily or weekly (in most cases, the minimum requirement is weekly sampling) (Table 9 and Figure 8). Most of the five marine beaches that were not tested with the required frequency were either in close proximity to beaches that were tested weekly or were beaches with Tier 3 status that allowed for reduced sampling. Communities that did not test all their beaches with the required frequency have been contacted and reminded of the regulatory requirements related to frequency of testing. MDPH contract laboratories performed the majority of analyses at marine beaches during 2006, accounting for 67% of the samples reported (Table 10). Local health departments, the National Park Service, and DCR performed the remainder of the marine beach water analyses.

The total number of marine beach postings (i.e., verification to MDPH that a sign was posted at the beach) increased from 313 in 2005 to 411 in 2006 (Table 11). The number of postings in 2006 (411) totaled more than the total number of single sample exceedances (405) due to physical or environmental conditions (e.g., heavy rainfall) that closed the beach, rather than high bacterial counts. These data are discussed further in the Discussion section. For the most part, the percentage of exceedances versus total number of samples collected remained consistent from 2005 (4.6%) to 2006 (4.8%) (Table 12).

Total rainfall amounts at many Massachusetts beaches during the 2006 season were higher compared to 2005 (Tables 13 and 14). Month to month averages were consistent

between the southeast region and Boston area, although Cape Cod experienced a slightly drier summer than Greater Boston. In June, a considerable amount of rain fell in the Boston (10.09 inches) and Cape Cod (9.49 inches) areas. In 2005, June was the driest month in both Boston (1.46 inches) and Cape Cod (1.61 inches). The months of July and August had similar amounts of rainfall in Boston and Cape Cod during 2006 when compared to the 2005 season.

Of the 602 public or semi-public marine beach locations, 191 (32%) incurred at least one bacterial exceedance (Table 15). In 2003, the MDPH GPS survey of marine beaches identified beach sampling locations that were near permanent sources of pollution, such as outfall pipes, that may pose a risk to human health on a more regular basis. Of the 405 marine beach samples that exceeded regulatory limits, 155 occurred at locations identified as near these pollution sources (Table 16). In 2006, sample sites having identified pollution sources nearby incurred bacterial exceedances in 7.9% of samples taken, whereas sampling locations with no known pollution sources nearby incurred exceedances in 3.9% of samples taken.

B. FRESHWATER BEACHES

During the 2006 bathing season, 183 of the 191 Massachusetts communities with known public and semi-public freshwater bathing beaches submitted beach monitoring data to MDPH (Tables 4, 17, 18 and Figure 9). Of the eight communities that did not report data for 2006, seven (Dartmouth, Dudley, Hopedale, New Bedford, New Marlborough, Norton, and Weymouth) did not open the freshwater beaches in their communities. North Adams is the only community that did not submit data for open freshwater beaches. The 183 communities contain 591 public or semi-public freshwater bathing beaches and collected a total of 7,438 freshwater samples that were reported to MDPH during the 2006 bathing beach season (Table 4).

In terms of bather density (Table 5 and Figure 10), the data look similar to that of marine beaches, with a high percentage (77%) indicating low bather density (0-10 bathers on the beach) during sampling. Approximately 51% of samples taken at freshwater beaches were obtained during non-peak bathing hours, either before 10:00 am or after 4:00 pm (Table 19). Samples at beaches are often taken in the morning to allow adequate time for delivery to and analysis at the laboratory.

In 2006, local boards of health used *E. coli* as an indicator organism for the majority of freshwater beaches (86%) in Massachusetts (Table 20). At the remaining beaches, 12% (73 beaches) used Enterococci, 1% (6 beaches) used both Enterococci and *E. coli*, and 1 % used Enterococci, *E. coli*, total and fecal coliform. Less than 1 % used *E. coli* and total coliform (2 beaches) or fecal coliform (1 beach) as their indicator organism (Figure 11).

The majority of public and semi-public freshwater beaches in Massachusetts were tested with the minimum required weekly frequency in 2006, with more than 95% of the freshwater beaches tested at least weekly (Table 9 and Figure 12). As noted, communities that did not test all their beaches with the required frequency have been contacted to review regulatory requirements. Local health departments were responsible for a majority of samples analyzed from freshwater beaches, accounting for 51% of samples reported to MDPH (Table 10). Independent laboratories and DCR performed the remainder of analyses at freshwater beaches.

The number of exceedances of the freshwater water quality standards (235 cfu/100ml *E. coli* and 61 cfu/100ml Enterococci) slightly decreased from 286 in 2005 to 279 in 2006 (Table 11). This decrease is noteworthy, as there was an increase in the number of samples collected and number of beaches tested was consistent from the previous beach season. MDPH reviewed the environmental observations recorded during sample collection. Twelve percent of the samples collected in 2006 recorded a transient pollution source (Table 6). The observations most commonly noted at freshwater beaches (Table 7) were the presence of birds (43%), algae (20%), and trash (14%). This compares to 8% of 2005 samples that indicated the presence of environmental sources. As with marine samples, it is not known whether samples with no environmental observations actually had no sources or whether the observer did not record sources.

V. DISCUSSION

A. ANALYSIS OF RESULTS

Since the passage of the Massachusetts Beaches Act in 2000, the state has adopted the USEPA recommended Enterococci as the standard indicator for water quality monitoring at marine beaches and Enterococci were the indicator used for all 8,370 water samples taken at marine beaches in 2006 (Table 8). The use of MDPH contracted laboratories for processing public marine beach water samples likely helped to facilitate uniform compliance with the MDPH regulation.

In 2006, MDPH continued to see improvements in the number of communities complying with bathing beach water quality reporting requirements. All marine communities and 99% of freshwater communities reported bathing beach water data to MDPH (Figures 10 and 11), up from 98% of marine communities and 83% of freshwater communities reporting in 2001. A significant improvement, particularly for marine beaches, is the public notification figures and increased compliance in reporting to MDPH of any posting within 24 hours for 2006. In 2001, MDPH received postings for approximately 35% of all exceedances at marine bathing beaches and approximately 40% of all exceedances at freshwater beaches. MDPH received more postings than exceedances at marine beaches in 2006 mainly due to the increased use of precautionary postings that do not rely on the presence of bacterial sampling results. Also, a posting may not always occur when there is an exceedance if a second sample is taken within 24 hours of the original exceedance and the results do not exceed the standard. The current rate of postings received versus exceedances has improved greatly over the past few years. At freshwater beaches posting notifications were received for 61% of exceedances in 2006, which highlights greater compliance in this area. Postings do not necessarily always correlate with exceedances for various reasons, such as if a beach was posted but the local Board of Health did not notify MDPH, or if a beach was already posted. Therefore, although posting notifications were received for 61% of exceedances, that does not necessarily mean that beaches with exceedances remained open 39% of the time.

Completeness of the field data form has also increased over the years. While there are still areas for improvement, such as actively reporting both the presence and absence of environmental sources, Massachusetts local health officials have for the most part

adhered to MDPH's field forms. This can be seen in the wide range of potential sources of pollution now received by MDPH. 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 2006 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 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.

During the 2006 beach season, the rate of marine beach exceedances remained fairly consistent with earlier years. Between 2001 and 2005, 4.6% of the samples collected exceeded the *Enterococcus* standard, which is consistent with the 4.8% of samples that exceeded the standard in 2006 (Table 11 and Figure 15). All marine communities that had at least one exceedance in 2006 appear in Figure 16. The quality of reporting has also improved due to the electronic reporting requirement associated with MDPH contract laboratories. MDPH is receiving nearly all eligible postings for beaches with an exceedance (Table 12). It is important to note, however, that an exceedance may not result in a new posting if the beach was already posted due to a previous exceedance or due to a precautionary posting. A complete listing of all marine beaches sampled during the 2006 beach season, their exceedances and postings can be found in Table 21.

Overall 3.8% of freshwater beaches had an exceedance during 2006 (Table 11 and Figure 17). This is slightly lower than the percent of exceedances in 2005 (4%) and significantly less than the average percentage of exceedances between 2001 and 2005 (4.9%). All freshwater communities that experienced at least one exceedance in 2006 can be seen in Figure 18. A higher percentage of postings was reported to MDPH during 2006 (61%) versus 2005 (44%) for freshwater beaches. Again, an exceedance may not result in a posting if the beach is already posted due to a previous exceedance and/or precautionary postings. A complete listing of all freshwater beaches sampled during the 2006 beach season, their exceedances and postings can be seen in Table 22. The reason for the increased percentage of postings may be due to better reporting from freshwater communities. Still, it is unclear whether the fact that only slightly more than 60% of exceedances resulted in postings was due to beaches already being posted, lack of reporting to MDPH of postings, or failure to post when an exceedance occurred. While

compliance is improving, 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 staff to obtain posting information by directly contacting communities both during and after the beach season to explain the regulations and to provide standardized reporting forms, as well as making both the forms and regulations available for download from the MDPH website.

Observations made by samplers at marine beaches may help to explain some contributing factors to elevated indicator levels (Table 23). Of the 802 samples collected from marine beaches that had a potential transient pollution source noted, 9.4% exceeded the Enterococci regulatory limit. The remaining marine beach samples that did not indicate an environmental source exceeded the regulatory limit 4.4% of the time. This may mean that the potential sources of pollution observed (e.g., algae, birds, trash) are in fact contributors to elevated bacteria levels. Environmental observations made at freshwater beaches did not seem to contribute to the percentage of exceedances (4.9% for those with a recorded pollution source versus 3.6% for those with no recorded source). However, it should be noted that overall only 10% of marine samples and 11% of freshwater samples collected were accompanied by a field data form that recorded a potential transient pollution source. Again, it should be noted that the field data form does not differentiate between no sources actually present versus the observer failing to record whether a source was present.

Table 24 and Figure 22 illustrate how the total number of exceedances statewide is significantly higher within 24 hours of a rain event. Nearly 88% of marine beach exceedances and 58% of freshwater exceedances occurred within 24 hours of a rain event. This figure shows the exponential drop-off in the number of exceedances as the time from rainfall increases.

In 2006, the amount of rainfall was uniform between the regions in Massachusetts. In June, rainfall was significantly above normal across the state. The amount of rain moderated in July and August to near normal levels. Compared to 2005, each summer month in 2006 received more rainfall. For additional detail on rainfall amounts, see Tables 13 and 14, which show rainfall totals and deviation from the norm for the months of June, July and August, from 2001 through 2006. 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). 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.

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, sun, and moon 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 to be twice as likely out of compliance with water quality standards during spring tides. This study concluded bacteria levels may be higher during spring-ebb tides (receding tides) compared to all other tidal conditions and that Enterococci densities were found at beaches during tidal events with no obvious point source. The study suggested that tidally forced sources of Enterococci may be occurring at beaches (Gorss 2005). Potential sources for these Enterococci could include beach sands and sediments, decaying plant material, and polluted groundwater. All of these sources are known to harbor fecal indicator bacteria and have the potential to become 'activated' with the mass and momentum of a spring tide (i.e., disturbing bacteria that would have otherwise lain dormant).

The bather load at a particular beach has the ability to affect water quality because humans are also sources of fecal pollution. The greater the bather density at a beach, the greater the likelihood that human sources are contributing to higher Enterococci levels. However, as in previous years, more than three quarters of the marine beach samples (76%) and freshwater beach samples (77%) 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. More than 49% of samples taken at marine beaches were obtained either before 10:00 AM or after 4:00 PM (Table 19). Approximately 15% of the samples were collected between 12:00 PM and 4:00 PM. 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.

For the most part beaches that had a high number of exceedances in 2005 had fewer exceedances in 2006. Tables 25 and 26 compare the beach water monitoring data at marine and freshwater beaches that had the highest percentage of exceedances during the 2005 season and the corresponding data in 2006. Table 25 shows that most of these marine beaches had a similar or lower percentage of exceedances in 2006. In Chatham, the Board of Health decided to preemptively close Cockle Cove Creek beach because of consistently elevated indicator levels and the sampling history of the beach. Table 26 displays the 2005 and 2006 data for freshwater beaches. Similar to the marine beach results, most of the freshwater beaches had a similar or smaller percentage of exceedances. DCR decided to preemptively close Westfield River Beach in Huntington and the Lynn Board of Health decided to preemptively close Flax and Sluice Ponds due to consistently elevated indicator levels based on the sampling history of the beaches.

B. FUTURE PLANS

Complete Flagship Beach Project

In 2007, MDPH will release the final sanitary survey reports for Willow's Pier Beach in Salem, Wollaston Beach in Quincy, and Ryder Street Beach in Provincetown. The Flagship Beach Reports detail specific activities undertaken at these beaches, including targeted monitoring for indicator bacteria and determining likely sources of bacteria from non-point and stormwater pollution sources and discharges of untreated sewage. These reports will be distributed to the municipalities in an effort to assist with the identification of potential pollution sources and to recommend improvements that can reduce the number of closures at these highly visible and popular beaches.

Direct Web-Based Reporting

In 2007, MDPH contracted laboratories, local boards of health and others will continue to perform data entry to the electronic, web-based public notification website. A history of postings will also be maintained on the website to facilitate analysis of the data for future

annual reports. This will allow for trends to be analyzed in future annual reports. MDPH will be working with contract laboratories and other reporters on ensuring field data are accurately recorded via the web-based reporting system. A focus will be on recent rainfall data and the presence of transient pollution sources.

Training and Community Outreach

MDPH plans to continue its support of communities' bathing water monitoring efforts by continuing to offer training sessions on current regulations, sampling techniques and the use of standardized reporting forms. MDPH will also continue to provide technical assistance to freshwater communities. MDPH will also provide assistance in the use of the field forms that are required to be completed each time a sample is taken. MDPH will provide guidance to local health officials on the use of the MPDH posting form.

MDPH has developed educational materials to address the effects of pet waste on water quality. These materials are focused on the general public and provide guidance on proper ways to dispose of pet waste as well as the impact improper disposal has on water quality and human health. These materials will be distributed to local health officials and posted on the MDPH website.

Tiered Monitoring

MDPH will continue to facilitate sanitary surveys in support of the Tiered Monitoring Plan during 2007. 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 in working with local health departments in 2007 to conduct sanitary

surveys that will support the Tiered Monitoring Plan. Data from the 2006 and 2007 beach seasons will be incorporated into the existing tiered monitoring plan to update the published classifications. These efforts will allow MDPH and marine communities to focus on determining and alleviating pollution sources at problematic beaches, and also allowing MDPH to reduce unnecessary sampling at low priority beaches through the variance process. MDPH will be conducting many sanitary surveys at public marine beaches in support of these efforts.

VI. SUMMARY

This report summarizes beach monitoring and testing data from Massachusetts public and semi-public marine and freshwater bathing beaches in the 2006 season. In total, 213 of the 221 communities with bathing beaches reported 15,808 water samples collected at 1,193 beaches. In 2006, the state of beaches in Massachusetts continued to show improvements in terms of the number of beaches reporting data and the number of samples taken. The beach testing results from the 2006 season show results consistent with prior years' results at both marine and freshwater beaches, with the percentage of exceedances remaining consistent with the 2005 beach season's averages. The rate of exceedances at marine beaches was consistent with historical averages while the rate of exceedances at freshwater beaches was lower. Massachusetts marine communities are nearly in full compliance with the regulations with the exception of some semi-public beaches missing several sampling rounds and posting notifications. This illustrates in part the success of the electronic reporting requirement through the MDPH 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 regulatory indicator. MDPH also achieved nearly full compliance with the posting regulation in marine communities and improved the number of postings received from both marine and freshwater communities. Freshwater bathing beach monitoring data showed greater consistency in 2006. Ninety-nine percent of the beaches tested used the correct regulatory indicators for freshwater, and the percentage of postings versus exceedances received by MDPH was significantly higher in 2006 versus 2005.

MDPH continues to provide training and information to local communities in an effort to improve compliance with the regulations. MDPH also continues to make improvements

in its public notification website to make sure this information is accessible to the public as soon as it becomes available. In addition, MDPH is continuing to focus efforts on the most vulnerable beaches through its Tiered Monitoring Plan and sanitary surveys.

VII. ACKNOWLEDGMENTS

This study would not have been possible without the efforts and cooperation of and collaboration with the local health departments in the Massachusetts (including Barnstable County). MDPH also received much assistance from many local and regional organizations, including DCR, who have maintained cooperative assistance in ensuring bathing beaches are tested and their data is forwarded to MDPH in a timely fashion. Finally, we are grateful to the USEPA for providing financial support. USEPA BEACH Grant funds have helped support efforts in areas related to public marine beach data reporting and notification, including the public notification website, laboratory analysis of routine monitoring samples, the Flagship Beach project, training and enforcement activities.

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IX. TABLES

Table 1

All Massachusetts communities grouped according to the presence or absence of data for marine or freshwater public and semi-public bathing beaches in 2006.

Type of community	#	%
Marine or freshwater beach, with data	219	62.4%
Marine or freshwater beach, without data	5	1.4%
No beaches	127	36.2%
Total	351	100%

Table 2

All Massachusetts communities grouped by the presence and/or absence of marine and freshwater public and semi-public bathing beaches in 2006.

Type of community	Number (#)	Percentage (%)
Marine beach only	33	9.4%
Freshwater beach only	164	46.7%
Marine and freshwater beaches	27	7.7%
No beaches	127	36.2%
Total	351	100%

Table 3

Water quality testing at marine public and semi-public bathing beaches in Massachusetts, grouped by community, for the years 2006, 2005, 2004, 2003, 2002, 2001, 1996, and 1995.

Coastal communities																
Type of community	2006		2005		2004		2003 ^a		2002		2001 ^a		1996		1995	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Coastal communities with marine bathing beaches	60	86%	60	86%	60	86%	60	86%	59	84%	59	84%	60	86%	60	86%
Coastal communities with marine bathing beaches for which data were obtained	60	100%	60	100%	60	100%	60	100%	59	100%	58	98%	53	88%	52	87%
Coastal communities with marine bathing beaches for which no data were obtained	0	0%	0	0%	0	0%	0	0%	0	0%	1	2%	7	12%	8	13%
Coastal communities without marine bathing beaches	10	14%	10	14%	10	14%	10	14%	11	16%	11	16%	10	14%	10	14%
Total number of coastal communities	70	100%	70	100%	70	100%	70	100%	70	100%	70	100%	70	100%	70	100%

a - The number of communities with marine beaches was adjusted as the inventory became more complete over time.

Table 4

Water quality testing at marine and freshwater public and semi-public bathing beaches in Massachusetts in 2006, grouped by community, beach, and sample.

Type of community	# communities (total)	# communities with data	# beaches¹ tested	# samples
Communities with marine bathing beaches	60	60	602	8,370
Communities with freshwater bathing beaches	191	183	591	7,438
		Total	1,193	15,808

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

Table 5

Bather density at marine and freshwater public and semi-public bathing beaches in Massachusetts in 2006, at times when samples were taken.

Marine beaches		
Bather Density (# people)	# Samples	%
0-10	6,320	75.5%
10-20	378	4.5%
20-50	222	2.7%
>50	191	2.3%
Not indicated	1,259	15.0%
Total	8,370	100.0%
Freshwater beaches		
Bather Density (# people)	# Samples	%
0-10	5,752	77.3%
10-20	265	3.6%
20-50	167	2.2%
>50	68	0.9%
Not indicated	1,186	15.9%
Total	7,438	100.0%

Table 6

Reported existence of open or obvious sources of pollution that might affect the water quality at public and semi-public bathing beaches in Massachusetts in 2006, reported during routine sampling.

Marine Beaches		
Pollution source ¹	# Samples ²	%
Yes	802	10%
No	0	0%
Not indicated	7,568	90%
Total	8,370	100%
Freshwater Beaches		
Yes	849	11%
No	0	0%
Not indicated	6,589	89%
Total	7,438	100%

¹. Pollution sources noted on field sampling forms during routine monitoring

². Some samples may have more than one pollution source listed

Table 7

Reported source of pollution for public and semi-public bathing beaches in Massachusetts in 2006 for which a pollution source was specified.

Marine Beaches		
Sources	# Beaches ¹	%
Trash	177	18.9%
Waste Solids	14	1.5%
Sludge Deposits	1	0.1%
Oils	82	8.8%
Algae	91	9.7%
Fish die-offs	19	2.0%
Jellyfish	35	3.7%
Birds	341	36.4%
Dogs	176	18.8%
Total	936	100.0%
Freshwater Beaches		
Trash	147	13.6%
Waste Solids	59	5.5%
Sludge Deposits	7	0.6%
Oils	22	2.0%
Algae	217	20.1%
Fish die-offs	57	5.3%
Jellyfish	0	0.0%
Birds	467	43.2%
Dogs	105	9.7%
Total	1081	100.0%

¹. Some beaches may list more than one source

Table 8

Water quality bacterial indicators used to test marine public and semi-public bathing beaches in Massachusetts in 2006, grouped by sample.

Marine Beaches		
Indicator¹	# Samples	%
Enterococcus	8,370	100%
<i>E. coli</i>	0	0%
Fecal coliform	0	0%
Total coliform	0	0%
Fecal streptococcus	0	0%
Not indicated	0	0%
Total	8,370	100%
Freshwater Beaches		
Enterococcus	1,140	15.3%
<i>E. coli</i>	6,214	83.5%
Fecal coliform	10	0.1%
Total coliform	74	1.0%
Fecal streptococcus	0	0.0%
Not indicated	0	0.0%
Total	7,438	100.0%

1. Massachusetts state guidelines indicate that Enterococcus be used to test marine beaches and either *E.coli* or Enterococci be used to test freshwater beaches for potential bacterial contamination.

Table 9

Frequency of water quality testing at public and semi-public bathing beaches in Massachusetts in 2006, grouped by beach and frequency.

Marine Beaches		
Test frequency	# Beaches	%
Daily	13	2.2%
Weekly	584	97.0%
Unknown	2	0.3%
Monthly	2	0.3%
Biweekly	1	0.2%
Total	602	100.0%
Freshwater Beaches		
Weekly	560	94.8%
Unknown	1	0.2%
Monthly	1	0.2%
Biweekly	9	1.5%
Twice per week	6	1.0%
Three times	5	0.8%
Two times	6	1.0%
One time	3	0.5%
Total	591	100.0%

Table 10

Groups, agencies, or individuals who collected water samples at public and semi-public bathing beaches in Massachusetts in 2006.

Marine Beaches		
Testing organization	# Samples	%
Local Health Department	1,190	14.2%
Department of Conservation/ Division of Urban Parks and Recreation (DCR-DUPR)	1,282	15.3%
Department of Conservation/Division of State Parks and Recreation (DCR-DSPR)	102	1.2%
Outside lab	5,628	67.2%
Other	168	2.0%
Total	8,370	100.0%
Freshwater Beaches		
Local Health Department	3,790	51.0%
Department of Conservation/ Division of Urban Parks and Recreation (DCR-DUPR)	79	1.1%
Department of Conservation/Division of State Parks and Recreation (DCR-DSPR)	848	11.4%
Outside lab	2,681	36.0%
Other	40	0.5%
Total	7,438	100.0%

Table 11

The number of exceedances and postings at marine and freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Marine beaches	
Exceedances, Total (Enterococcus)	405
Postings, Total ¹	411
Postings, Enterococcus	254
Postings, Geomean	21
Postings, Preemptive Rainfall	132
Postings, Preemptive Pollution	2
Freshwater beaches	
Exceedances, Total	279
Exceedances, Enterococcus	117
Exceedances, E. Coli	162
Postings, Total ¹	169
Postings, Enterococcus	80
Postings, E. Coli	57
Postings, Preemptive	4
Postings, Geomean	18

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

Table 12

The number of samples in which the measured Enterococcus concentration (marine beaches) or Enterococcus or *E. coli* concentration (freshwater beaches) exceeded their respective water quality criteria at public and semi-public bathing beaches in Massachusetts in 2006.

Marine beaches		
Concentration	# Samples	%
Exceedance ¹	405	4.8%
Non-exceedance	7965	95.2%
Total	8,370	100.0%
Freshwater beaches		
Concentration	# Samples	%
Exceedance ¹	279	3.8%
Non-exceedance	7,075	95.1%
Indeterminant ²	84	1.1%
Total	7,438	100.0%

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 30-day period. For freshwater beaches, either Enterococcus or *E. coli* can be used as indicator species. For Enterococcus, a sample is said to be in exceedance if the number of CFU / 100 ml is greater than 61 for a single sample or greater than 33 for the average of at least 5 samples over a 30-day period. For *E. coli*, a sample is said to be in exceedance if the number of CFU / 100 ml is greater than 235 for a single sample or greater than 126 for the average of at least 5 samples over a 30-day period.

2. Indeterminant means that an indicator other than those recommended by current guidelines was used, no indicator was reported, or no level was reported.

Table 13

Beach season (June – August) rainfall data for Boston, 2001-2006*

Year	Boston				
	Rainfall	June	July	August	Total
2001	Total	4.99	2.13	4.14	11.26
	Dev From Norm	1.77	-0.93	0.77	1.61
2002	Total	4.78	1.42	2.13	8.33
	Dev From Norm	1.56	-1.64	-1.24	-1.32
2003	Total	4.69	2.11	2.89	9.69
	Dev From Norm	1.47	-0.95	-0.48	0.04
2004	Total	1.95	3.87	4.38	10.20
	Dev From Norm	-1.27	0.81	1.01	0.55
2005	Total	1.46	3.37	2.88	7.71
	Dev From Norm	-1.76	0.31	-0.49	-1.94
2006	Total	10.09	3.58	3.20	16.87
	Dev From Norm	6.87	0.52	-0.17	7.22

Table 14

Beach season (June – August) rainfall data for Chatham, 2001-2006*

Year	Chatham				
	Rainfall	June	July	August	Total
2001	Total	3.00	3.35	5.36	11.71
	Dev From Norm	-0.44	-0.03	2.03	1.56
2002	Total	2.88	0.48	2.45	5.81
	Dev From Norm	-0.56	-2.90	-0.88	-4.34
2003	Total	5.07	1.78	3.46	10.31
	Dev From Norm	1.63	-1.60	0.13	0.16
2004	Total	1.60	2.48	5.49	9.57
	Dev From Norm	-1.84	-0.90	2.16	-0.58
2005	Total	1.61	3.37	2.99	7.97
	Dev From Norm	-1.83	-0.01	-0.34	-2.18
2006	Total	9.49	2.97	2.61	15.07
	Dev From Norm	6.05	-0.41	-0.72	4.92

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

Table 15

The 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 their respective water quality criteria at public bathing beaches in Massachusetts in 2006.

	# beaches with at least one exceedance	Total # beaches reporting	%
Marine beaches	191	602	31.7%
Freshwater beaches	137	591	23.2%

Table 16

2006 Marine Beach samples, exceedance and proximity to known pollution sources
when a pollution source was specified

Sample Sites	2006 Samples	2006 Exceedances	% Exceedance
Near Pollution Sources	1,960	155	7.9%
No Known Pollution Source	6,410	250	3.9%
Total	8,370	405	4.8%

Table 17

Water quality testing at freshwater public and semi-public bathing beaches in Massachusetts, grouped by community, for the years 2006, 2005, 2004, 2003, 2002, 2001, 1996, and 1995.

All cities/towns																
Type of community	2006 ^a		2005		2004		2003		2002		2001		1996		1995	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Communities with freshwater bathing beaches	191	54.4%	189	53.8%	193	55.0%	197	56.1%	194	55.3%	175	49.9%	N/A	N/A	N/A	N/A
Communities with freshwater bathing beaches for which data were obtained	183	95.8%	183	96.8%	188	97.4%	157	79.7%	158	81.4%	145	82.9%	N/A	N/A	N/A	N/A
Communities with freshwater bathing beaches for which no data were obtained	8	4.2%	6	3.2%	5	2.6%	40	20.3%	36	18.6%	30	17.1%	N/A	N/A	N/A	N/A
Communities without freshwater bathing beaches	156	44.4%	162	46.2%	158	45.0%	154	43.9%	157	44.7%	176	50.1%	N/A	N/A	N/A	N/A
Total number of communities	351	100%	351	100%	351	100%	351	100%	351	100%	351	100%	N/A	N/A	N/A	N/A

a - The number of communities with beaches was adjusted as the inventory became more complete over time.

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Abington				X	X	X
Acton				X	X	
Acushnet						
Adams						
Agawam				X	X	
Alford						
Amesbury				X	X	X
Amherst						
Andover				X	X	
Aquinnah	X	X				
Arlington				X	X	X
Ashburnham				X	X	X
Ashby				X	X	
Ashfield				X	X	
Ashland				X	X	X
Athol				X	X	X
Attleboro						
Auburn				X	X	
Avon						
Ayer				X	X	X
Barnstable	X	X		X	X	
Barre						
Becket				X	X	X
Bedford				X	X	
Belchertown				X	X	
Bellingham				X	X	X
Belmont						
Berkley						

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Berlin						
Bernardston						
Beverly	X	X				
Billerica				X	X	
Blackstone						
Blandford						
Bolton				X	X	X
Boston	X	X				
Bourne	X	X		X	X	
Boxborough						
Boxford				X	X	
Boylston						
Braintree	X	X		X	X	
Brewster	X	X		X	X	
Bridgewater						
Brimfield				X	X	
Brockton						
Brookfield						
Brookline						
Buckland						
Burlington						
Cambridge						
Canton						
Carlisle						
Carver				X	X	X
Charlemont				X	X	
Charlton				X	X	X
Chatham	X	X		X	X	

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Chelmsford				X	X	
Chelsea						
Cheshire						
Chester						
Chesterfield				X	X	
Chicopee				X	X	
Chilmark	X	X	X			
Clarksburg				X	X	
Clinton						
Cohasset	X	X	X			
Colrain						
Concord				X	X	
Conway				X	X	
Cummington				X	X	X
Dalton						
Danvers	X	X	X			
Dartmouth ¹	X	X	X	X		
Dedham						
Deerfield						
Dennis	X	X		X	X	
Dighton						
Douglas				X	X	X
Dover				X	X	
Dracut				X	X	X
Dudley ¹				X		
Dunstable						
Duxbury	X	X	X			

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
East Bridgewater						
East Brookfield				X	X	
East Longmeadow						
Eastham	X	X		X	X	
Easthampton						
Easton				X	X	X
Edgartown	X	X	X			
Egremont				X	X	
Erving				X	X	
Essex	X	X		X	X	X
Everett						
Fairhaven	X	X				
Fall River						
Falmouth	X	X	X	X	X	
Fitchburg						
Florida				X	X	
Foxborough						
Framingham				X	X	
Franklin				X	X	
Freetown				X	X	X
Gardner				X	X	X
Georgetown				X	X	X
Gill						
Gloucester	X	X	X			
Goshen				X	X	X
Gosnold						

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Grafton				X	X	
Granby						
Granville						
Great Barrington				X	X	
Greenfield				X	X	X
Groton				X	X	
Groveland						
Hadley						
Halifax				X	X	
Hamilton						
Hampden						
Hancock						
Hanover						
Hanson				X	X	X
Hardwick						
Harvard				X	X	
Harwich	X	X		X	X	
Hatfield						
Haverhill				X	X	
Hawley						
Heath				X	X	
Hingham	X	X				
Hinsdale				X	X	X
Holbrook						
Holden				X	X	
Holland				X	X	
Holliston				X	X	
Holyoke						

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Hopedale ¹				X		
Hopkinton				X	X	X
Hubbardston				X	X	X
Hudson				X	X	X
Hull	X	X				
Huntington				X	X	
Ipswich	X	X		X	X	
Kingston	X	X		X	X	
Lakeville				X	X	X
Lancaster				X	X	X
Lanesborough				X	X	
Lawrence						
Lee				X	X	X
Leicester						
Lenox				X	X	
Leominster				X	X	X
Leverett						
Lexington				X	X	
Leyden						
Lincoln						
Littleton				X	X	
Longmeadow						
Lowell				X	X	X
Ludlow				X	X	X
Lunenburg				X	X	X
Lynn ¹	X	X		X	X	
Lynnfield						
Malden						

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Manchester-by-the-Sea	X	X				
Mansfield						
Marblehead	X	X				
Marion	X	X	X			
Marlborough				X	X	X
Marshfield	X	X				
Mashpee	X	X		X	X	
Mattapoissett	X	X	X			
Maynard						
Medfield				X	X	X
Medford				X	X	
Medway ¹				X	X	
Melrose						
Mendon				X	X	
Merrimac				X	X	
Methuen				X	X	
Middleborough				X	X	X
Middlefield						
Middleton				X	X	
Milford						
Millbury						
Millis						
Millville						
Milton				X	X	
Monroe						
Monson						
Montague						

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Monterey				X	X	
Montgomery						
Mount Washington				X	X	
Nahant	X	X				
Nantucket	X	X		X	X	
Natick				X	X	
Needham						
New Ashford						
New Bedford ¹	X	X		X		
New Braintree						
New Marlborough ¹				X		
New Salem						
Newbury	X	X				
Newburyport	X	X				
Newton				X	X	
Norfolk						
North Adams				X		X
North Andover				X	X	
North Attleborough				X	X	X
North Brookfield				X	X	X
North Reading						
Northampton				X	X	X
Northborough						
Northbridge				X	X	
Northfield						

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Norton ¹				X		
Norwell						
Norwood						
Oak Bluffs	X	X				
Oakham				X	X	
Orange				X	X	X
Orleans	X	X		X	X	
Otis				X	X	
Oxford				X	X	X
Palmer						
Paxton						
Peabody						
Pelham						
Pembroke				X	X	X
Pepperell						
Peru				X	X	
Petersham						
Phillipston				X	X	X
Pittsfield				X	X	X
Plainfield				X	X	X
Plainville						
Plymouth	X	X	X	X	X	X
Plympton						
Princeton						
Provincetown	X	X				
Quincy	X	X				
Randolph				X	X	X
Raynham						

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Reading						
Rehoboth						
Revere	X	X				
Richmond				X	X	
Rochester				X	X	X
Rockland				X	X	
Rockport	X	X				
Rowe				X	X	
Rowley						
Royalston				X	X	X
Russell				X	X	
Rutland				X	X	
Salem	X	X	X			
Salisbury	X	X				
Sandisfield				X	X	
Sandwich	X	X		X	X	
Saugus				X	X	
Savoy				X	X	
Scituate	X	X				
Seekonk						
Sharon				X	X	
Sheffield				X	X	
Shelburne						
Sherborn				X	X	X
Shirley						
Shrewsbury				X	X	
Shutesbury				X	X	
Somerset	X	X				

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Somerville						
South Hadley						
Southampton						
Southborough						
Southbridge						
Southwick				X	X	X
Spencer				X	X	X
Springfield				X	X	X
Sterling				X	X	X
Stockbridge				X	X	X
Stoneham						
Stoughton				X	X	X
Stow				X	X	
Sturbridge				X	X	X
Sudbury						
Sunderland						
Sutton				X	X	
Swampscott	X	X				
Swansea	X	X				
Taunton				X	X	
Templeton				X	X	X
Tewksbury						
Tisbury	X	X		X	X	
Tolland				X	X	
Topsfield				X	X	X
Townsend				X	X	
Truro	X	X				
Tyngsborough				X	X	X

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Tyringham				X	X	
Upton				X	X	X
Uxbridge				X	X	X
Wakefield						
Wales				X	X	X
Walpole				X	X	
Waltham						
Ware						
Wareham	X	X	X	X	X	
Warren				X	X	
Warwick						
Washington						
Watertown						
Wayland				X	X	
Webster				X	X	
Wellesley				X	X	X
Wellfleet	X	X		X	X	
Wendell				X	X	
Wenham				X	X	X
West Boylston						
West Bridgewater						
West Brookfield				X	X	
West Newbury						
West Springfield						
West Stockbridge				X	X	
West Tisbury	X	X	X	X	X	X

Table 18

Communities in Massachusetts, indicating type of beach
and the presence or absence of data in 2006.

Community	Marine Beach	Marine Beach with Data	Marine Beach w/o Complete Data	Freshwater Beach	Freshwater Beach with Data	Freshwater Beach w/o Complete Data
Westborough				X	X	
Westfield				X	X	
Westford				X	X	X
Westhampton						
Westminster				X	X	X
Weston				X	X	X
Westport	X	X		X	X	
Westwood				X	X	
Weymouth ¹	X	X		X		
Whately						
Whitman						
Wilbraham				X	X	X
Williamsburg						
Williamstown				X	X	X
Wilmington				X	X	X
Winchendon				X	X	
Winchester				X	X	X
Windsor				X	X	
Winthrop	X	X	X			
Woburn						
Worcester				X	X	
Worthington						
Wrentham				X	X	X
Yarmouth	X	X		X	X	X

1 - These communities did not open their freshwater beaches during the 2006 beach season.

Table 19

Time of day when samples were collected at public and semi-public bathing beaches in Massachusetts in 2006

Time of Sample	Marine		Fresh	
	# Samples	% Samples	# Samples	% Samples
Before 10:00 AM	4,131	49.4%	3,795	51.0%
Between 10:00 AM and 12:00 PM	2,412	28.8%	2,120	28.5%
Between 12:00 PM and 4:00 PM	1,249	14.9%	1,194	16.1%
After 4:00 PM	33	0.4%	29	0.4%
Indeterminate	545	6.5%	300	4.0%
Total	8,370	100.0%	7,438	100.0%

Table 20

Water quality bacterial indicators or combinations of indicators used to test public and semi-public bathing beaches in Massachusetts in 2006, grouped by beach.

Marine Beaches		
Indicator(s)	# Beaches	%
Enterococcus only	602	100%
<i>E. coli</i> only	0	0%
Fecal coliform only	0	0%
Total coliform only	0	0%
Enterococcus and <i>E. coli</i>	0	0%
Enterococcus and Fecal coliform	0	0%
Enterococcus and Total coliform	0	0%
Enterococcus, Fecal coliform, and Total coliform	0	0%
Not indicated	0	0%
Total	602	100%
Freshwater Beaches		
Enterococcus only	73	12%
<i>E. coli</i> only	505	85%
Fecal coliform only	1	0%
Total coliform only	0	0%
Enterococcus and <i>E. coli</i>	7	1%
<i>E. Coli</i> and Fecal coliform	0	0%
<i>E. Coli</i> and Total coliform	2	0%
<i>E. Coli</i> , Enterococcus, Fecal coliform, and Total coliform	3	1%
Not indicated	0	0%
Total	591	100%

1. Each of the rows in this table is independent of the others (e.g., the number of beaches tested for Enterococcus and *E. coli* together is not included in the number of beaches tested for Enterococcus only).

2. Beaches that use multiple indicators usually do not use them on a consistent basis (e.g., water samples on a given date are tested with one indicator, while those tested on a different date are tested with another indicator).

Table 21

Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Aquinnah	Lobsterville	Weekly	Enterococci	11				
Aquinnah	Moshup Beach	Weekly	Enterococci	11				
Aquinnah	Philbin Beach	Weekly	Enterococci	12	1	135	135	
Aquinnah	Red Beach	Weekly	Enterococci	11				
Barnstable	Bone Hill	Weekly	Enterococci	14	1	114	114	1
Barnstable	Bridge Street	Weekly	Enterococci	14	1	400	400	1
Barnstable	Cordwood Road	Weekly	Enterococci	13				
Barnstable	Cotuit Bay Shores Association	Weekly	Enterococci	12				
Barnstable	Covell's	Weekly	Enterococci	13				
Barnstable	Craigville	Weekly	Enterococci	14	1	400	400	1
Barnstable	Craigville Beach Club	Weekly	Enterococci	12				
Barnstable	Crocker's Neck	Weekly	Enterococci	14	1	400	400	1
Barnstable	Cross Street	Weekly	Enterococci	13				
Barnstable	Dowses	Weekly	Enterococci	13				
Barnstable	East (Town) Beach	Weekly	Enterococci	14	1	136	136	1
Barnstable	Estey Avenue	Weekly	Enterococci	13				
Barnstable	Fifth Ave (boat launch)	Weekly	Enterococci	14	1	242	242	1
Barnstable	Indian Trail	Weekly	Enterococci	13				
Barnstable	Kalmus Ocean	Weekly	Enterococci	13				
Barnstable	Kalmus Yacht	Weekly	Enterococci	13				
Barnstable	Kennedy Memorial	Weekly	Enterococci	13				
Barnstable	Keyes Beach	Weekly	Enterococci	15	2	110	122	2
Barnstable	Little River Road	Weekly	Enterococci	13				
Barnstable	Loops	Weekly	Enterococci	13				
Barnstable	Millway	Weekly	Enterococci	13				
Barnstable	Oregon	Weekly	Enterococci	13				
Barnstable	Oyster Harbors Club	Weekly	Enterococci	12				
Barnstable	Oyster Place	Weekly	Enterococci	14	1	226	226	1
Barnstable	Prince Cove	Weekly	Enterococci	18	5	164	286	5
Barnstable	Ropes	Weekly	Enterococci	14	1	310	310	1
Barnstable	Sandy Neck	Weekly	Enterococci	13				
Barnstable	Scudder Lane	Weekly	Enterococci	13				
Barnstable	Seaside Park Improvement Association	Weekly	Enterococci	12				
Barnstable	Veterans	Weekly	Enterococci	13				
Barnstable	Wianno Avenue	Weekly	Enterococci	13				
Barnstable	Wianno Club (Salt-107 Seaview)	Weekly	Enterococci	12				
Beverly	Brackenbury	Weekly	Enterococci	14	2	153	336	
Beverly	Dane Street	Weekly	Enterococci	14	2	166	230	

Table 21

Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Beverly	Goat Hill	Weekly	Enterococci	13	1	850	850	1
Beverly	Independence Park	Weekly	Enterococci	13	1	310	310	
Beverly	Lynch Park	Weekly	Enterococci	12				
Beverly	Mingo	Weekly	Enterococci	12				
Beverly	Obear Park	Weekly	Enterococci	13	1	115	115	
Beverly	Rice	Weekly	Enterococci	12				
Beverly	Sandy Point	Weekly	Enterococci	12				
Beverly	West	Weekly	Enterococci	15	3	107	180	1
Beverly	Woodbury	Weekly	Enterococci	13	1	154	154	
Boston	Carson Beach (DCR - DUPR)	Daily	Enterococci	70	5	138	365	14
Boston	Carson Beach (DCR - DUPR)	Daily	Enterococci	70	4	115	245	13
Boston	City Point Beach @ Farragut Road & Day Blvd. (DCR)	Daily	Enterococci	70	6	175	480	12
Boston	Constitution (DCR - DUPR)	Daily	Enterococci	70	9	115	523	16
Boston	Constitution (DCR - DUPR)	Daily	Enterococci	71	9	114	450	14
Boston	Constitution (DCR - DUPR)	Daily	Enterococci	71	7	122	500	14
Boston	Lovell's Island (DCR - DUPR)	Weekly	Enterococci	12				
Boston	M Street Beach @ M Street (DCR - DUPR)	Daily	Enterococci	69				8
Boston	Malibu (DCR - DUPR)	Weekly	Enterococci	22	2	156	750	5
Boston	Pleasure Bay @ Broadway (DCR - DUPR)	Daily	Enterococci	72	1	300	300	5
Boston	Savin Hill (DCR - DUPR)	Weekly	Enterococci	19	2	146	223	5
Boston	Spectacle Island	Weekly	Enterococci	14	2	110	2300	2
Boston	Tenean (DCR - DUPR)	Daily	Enterococci	72	8	105	3500	19
Bourne	Barlows Landing	Weekly	Enterococci	12				
Bourne	Briarwood Marine and Science	Weekly	Enterococci	8				
Bourne	Cataumet Harbor	Weekly	Enterococci	13	1	240	240	1
Bourne	Cedar Point Association	Weekly	Enterococci	12				
Bourne	Electric Avenue	Weekly	Enterococci	12				
Bourne	Gray Gables	Weekly	Enterococci	12				
Bourne	Hideaway Village Association	Weekly	Enterococci	13	1	270	270	1
Bourne	Monument	Weekly	Enterococci	12				
Bourne	Patiusset Beach	Weekly	Enterococci	14	2	122	400	2
Bourne	Pocasset Beach Improvement Association	Weekly	Enterococci	12				
Bourne	Sagamore	Weekly	Enterococci	12				
Bourne	Scraggy Neck Recreation Association	Weekly	Enterococci	12				
Bourne	Tahanto Associates, Inc.	Weekly	Enterococci	13	2	250	272	1
Bourne	Wings Neck Trust Association (Lagoon Pond)	Biweekly	Enterococci	6				
Bourne	Wings Neck Trust Association (North Beach)	Weekly	Enterococci	12				
Bourne	Wings Neck Trust Association (South Beach)	Weekly	Enterococci	12				

Table 21

Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Braintree	Smith Beach	Weekly	Enterococci	14	2	126	159	2
Brewster	Breakwater Landing	Weekly	Enterococci	16	3	162	400	3
Brewster	Cape Cod Sea Camps (Bay)	Weekly	Enterococci	12				
Brewster	Crosby Landing	Weekly	Enterococci	14	1	130	130	1
Brewster	Ellis Landing	Weekly	Enterococci	13				
Brewster	Linnell Landing	Weekly	Enterococci	13				
Brewster	Paines Creek	Weekly	Enterococci	16	3	114	400	3
Brewster	Point of Rocks	Weekly	Enterococci	13				
Brewster	Robbins Hill	Weekly	Enterococci	15	2	330	400	2
Brewster	Saints Landing	Weekly	Enterococci	15	2	180	400	2
Chatham	Andrew Harding Lane Beach	Weekly	Enterococci	13				
Chatham	Bucks Creek	Weekly	Enterococci	20	10	122	1290	3
Chatham	Chatham Bars Inn	Weekly	Enterococci	11				
Chatham	Cockle Cove	Weekly	Enterococci	14	1	578	578	1
Chatham	Cockle Cove Creek	Weekly	Enterococci	15	10	175	1670	1
Chatham	Cockle Cove Creek	Weekly	Enterococci	18	11	120	2240	1
Chatham	Forest Street Beach	Weekly	Enterococci	14	1	213	213	1
Chatham	Hardings	Weekly	Enterococci	13				
Chatham	Hardings	Weekly	Enterococci	13				
Chatham	Hawthorne	Weekly	Enterococci	12				
Chatham	Jacknife Harbor	Weekly	Enterococci	13				
Chatham	Lighthouse	Weekly	Enterococci	13				
Chatham	Oyster Pond	Weekly	Enterococci	13				
Chatham	Pleasant Street	Weekly	Enterococci	14	1	208	208	1
Chatham	Ridgevale	Weekly	Enterococci	14				
Chatham	Scatteree Town Landing	Weekly	Enterococci	13				
Chilmark	Great Rock Bight	Weekly	Enterococci	11				
Chilmark	Menemsha	Weekly	Enterococci	11				
Chilmark	Ocean @ Chilmark Pond Preserve	Weekly	Enterococci	12	1	144	144	1
Chilmark	Ocean @ Lucy Vincent Beach	Weekly	Enterococci	11				
Chilmark	Ocean @ Squibnocket Beach	Weekly	Enterococci	12	1	215	215	
Chilmark	Pond @ Lucy Vincent Beach	Weekly	Enterococci	12	1	279	279	
Cohasset	Bassing's (Sailing Club)	Weekly	Enterococci	13				1
Cohasset	Black Rock	Weekly	Enterococci	12	1	166	166	1
Cohasset	Little Harbor	Weekly	Enterococci	11				
Cohasset	Sandy	Weekly	Enterococci	12				
Cohasset	Sandy Cove	Weekly	Enterococci	11				
Cohasset	Yacht Club	Weekly	Enterococci	13				1

Table 21

Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Danvers	Sandy Beach	Weekly	Enterococci	13	3	126	510	
Danvers	Sandy Beach	Weekly	Enterococci	14	3	108	490	2
Dartmouth	Anthony's	Weekly	Enterococci	10				
Dartmouth	Apponagansett Town Beach	Weekly	Enterococci	13	2	455	850	1
Dartmouth	Bayview	Weekly	Enterococci	10				
Dartmouth	Demarest Lloyd (DCR - DSPR)	Weekly	Enterococci	15				
Dartmouth	Hidden Bay	Weekly	Enterococci	10	2	670	6000	1
Dartmouth	Jones Town Beach	Weekly	Enterococci	13	1	360	360	
Dartmouth	Moses Smith Creek	Weekly	Enterococci	11	3	180	370	3
Dartmouth	Nonquitt	Weekly	Enterococci	10				
Dartmouth	Oak Hill Shores	Weekly	Enterococci	10				
Dartmouth	Round Hill	Weekly	Enterococci	12				
Dartmouth	Salter's Point East	Weekly	Enterococci	10				
Dartmouth	Salter's Point South	Weekly	Enterococci	10	1	255	255	1
Dennis	Bayview	Weekly	Enterococci	13				
Dennis	Chapin Memorial	Weekly	Enterococci	13				
Dennis	Cold Storage	Weekly	Enterococci	13				
Dennis	Corporation	Weekly	Enterococci	13				
Dennis	Follins Pond	Weekly	Enterococci	13	1	356	356	1
Dennis	Glendon Road	Weekly	Enterococci	13				
Dennis	Haigis	Weekly	Enterococci	13				
Dennis	Harborview	Weekly	Enterococci	13				
Dennis	Howes Street	Weekly	Enterococci	13				
Dennis	Inman Road	Weekly	Enterococci	13				
Dennis	Mayflower	Weekly	Enterococci	13				
Dennis	Raycroft	Weekly	Enterococci	13				
Dennis	Sea Street (Dennisport)	Weekly	Enterococci	13				
Dennis	Sea Street (East Dennis)	Weekly	Enterococci	13				
Dennis	South Village	Weekly	Enterococci	13				
Dennis	Sullivan (Depot St.)	Weekly	Enterococci	13				
Dennis	Trotting Park	Weekly	Enterococci	13				
Dennis	West Dennis	Weekly	Enterococci	13				
Dennis	West Dennis	Weekly	Enterococci	13				
Dennis	West Dennis	Weekly	Enterococci	13				
Duxbury	Duxbury Beach @ Bath House	Weekly	Enterococci	15	1	300	300	1
Duxbury	Landing Road	Weekly	Enterococci	16	2	107	150	2
Duxbury	Residents Beach (Duxbury Beach)	Weekly	Enterococci	14				
Duxbury	Shipyards Lane	Weekly	Enterococci	14				

Table 21

Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Duxbury	West End	Weekly	Enterococci	14				
Eastham	Boat Meadow	Weekly	Enterococci	14	1	214	214	1
Eastham	Campground	Weekly	Enterococci	14	1	260	260	1
Eastham	Coast Guard	Weekly	Enterococci	12				
Eastham	Coast Guard	Weekly	Enterococci	12				
Eastham	Cole Road	Weekly	Enterococci	13				
Eastham	Cook's Brook	Weekly	Enterococci	13				
Eastham	Dyer Prince	Weekly	Enterococci	14	1	400	400	1
Eastham	First Encounter	Weekly	Enterococci	13				
Eastham	First Encounter	Weekly	Enterococci	13				
Eastham	Kingsbury	Weekly	Enterococci	13				
Eastham	Nauset Light	Weekly	Enterococci	12				
Eastham	Nauset Light	Weekly	Enterococci	12				
Eastham	Nauset Light	Weekly	Enterococci	12				
Eastham	S. Sunken Meadow	Weekly	Enterococci	13				
Eastham	Silver Springs Association	Weekly	Enterococci	12				
Eastham	Thumpertown	Weekly	Enterococci	13				
Eastham	Town Cove	Weekly	Enterococci	14	1	106	106	1
Edgartown	Bend in the Road	Weekly	Enterococci	11				
Edgartown	Chappy Point Beach	Weekly	Enterococci	11				
Edgartown	East Beach (Chappy)	Weekly	Enterococci	11				
Edgartown	Felix Neck	Weekly	Enterococci	11				
Edgartown	Fuller Street	Weekly	Enterococci	11				
Edgartown	Joseph Sylvia State Beach	Weekly	Enterococci	11	1	115	115	
Edgartown	Joseph Sylvia State Beach	Weekly	Enterococci	11				
Edgartown	Norton Point Beach	Weekly	Enterococci	12				
Edgartown	Norton Point Beach	Weekly	Enterococci	5				
Edgartown	Norton Point Beach	Weekly	Enterococci	11	1	120	120	
Edgartown	Ocean @ Edgartown Great Pond	Weekly	Enterococci	10				
Edgartown	South Beach State Park	Weekly	Enterococci	12				
Edgartown	South Beach State Park	Weekly	Enterococci	12	1	191	191	
Edgartown	South Beach State Park	Weekly	Enterococci	12				
Edgartown	Wasque Swim Beach	Unknown	Enterococci	5				
Essex	Clammer's Beach	Weekly	Enterococci	13	1	134	134	
Essex	Front Beach	Weekly	Enterococci	13				
Fairhaven	Fort Phoenix (DCR - DSPR)	Weekly	Enterococci	17	2	400	400	1
Fairhaven	Manhattan Avenue	Weekly	Enterococci	14	2	740	2100	2
Fairhaven	Raymond Street	Weekly	Enterococci	12	1	167	167	1

Table 21

Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Fairhaven	Seaview	Weekly	Enterococci	8				
Fairhaven	West Island Causeway	Weekly	Enterococci	12				
Fairhaven	West Island Town Beach	Weekly	Enterococci	12				
Falmouth	Acapesketch Improvement Association	Weekly	Enterococci	12				
Falmouth	Bikepath Beach (Trunk River)	Weekly	Enterococci	13				
Falmouth	Bristol	Weekly	Enterococci	13				
Falmouth	Bristol	Weekly	Enterococci	13				
Falmouth	Chapoquoit	Weekly	Enterococci	13				
Falmouth	Chapoquoit Associates - Front Beach	Weekly	Enterococci	12				
Falmouth	Chapoquoit Associates - Little Beach	Weekly	Enterococci	12				
Falmouth	Falmouth Associates - 564 Surf Drive	Weekly	Enterococci	12				
Falmouth	Falmouth Heights	Weekly	Enterococci	13				
Falmouth	Falmouth Heights	Weekly	Enterococci	13				
Falmouth	Falmouth Yacht Club	Weekly	Enterococci	12				
Falmouth	Jetty Lane	Weekly	Enterococci	12				
Falmouth	Little Island Beach Preserve	Weekly	Enterococci	12				
Falmouth	Megansett	Weekly	Enterococci	13				
Falmouth	Menauhant	Weekly	Enterococci	13				
Falmouth	Menauhant	Weekly	Enterococci	13				
Falmouth	Mill Road	Weekly	Enterococci	13				
Falmouth	New Silver (Silver Beach Improvement Association)	Weekly	Enterococci	13	1	124	124	
Falmouth	Nobska Beach Association	Weekly	Enterococci	12				
Falmouth	Old Silver 1	Weekly	Enterococci	13				
Falmouth	Old Silver 1	Weekly	Enterococci	13				
Falmouth	Old Silver 2	Weekly	Enterococci	13				
Falmouth	Old Silver 2	Weekly	Enterococci	13				
Falmouth	Old Silver Beach Estates Assoc.	Weekly	Enterococci	12				
Falmouth	Racing Beach Association	Weekly	Enterococci	12				
Falmouth	Saconnessett Hills Association	Weekly	Enterococci	14	2	130	400	
Falmouth	Seacoast Shores Associates, Inc.	Weekly	Enterococci	12				
Falmouth	Shorewood Beach Association	Weekly	Enterococci	19	7	116	376	1
Falmouth	Sippewissett Highlands Trust	Weekly	Enterococci	12				
Falmouth	Stoney Beach (MBL)	Weekly	Enterococci	13				
Falmouth	Surf Drive	Weekly	Enterococci	13				
Falmouth	Surf Drive	Weekly	Enterococci	14	1	130	130	1
Falmouth	Surf Drive	Weekly	Enterococci	13				
Falmouth	Surf Drive	Weekly	Enterococci	13				
Falmouth	Wild Harbour Estates	Weekly	Enterococci	12				

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Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Falmouth	Wood Neck Beach	Weekly	Enterococci	13				
Falmouth	Wood Neck River	Weekly	Enterococci	16	3	136	400	3
Gloucester	Cressy's	Weekly	Enterococci	12				
Gloucester	Good Harbor	Weekly	Enterococci	12				
Gloucester	Good Harbor Creek	Weekly	Enterococci	12				
Gloucester	Half Moon	Weekly	Enterococci	11				
Gloucester	Niles	Weekly	Enterococci	12				
Gloucester	Pavillion Beach	Weekly	Enterococci	12				
Gloucester	Plum Cove	Weekly	Enterococci	12				
Gloucester	Wingearsheek	Weekly	Enterococci	12				
Harwich	Atlantic Avenue	Weekly	Enterococci	12				
Harwich	Bank Street (Bayview Rd)	Weekly	Enterococci	12				
Harwich	Bayview	Weekly	Enterococci	10				
Harwich	Brooks	Weekly	Enterococci	12				
Harwich	Earle Road	Weekly	Enterococci	12				
Harwich	Grey Neck	Weekly	Enterococci	12				
Harwich	Merkel Beach (Snow Inn Road)	Weekly	Enterococci	12				
Harwich	Neel Road	Weekly	Enterococci	12				
Harwich	Old Mill Point Association	Weekly	Enterococci	12				
Harwich	Old Mill Point Association	Weekly	Enterococci	12				
Harwich	Pleasant Bay	Weekly	Enterococci	12				
Harwich	Pleasant Road	Weekly	Enterococci	12				
Harwich	Red River	Weekly	Enterococci	12				
Harwich	Red River	Weekly	Enterococci	12				
Harwich	Red River	Weekly	Enterococci	12				
Harwich	Seabreeze	Weekly	Enterococci	12				
Harwich	The Belmont	Weekly	Enterococci	13	1	400	400	
Harwich	Wah Wah Taysee Road	Weekly	Enterococci	12				
Harwich	Wequasett Inn Resort	Weekly	Enterococci	12				
Harwich	Zylpha	Weekly	Enterococci	12				
Hingham	Belair	Weekly	Enterococci	11				
Hingham	Cliff Road	Weekly	Enterococci	4				
Hingham	Kimball	Weekly	Enterococci	11				
Hingham	Melville	Weekly	Enterococci	11				
Hingham	North	Weekly	Enterococci	11				
Hingham	Seal Cove	Weekly	Enterococci	11				
Hingham	Town Beach	Weekly	Enterococci	11				
Hingham	Wampatuck	Weekly	Enterococci	11				

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Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Hingham	Yacht Club	Weekly	Enterococci	12	1	264	264	1
Hull	A Street Bay Side	Weekly	Enterococci	13	1	1800	1800	1
Hull	A Street Ocean	Weekly	Enterococci	12				
Hull	Darcy's	Weekly	Enterococci	13	1	2300	2300	1
Hull	Edgewater	Weekly	Enterococci	13	1	370	370	1
Hull	Gunrock	Weekly	Enterococci	12				
Hull	Helen Street	Weekly	Enterococci	12				
Hull	Kenburma	Weekly	Enterococci	12				
Hull	Nantasket (DCR - DUPR)	Weekly	Enterococci	15				
Hull	Nantasket (DCR - DUPR)	Weekly	Enterococci	15	1	215	215	
Hull	Nantasket (DCR - DUPR)	Weekly	Enterococci	15				
Hull	Nantasket (DCR - DUPR)	Weekly	Enterococci	15				
Hull	Newport	Weekly	Enterococci	12				
Hull	Spring Street	Weekly	Enterococci	12				
Hull	Whitehead	Weekly	Enterococci	12				
Hull	XYZ	Weekly	Enterococci	12				
Ipswich	Clark	Weekly	Enterococci	14				
Ipswich	Crane	Weekly	Enterococci	15				
Ipswich	Little Neck	Weekly	Enterococci	14				
Ipswich	Pavillion	Weekly	Enterococci	14				
Ipswich	Pavillion	Weekly	Enterococci	14				
Ipswich	Steep Hill	Weekly	Enterococci	15				
Kingston	Gray's	Weekly	Enterococci	14				
Kingston	Rocky Nook	Weekly	Enterococci	14				
Lynn	Kings (DCR - DUPR)	Weekly	Enterococci	24	5	118	562	3
Lynn	Kings (DCR - DUPR)	Weekly	Enterococci	24	5	106	585	3
Manchester	Black	Weekly	Enterococci	14				
Manchester	Magnolia	Weekly	Enterococci	14				
Manchester	Magnolia	Weekly	Enterococci	15	1	900	900	1
Manchester	Singing	Weekly	Enterococci	14				
Manchester	Singing	Weekly	Enterococci	14				
Manchester	Tuck's Point	Weekly	Enterococci	15	1	300	300	1
Manchester	West Manchester	Weekly	Enterococci	15	1	350	350	1
Manchester	White	Weekly	Enterococci	14				
Marblehead	Crocker Park	Weekly	Enterococci	10				
Marblehead	Devereux	Weekly	Enterococci	13				
Marblehead	Gas House	Weekly	Enterococci	14	1	177	177	1
Marblehead	Grace Oliver	Weekly	Enterococci	15	2	273	664	1

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Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Marblehead	Stramski	Weekly	Enterococci	16	4	240	764	3
Marblehead	Sunset Road	Weekly	Enterococci	14	1	509	509	1
Marblehead	Village Street	Weekly	Enterococci	13				
Marion	Beverly Yacht	Weekly	Enterococci	10				
Marion	Converse Point	Weekly	Enterococci	10				
Marion	Dexter Lane	Weekly	Enterococci	11	1	320	320	1
Marion	Island Wharf	Weekly	Enterococci	10				
Marion	Oakdale Avenue	Weekly	Enterococci	11	3	154	9800	2
Marion	Piney Point	Weekly	Enterococci	11	1	118	118	1
Marion	Planting Island	Weekly	Enterococci	10	1	134	134	1
Marion	River Road	Weekly	Enterococci	11	6	260	790	1
Marion	Silver Shell	Weekly	Enterococci	10				
Marion	Silver Shell	Weekly	Enterococci	10				
Marion	Tabor Academy	Weekly	Enterococci	11				1
Marion	Tabor Academy	Weekly	Enterococci	11				1
Marshfield	Brant Rock	Weekly	Enterococci	13				
Marshfield	Fieldston	Weekly	Enterococci	13				
Marshfield	Fieldston	Weekly	Enterococci	13				
Marshfield	Green Harbor	Weekly	Enterococci	13				
Marshfield	Rexhame	Weekly	Enterococci	13				
Mashpee	Callies Beach	Weekly	Enterococci	11				
Mashpee	Mashpee Neck Road (Town Landing)	Weekly	Enterococci	13				
Mashpee	Maushup Village	Weekly	Enterococci	13	1	112	112	
Mashpee	New Seabury Inn	Weekly	Enterococci	11				
Mashpee	Poponneset	Weekly	Enterococci	13	1	400	400	1
Mashpee	Poponneset Spit	Weekly	Enterococci	12				
Mashpee	Seconsett Island Causeway	Weekly	Enterococci	14	1	282	282	
Mashpee	South Cape Beach (DCR - DSPR)	Weekly	Enterococci	15				
Mashpee	South Cape Civic Association	Weekly	Enterococci	12				
Mattapoisett	Antasawomak	Weekly	Enterococci	20				
Mattapoisett	Aucoot	Weekly	Enterococci	9				
Mattapoisett	Brant Beach	Weekly	Enterococci	10				
Mattapoisett	Crescent	Weekly	Enterococci	10				
Mattapoisett	Harbor 1	Weekly	Enterococci	11	1	150	150	
Mattapoisett	Harbor 2	Weekly	Enterococci	11	1	168	168	
Mattapoisett	Hollywoods	Weekly	Enterococci	11	1	134	134	
Mattapoisett	Hollywoods	Weekly	Enterococci	12	2	158	174	
Mattapoisett	Land Trust Reservation	Weekly	Enterococci	10	1	142	142	

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Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Mattapoisett	Leisure Shores	Weekly	Enterococci	10				
Mattapoisett	Mattapoisett Shores Association	Weekly	Enterococci	10	1	464	464	
Mattapoisett	Peases Point	Weekly	Enterococci	11	1	122	122	
Mattapoisett	Point Connett	Weekly	Enterococci	10				
Mattapoisett	Town Beach	Weekly	Enterococci	11	3	396	508	
Nahant	Black Rock	Weekly	Enterococci	12				
Nahant	Canoe	Weekly	Enterococci	12	2	149	290	2
Nahant	Nahant Beach (DCR - DUPR)	Weekly	Enterococci	19	3	105	200	2
Nahant	Nahant Beach (DCR - DUPR)	Weekly	Enterococci	19	3	110	340	2
Nahant	Nahant Beach (DCR - DUPR)	Weekly	Enterococci	19	2	110	280	2
Nahant	Nahant Beach (DCR - DUPR)	Weekly	Enterococci	19	3	129	380	2
Nahant	Short	Weekly	Enterococci	12				
Nahant	Tudor	Weekly	Enterococci	12				
Nantucket	40th Pole 1	Weekly	Enterococci	11				
Nantucket	40th Pole 2	Weekly	Enterococci	11				
Nantucket	Children's	Weekly	Enterococci	12	1	278	278	1
Nantucket	Cisco	Weekly	Enterococci	11				
Nantucket	Cliffside	Weekly	Enterococci	11				
Nantucket	Dionis	Weekly	Enterococci	10				
Nantucket	Jettes	Weekly	Enterococci	11				
Nantucket	Madaket	Weekly	Enterococci	11				
Nantucket	Miacomet	Weekly	Enterococci	11				
Nantucket	Sconset 1	Weekly	Enterococci	11				
Nantucket	Sconset 2	Weekly	Enterococci	11				
Nantucket	Sewerbeds	Weekly	Enterococci	11				
Nantucket	Surfside 1	Weekly	Enterococci	11				
Nantucket	Surfside 2	Weekly	Enterococci	11				
Nantucket	Warren's Landing	Weekly	Enterococci	11				
Nantucket	Washing Pond	Weekly	Enterococci	11				
Nantucket	Washington Street	Weekly	Enterococci	11	1	322	322	1
New Bedford	400 North	Weekly	Enterococci	13	1	500	500	1
New Bedford	400 South	Weekly	Enterococci	13	1	500	500	1
New Bedford	Davy's Locker	Weekly	Enterococci	13	1	500	500	1
New Bedford	J. Beach	Weekly	Enterococci	13	1	500	500	1
New Bedford	Kids Beach	Weekly	Enterococci	13	1	500	500	1
New Bedford	O'Tools	Weekly	Enterococci	12				
New Bedford	Squid	Weekly	Enterococci	13	1	230	230	1
New Bedford	Tabor Park South	Weekly	Enterococci	12				

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Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
New Bedford	Tower 1	Weekly	Enterococci	12				
New Bedford	Tower 4	Weekly	Enterococci	12				
Newbury	Plum Island	Weekly	Enterococci	14				
Newburyport	Plum Island	Weekly	Enterococci	15				
Newburyport	Plum Island	Weekly	Enterococci	15				
Newburyport	Plum Island	Weekly	Enterococci	15				
Newburyport	Plum Island	Weekly	Enterococci	15				
Oak Bluffs	Eastville Town Beach - Drawbridge	Weekly	Enterococci	11				
Oak Bluffs	Eastville Town Beach - Harbor	Weekly	Enterococci	11				
Oak Bluffs	Joseph Sylvia State Beach	Weekly	Enterococci	11				
Oak Bluffs	Joseph Sylvia State Beach	Weekly	Enterococci	1				
Oak Bluffs	Lagoon Pond Herring Run	Weekly	Enterococci	13				
Oak Bluffs	Marinelli (Jetty) Beach	Weekly	Enterococci	11				
Oak Bluffs	Pay Beach	Weekly	Enterococci	11				
Oak Bluffs	Sailing Camp Park	Weekly	Enterococci	11				
Orleans	Kent's Point	Weekly	Enterococci	12				
Orleans	Little Inn at Pleasant Bay	Weekly	Enterococci	12				
Orleans	Meeting House Pond	Weekly	Enterococci	12				
Orleans	Nauset	Weekly	Enterococci	12				
Orleans	Paw Wah Pond	Weekly	Enterococci	11				
Orleans	Pleasant Bay	Weekly	Enterococci	10				
Orleans	Pricilla's Landing	Weekly	Enterococci	12				
Orleans	Quanset Harbor Club Association	Weekly	Enterococci	13	1	400	400	1
Orleans	Rock Harbor	Weekly	Enterococci	14	2	114	400	1
Orleans	Skaket Beach	Weekly	Enterococci	12				
Orleans	Skaket Beach Condominiums	Weekly	Enterococci	7				
Orleans	Town Cove	Weekly	Enterococci	13	1	274	274	1
Plymouth	Nelson Street	Weekly	Enterococci	12				
Plymouth	Plymouth	Weekly	Enterococci	12				
Plymouth	Plymouth	Weekly	Enterococci	12				
Plymouth	Plymouth	Weekly	Enterococci	12				
Plymouth	White Horse	Weekly	Enterococci	12				
Plymouth	White Horse	Weekly	Enterococci	11				
Provincetown	29 Commercial Street	Weekly	Enterococci	15	2	218	400	2
Provincetown	333 Commercial Street	Weekly	Enterococci	14	1	142	142	1
Provincetown	451 Commerical Street	Weekly	Enterococci	15	2	400	400	2
Provincetown	593 Commercial Street	Weekly	Enterococci	14	1	400	400	1
Provincetown	637 Commercial Street	Weekly	Enterococci	17	1	364	364	2

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Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Provincetown	Atkins Lane	Weekly	Enterococci	17	2	180	400	3
Provincetown	Atlantic Avenue	Weekly	Enterococci	13				
Provincetown	Court Street	Weekly	Enterococci	14	1	130	130	1
Provincetown	Herring Cove (National)	Weekly	Enterococci	12				
Provincetown	Herring Cove (National)	Weekly	Enterococci	12				
Provincetown	Johnson Street	Weekly	Enterococci	15	2	106	144	2
Provincetown	Kendal Lane	Weekly	Enterococci	20	3	184	400	3
Provincetown	Provincetown Inn Rotary	Weekly	Enterococci	13				
Provincetown	Race Point (National)	Weekly	Enterococci	12				
Provincetown	Race Point (National)	Weekly	Enterococci	12				
Provincetown	Race Point (National)	Weekly	Enterococci	12				
Provincetown	Ryder Street	Weekly	Enterococci	15	2	118	350	2
Provincetown	Ryder Street	Weekly	Enterococci	14	1	310	310	1
Provincetown	Ryder Street	Weekly	Enterococci	15	2	190	400	2
Provincetown	Town Landing - Breakwater	Weekly	Enterococci	15	2	142	224	2
Provincetown	Town Landing - Snail Road	Weekly	Enterococci	15	1	204	204	2
Provincetown	Town Landing West of Coast Guard	Weekly	Enterococci	17	5	108	400	3
Provincetown	West End Lot	Weekly	Enterococci	14	1	176	176	1
Quincy	Avalon	Weekly	Enterococci	14	1	123	123	1
Quincy	Broady (Baker)	Weekly	Enterococci	14	1	116	116	1
Quincy	Chikatawbot	Weekly	Enterococci	14	1	200	200	1
Quincy	Edgewater	Weekly	Enterococci	13				
Quincy	Germantown Firestation	Weekly	Enterococci	13				
Quincy	Heron	Weekly	Enterococci	15	3	140	8300	2
Quincy	Merrymount	Weekly	Enterococci	14	1	382	382	1
Quincy	Mound	Weekly	Enterococci	13				
Quincy	Nickerson	Weekly	Enterococci	14	2	113	131	1
Quincy	Orchard Street	Weekly	Enterococci	13				
Quincy	Parkhurst	Weekly	Enterococci	15	2	170	1200	2
Quincy	Rhoda	Weekly	Enterococci	17	4	112	300	4
Quincy	Wollaston (DCR - DUPR)	Daily	Enterococci	72	7	138	1000	19
Quincy	Wollaston (DCR - DUPR)	Daily	Enterococci	71	5	113	1000	20
Quincy	Wollaston (DCR - DUPR)	Daily	Enterococci	72	4	108	1000	19
Quincy	Wollaston (DCR - DUPR)	Daily	Enterococci	73	11	108	1000	21
Revere	Revere (DCR - DUPR)	Weekly	Enterococci	19	2	540	746	2
Revere	Revere (DCR - DUPR)	Weekly	Enterococci	19	3	440	815	2
Revere	Revere (DCR - DUPR)	Weekly	Enterococci	19	3	490	1033	2
Revere	Revere (DCR - DUPR)	Weekly	Enterococci	19	3	346	900	2

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Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Revere	Short (DCR - DUPR)	Weekly	Enterococci	16	1	390	390	1
Rockport	Back	Weekly	Enterococci	13				
Rockport	Cape Hedge	Monthly	Enterococci	5				
Rockport	Front Beach	Weekly	Enterococci	13				
Rockport	Long	Weekly	Enterococci	13				
Rockport	Long	Weekly	Enterococci	13				
Rockport	Old Garden	Weekly	Enterococci	12				
Rockport	Pebble	Monthly	Enterococci	5				
Salem	Children's Island - Back	Weekly	Enterococci	10	4	116	420	1
Salem	Children's Island - Dock	Weekly	Enterococci	10				
Salem	Children's Island - Tractor	Weekly	Enterococci	10	4	130	1500	1
Salem	Children's Island - Wally	Weekly	Enterococci	10	1	346	346	1
Salem	Collins Cove	Weekly	Enterococci	12				
Salem	Dead Horse	Weekly	Enterococci	11				
Salem	Forest River Point	Weekly	Enterococci	12				
Salem	Juniper Point	Weekly	Enterococci	12				
Salem	Mackey	Weekly	Enterococci	13	2	133	182	1
Salem	Ocean Avenue	Weekly	Enterococci	15	5	110	4700	3
Salem	Osgood	Weekly	Enterococci	12				
Salem	Pioneer	Weekly	Enterococci	13	2	108	410	1
Salem	Steps	Weekly	Enterococci	12				
Salem	Willow Avenue	Weekly	Enterococci	14	3	131	618	2
Salem	Willows Pier	Weekly	Enterococci	13	1	4700	4700	
Salem	Winter Island (Waikiki)	Weekly	Enterococci	12				
Salisbury	Salisbury (DCR - DSPR)	Weekly	Enterococci	11				
Salisbury	Salisbury (DCR - DSPR)	Weekly	Enterococci	15				
Sandwich	East Sandwich	Weekly	Enterococci	14	1	110	110	1
Sandwich	Scusset (DCR - DSPR)	Weekly	Enterococci	14				
Sandwich	Torrey Beach Community Association	Weekly	Enterococci	13	1	234	234	
Sandwich	Town Neck (Boardwalk)	Weekly	Enterococci	13				
Sandwich	Town Neck (Horizons)	Weekly	Enterococci	13				
Scituate	Egypt	Weekly	Enterococci	11				
Scituate	Humarock	Weekly	Enterococci	11				
Scituate	Minot	Weekly	Enterococci	11				
Scituate	Peggotty	Weekly	Enterococci	11				
Scituate	Sand Hills	Weekly	Enterococci	11				
Somerset	Pearse	Weekly	Enterococci	15	4	110	2300	3
Swampscott	Eisman's	Weekly	Enterococci	12				

Table 21

Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Swampscott	Fisherman's	Weekly	Enterococci	13	1	300	300	1
Swampscott	Kings	Weekly	Enterococci	12				
Swampscott	Phillips	Weekly	Enterococci	12				
Swampscott	Preston	Weekly	Enterococci	13	1	3300	3300	1
Swampscott	Stacey	Weekly	Enterococci	13	1	156	156	1
Swampscott	Whales	Weekly	Enterococci	12				
Swansea	Cedar Cove	Weekly	Enterococci	10	2	149	300	2
Swansea	Coles River Club off Harbor Rd	Weekly	Enterococci	10				
Swansea	Leeside	Weekly	Enterococci	7				
Swansea	Sandy Beach	Weekly	Enterococci	14	2	149	1200	2
Swansea	Town Beach	Weekly	Enterococci	13	1	149	149	1
Tisbury	Hilman's Point	Weekly	Enterococci	10				
Tisbury	Lake Street	Weekly	Enterococci	12	1	144	144	1
Tisbury	Owen Little Way	Weekly	Enterococci	11				
Tisbury	Owen Park	Weekly	Enterococci	11				
Tisbury	Sound @ Wilfred's Pond Reserve	Weekly	Enterococci	12				
Tisbury	Tashmoo Beach	Weekly	Enterococci	11				
Tisbury	Tashmoo Cut	Weekly	Enterococci	11				
Tisbury	Vineyard Harbor Motel	Weekly	Enterococci	11				
Truro	Ballston	Weekly	Enterococci	13				
Truro	Coast Guard Town	Weekly	Enterococci	13				
Truro	Cold Storage/Pond Village	Weekly	Enterococci	13				
Truro	Corn Hill	Weekly	Enterococci	13				
Truro	Crow's Nest (496 Shore Rd)	Weekly	Enterococci	13				
Truro	Dune's Colony (648 Shore Rd)	Weekly	Enterococci	13				
Truro	Fisher	Weekly	Enterococci	13				
Truro	Great Hollow	Weekly	Enterococci	13				
Truro	Head of the Meadow (National)	Weekly	Enterococci	12				
Truro	Head of the Meadow (Town)	Weekly	Enterococci	13				
Truro	Longnook	Weekly	Enterococci	12				
Truro	Noon's Landing	Weekly	Enterococci	13				
Truro	Pamet Harbor	Weekly	Enterococci	13				
Truro	Ryder	Weekly	Enterococci	13				
Truro	Sunset Village (379 Shore Rd)	Weekly	Enterococci	13				
Truro	Town Landing Beach Point	Weekly	Enterococci	13				
Wareham	Briarwood	Weekly	Enterococci	11				
Wareham	East Boulevard	Weekly	Enterococci	11				
Wareham	Forbes	Weekly	Enterococci	8				

Table 21

Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Wareham	Little Harbor	Weekly	Enterococci	13	2	400	400	
Wareham	North Boulevard	Weekly	Enterococci	11				
Wareham	Onset	Weekly	Enterococci	11				
Wareham	Parkwood	Weekly	Enterococci	11				
Wareham	Pinehurst	Weekly	Enterococci	11				
Wareham	Point Independence	Weekly	Enterococci	11				
Wareham	Riverside Avenue	Weekly	Enterococci	11				
Wareham	Shell Point	Weekly	Enterococci	11				
Wareham	Swift's	Weekly	Enterococci	11				
Wareham	Swift's Neck	Weekly	Enterococci	11				
Wellfleet	Burton Baker	Weekly	Enterococci	13				
Wellfleet	Cahoon Hollow	Weekly	Enterococci	13				
Wellfleet	Chequesset Yacht and Country Club	Weekly	Enterococci	12				
Wellfleet	Duck Harbor	Weekly	Enterococci	13				
Wellfleet	Indian Neck	Weekly	Enterococci	13				
Wellfleet	Kellers Corner	Weekly	Enterococci	13				
Wellfleet	Maguires Landing	Weekly	Enterococci	13				
Wellfleet	Marconi	Weekly	Enterococci	12				
Wellfleet	Marconi	Weekly	Enterococci	12				
Wellfleet	Marconi	Weekly	Enterococci	12				
Wellfleet	Mayo	Weekly	Enterococci	15	2	134	180	
Wellfleet	Newcomb Hollow	Weekly	Enterococci	13				
Wellfleet	Omaha Road	Weekly	Enterococci	13				
Wellfleet	Powers Landing	Weekly	Enterococci	13				
Wellfleet	White Crest	Weekly	Enterococci	13				
West Tisbury	Great Pond @ Long Point	Weekly	Enterococci	13	1	136	136	1
West Tisbury	Lambert's Cove Beach	Weekly	Enterococci	11				
West Tisbury	Lambert's Cove Beach	Weekly	Enterococci	11				
West Tisbury	Ocean @ Long Point	Weekly	Enterococci	11				
West Tisbury	Ocean @ Long Point	Weekly	Enterococci	12				
West Tisbury	Sepiessa Point	Weekly	Enterococci	11				
Westport	Baker's Beach	Weekly	Enterococci	12				
Westport	C & K Club	Weekly	Enterococci	12				
Westport	Cherry & Webb	Weekly	Enterococci	12				
Westport	East Beach	Weekly	Enterococci	12				
Westport	Elephant Rock	Weekly	Enterococci	12				
Westport	Horseneck (DCR - DSPR)	Weekly	Enterococci	15				
Westport	Howland Beach	Weekly	Enterococci	12				

Table 21

Water quality data for marine public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Westport	Spindle Rock	Weekly	Enterococci	13	1	139	139	
Westport	Town Beach	Weekly	Enterococci	13	1	336	336	
Westport	Yacht Club	Weekly	Enterococci	13	1	255	255	
Weymouth	Lane (New Wessagussett)	Weekly	Enterococci	12				
Weymouth	Wessagussett (Old Wessagussett)	Weekly	Enterococci	12				
Winthrop	Donovans	Weekly	Enterococci	11	2	910	4900	1
Winthrop	Grandview	Weekly	Enterococci	11	1	264	264	1
Winthrop	Halford	Weekly	Enterococci	11	1	1400	1400	1
Winthrop	Pico	Weekly	Enterococci	11				
Winthrop	Winthrop (DCR - DUPR)	Weekly	Enterococci	16	1	285	285	1
Winthrop	Yerrill	Weekly	Enterococci	11				
Yarmouth	Bass River	Weekly	Enterococci	13				
Yarmouth	Bass River	Weekly	Enterococci	13				
Yarmouth	Baxter Avenue	Weekly	Enterococci	15	1	106	106	
Yarmouth	Bay Road	Weekly	Enterococci	13				
Yarmouth	Bayview Street	Weekly	Enterococci	15	1	388	388	
Yarmouth	Colonial Acres	Weekly	Enterococci	15	1	146	146	
Yarmouth	Colonial Acres	Weekly	Enterococci	15	1	240	240	
Yarmouth	Columbus Avenue	Weekly	Enterococci	14	1	220	220	
Yarmouth	Englewood	Weekly	Enterococci	14				
Yarmouth	Follins Pond	Weekly	Enterococci	14	2	122	180	
Yarmouth	Gray's Beach	Weekly	Enterococci	14	1	162	162	
Yarmouth	Parkers River East	Weekly	Enterococci	13				
Yarmouth	Parkers River West	Weekly	Enterococci	14	1	110	110	
Yarmouth	Seagull (Center)	Weekly	Enterococci	13				
Yarmouth	Seagull (Left)	Weekly	Enterococci	13				
Yarmouth	Seagull (Right)	Weekly	Enterococci	13				
Yarmouth	Seaview Ave. Beach	Weekly	Enterococci	13				
Yarmouth	South Middle	Weekly	Enterococci	13				
Yarmouth	Thatcher Town Park	Weekly	Enterococci	13				
Yarmouth	Wilbur Park	Weekly	Enterococci	13				
Yarmouth	Windmill	Weekly	Enterococci	13				
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.								

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Abington	Island Grove Beach	Weekly	E. Coli	9				
Acton	Nara Beach	Weekly	E. Coli	17	1	600	600	1
Agawam	Robinson Pond Beach 1	Weekly	Enterococci	17	2	68	78	2
Amesbury	Camp Bauercrest	Weekly	E. Coli	14	1	520	520	
Amesbury	Glen Devin Condominiums	Weekly	E. Coli	15	1	320	320	
Amesbury	Lake Attitash-Dam/Bathing area	Weekly	E. Coli	15	1	410	410	
Amesbury	Lake Gardner-Greatest batherload	Weekly	E. Coli	15				
Amesbury	Whitehall Lake Condominiums-Crowninshield Mgmt.	Weekly	E. Coli	15	1	1100	1100	
Andover	Pomps Pond - Center	Weekly	E. Coli	11				
Andover	Pomps Pond - Left Side	Weekly	E. Coli	16	1	1830	1830	1
Andover	Pomps Pond - Right Side	Weekly	E. Coli	15	1	260	260	
Arlington	Arlington Reservoir	Weekly	E. Coli	12	1	400	400	1
Arlington	Medford Boat Club	Weekly	E. Coli	13	1	324	324	
Arlington	Medford Boat Club	Weekly	E. Coli	12				
Ashburnham	Camp Winnekeag Pond	Weekly	E. Coli	9				
Ashby	Camp Middlesex	Weekly	E. Coli	8				
Ashby	Damon Pond Beach	Weekly	Enterococci	23	5	80	150	5
Ashfield	Ashfield Lake Beach	Weekly	E. Coli	16				
Ashland	Ashland Reservoir-Main Beach	Weekly	Enterococci	15	1	70	70	1
Ashland	Camp Winnetaska	Weekly	E. Coli	8				
Ashland	Warren Conference Center	Three Times	E. Coli	3				
Athol	Ellis Beach	Weekly	E. Coli	19	1	625	625	
Athol	Silver Lake	Weekly	E. Coli	19	1	402	402	
Auburn	Century Sportsmen	Weekly	E. Coli	15				
Ayer	Ayer Town Beach	Weekly	E. Coli	10				
Ayer	Mirror Lake	Weekly	E. Coli	10				
Barnstable	Bearses Pond	Weekly	E. Coli	13				
Barnstable	Garrett's Pond	Weekly	E. Coli	13	1	384	384	1
Barnstable	Gooseberry Pond	Weekly	E. Coli	13				
Barnstable	Hamblin Pond	Weekly	E. Coli	13				
Barnstable	Hathaway Pond	Weekly	E. Coli	13				
Barnstable	Joshua's Pond	Weekly	E. Coli	13				
Barnstable	Long Pond (Centerville)	Weekly	E. Coli	13				
Barnstable	Long Pond Farms Association	Weekly	E. Coli	11				
Barnstable	Lovell's Pond	Weekly	E. Coli	14	1	300	300	1
Barnstable	Middle Pond	Weekly	E. Coli	13				
Barnstable	Mystic Lake Race Lane	Weekly	E. Coli	13				
Barnstable	Mystic Lake Sawmill	Weekly	E. Coli	13				
Barnstable	Sand Shores Association	Weekly	E. Coli	12				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Barnstable	Shallow Pond	Weekly	E. Coli	14	1	548	548	1
Barnstable	Shubael Pond	Weekly	E. Coli	13				
Barnstable	Wequaquet Heights Association	Weekly	E. Coli	12				
Barnstable	Wequaquet Heights Association	Weekly	E. Coli	12				
Barnstable	Wequaquet Lake Town	Weekly	E. Coli	13				
Barnstable	Wequaquet Lake Yacht	Weekly	E. Coli	13				
Barnstable	Wianno Club (Fresh-Crystal Lake)	Weekly	E. Coli	12				
Becket	Becket Woods Beach	Weekly	E. Coli	16				
Becket	Becket Woods Dock	Weekly	E. Coli	16				
Becket	Camp Becket Iroquois Beach	Weekly	E. Coli	15				
Becket	Camp Becket Main Beach	Weekly	E. Coli	17				
Becket	Camp Greylock Jr. Beach	Weekly	E. Coli	10				
Becket	Camp Greylock Sr. Beach	Once	E. Coli	1				
Becket	Camp Lenox	Weekly	E. Coli	6				
Becket	Camp Watitoh Beach	Weekly	E. Coli	10				
Becket	Center Lake Estates Beach	Weekly	E. Coli	16				
Becket	Center Pond Beach	Weekly	E. Coli	16				
Becket	Center Pond Beach	Weekly	Coliform	8				
Becket	Chimney Corners Beach	Weekly	E. Coli	17				
Becket	Crystal Pond Beach	Weekly	E. Coli	16				
Becket	Excalibur	Biweekly	E. Coli	8				
Becket	Indian Lake	Weekly	E. Coli	17				
Becket	Indian Lake Large Beach	Weekly	E. Coli	17				
Becket	Indian Lake Small Beach	Weekly	E. Coli	17				
Becket	Indian Lake Small Pond Beach	Weekly	E. Coli	17				
Becket	Lancelot Beach	Biweekly	E. Coli	8				
Becket	Little Robin Beach	Biweekly	E. Coli	8				
Becket	Mountain Grove Beach	Weekly	E. Coli	16				
Becket	Robin Hood #1	Biweekly	E. Coli	8				
Becket	Robin Hood #2	Biweekly	E. Coli	8				
Becket	Shawnee Shore Beach	Weekly	E. Coli	16				
Bedford	Springs Brook Park Bathing Beach	Weekly	E. Coli	1				
Bedford	Springs Brook Park Bathing Beach	Weekly	E. Coli	12				
Bedford	Springs Brook Park Bathing Beach	Weekly	E. Coli	11				
Belchertown	Lake Arcadia	Weekly	E. Coli	11				
Bellingham	Arcand Park	Weekly	E. Coli	11				
Bellingham	Silver Lake	Weekly	E. Coli	11	2	260	270	
Billerica	Nutting Lake - Micozzi Beach	Weekly	E. Coli	17	3	326	530	4
Billerica	Nutting Lake - Micozzi Beach	Weekly	E. Coli	15	4	246	274	4

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Bolton	Bolton Town Beach	Weekly	E. Coli	13				
Bolton	Camp Virginia Beach	Weekly	E. Coli	9				
Bolton	Tom Denny Camp	Weekly	E. Coli	7				
Bourne	Picture Lake	Weekly	E. Coli	12				
Bourne	Queen Sewell Pond	Weekly	E. Coli	12				
Boxford	Stiles Pond - Greatest Batherload	Weekly	E. Coli	11				
Braintree	Sunset Lake	Weekly	E. Coli	15	3	248	260	4
Brewster	Beechwood	Weekly	E. Coli	11				
Brewster	Blueberry Pond	Weekly	E. Coli	12				
Brewster	Cape Cod Sea Camps (Long Pond)	Weekly	E. Coli	12				
Brewster	Cliff Pond	Weekly	Enterococci	15	1	200	200	1
Brewster	Cliff Pond	Weekly	Enterococci	15	1	134	134	1
Brewster	Flax Pond	Weekly	Enterococci	9				
Brewster	Greenland Pond	Weekly	E. Coli	12				
Brewster	Little Cliff Pond	Weekly	Enterococci	9				
Brewster	Long Pond	Weekly	E. Coli	13				
Brewster	Long Pond at Camp Favorite	Weekly	E. Coli	12				
Brewster	Owl Pond	Weekly	E. Coli	12				
Brewster	Seymour Pond	Weekly	E. Coli	13				
Brewster	Sheep Pond	Weekly	E. Coli	13				
Brewster	Sheep Pond Beach (Tupelo Rd.)	Weekly	E. Coli	12				
Brewster	Slough Pond	Weekly	E. Coli	7				
Brewster	Slough Pond	Weekly	E. Coli	13				
Brewster	Upper Mill Pond	Weekly	E. Coli	13				
Brimfield	Dean Pond Beach	Weekly	Enterococci	16	1	90	90	1
Carver	Cooper's Pond	Weekly	E. Coli	17	1	290	290	
Carver	Crystal Lake	Weekly	E. Coli	17				
Carver	John's Pond	Weekly	E. Coli	17				
Carver	Sampson's Pond	Weekly	E. Coli	17				
Charlemont	Cold River Pool	Weekly	Enterococci	21	8	68	150	5
Charlton	Camp Foscett	Weekly	E. Coli	14				
Charlton	Camp Joslin	Weekly	E. Coli	9				
Charlton	Little Nugget	Weekly	E. Coli	10				
Charlton	Prindle Beach	Weekly	E. Coli	9				
Chatham	Goose Pond	Weekly	Enterococci	15	1	436	436	1
Chatham	Pilgrim Village	Weekly	Enterococci	13	1	203	203	1
Chatham	Schoolhouse Pond	Weekly	Enterococci	13				
Chatham	White Pond	Weekly	Enterococci	14	1	68	68	
Chelmsford	Freeman Lake	Weekly	E. Coli	9				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Chelmsford	Freeman Lake	Weekly	E. Coli	9				
Chesterfield	Chesterfield Scout Reservation - BSA	Weekly	E. Coli	10				
Chicopee	Chicopee Beach	Weekly	Enterococci	15				
Clarksburg	Mausert Pond - Day use area beach	Weekly	Enterococci	16	2	1050	1260	2
Concord	Annursnac Hill Assoc.	Weekly	E. Coli	15				
Concord	Kennedy Pond	Weekly	E. Coli	15	1	860	860	1
Concord	Silver Hill Assoc	Weekly	E. Coli	15				
Concord	Walden Pond - Main	Weekly	Enterococci	15				
Concord	Walden Pond - Red Cross	Weekly	Enterococci	15				
Concord	White Pond - SW Cove	Weekly	E. Coli	15				
Concord	White Pond Assoc	Weekly	E. Coli	15				
Conway	Conway Swimming Pool	Weekly	E. Coli	6				
Cummington	Shire Village Beach	Weekly	E. Coli	10	1	870	870	
Dennis	Flax Pond	Weekly	E. Coli	12				
Dennis	Princess Beach-Scargo Lake	Weekly	E. Coli	13				
Dennis	Scargo Lake	Weekly	E. Coli	13				
Douglas	Breezy Picnic Grounds	Weekly	E. Coli	13				
Douglas	Lake Manchaug Camping	Weekly	E. Coli	13				
Douglas	Wallum Lake Terrace	Weekly	E. Coli	13				
Douglas	Wallum Lake Terrace	Weekly	Enterococci	17	2	96	112	2
Dover	Grossman Beach	Weekly	E. Coli	14				
Dover	Powissett	Weekly	E. Coli	14				
Dracut	Fleur de Lis	Weekly	E. Coli	8				
Dracut	Grove	Weekly	E. Coli	8				
Dracut	Hilltop	Weekly	E. Coli	8				
Dracut	Mascuppic	Weekly	E. Coli	8				
Dracut	Passaconaway	Weekly	E. Coli	8				
Dracut	Peter's Pond	Weekly	E. Coli	8				
Dracut	Richardson	Weekly	E. Coli	8				
East Brookfield	Camp Frank A Day	Weekly	E. Coli	8				
East Brookfield	Lake Lashaway	Weekly	E. Coli	11				
Eastham	Great Pond	Weekly	E. Coli	13				
Eastham	Herring Pond	Weekly	E. Coli	13				
Eastham	Long Pond (Depot St.)	Weekly	E. Coli	13				
Eastham	Minister's Pond	Weekly	E. Coli	13				
Eastham	Nauset Haven Lakeside Condo (Minister)	Weekly	E. Coli	12				
Eastham	Whispering Pines Condo (Muddy Pond)	Weekly	E. Coli	12				
Eastham	Wiley Park	Weekly	E. Coli	13				
Easton	Swim area	Weekly	E. Coli	10				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Egremont	Prospect Lake Park	Weekly	E. Coli	14				
Erving	Laurel Lake	Weekly	Enterococci	15				
Essex	Camp Menorah	Weekly	E. Coli	9				
Essex	Centennial Grove	Weekly	E. Coli	13				
Falmouth	Ashumet Pond	Weekly	E. Coli	13				
Falmouth	Ashumet Valley Holly Sands	Weekly	E. Coli	12				
Falmouth	Coonamessett Pond	Weekly	E. Coli	13				
Falmouth	Grew's Pond	Weekly	E. Coli	13				
Falmouth	Jenkins Pond - Pinecrest	Weekly	E. Coli	12				
Falmouth	Lochstead Association	Weekly	E. Coli	12				
Falmouth	Mares Pond Association	Weekly	E. Coli	13	1	412	412	
Falmouth	Sand Point Shores-Rock Hollow	Weekly	E. Coli	12				
Falmouth	Sand Point Shores-White Cap	Weekly	E. Coli	12				
Falmouth	Shady Lane HA-Crooked Pond	Weekly	E. Coli	12				
Falmouth	Water-by Estates Association-Flax Pond	Weekly	E. Coli	12				
Florida	Manice Education Center Beach	Weekly	E. Coli	14				
Framingham	Cochituate Beach	Weekly	E. Coli	11	1	248	248	1
Framingham	Learned Beach	Weekly	E. Coli	11	2	304	2800	
Framingham	Washakum Beach	Weekly	E. Coli	10	1	550	550	
Franklin	Chilson Beach	Weekly	E. Coli	13	6	280	980	4
Freetown	Town Beach	Weekly	E. Coli	11	4	340	660	
Gardner	Bonnie Brae Day Camp	Weekly	E. Coli	7	1	640	640	
Gardner	Dunn Pond	Weekly	Enterococci	16				
Gardner	Kendall Pond	Three Times	E. Coli	3				
Georgetown	American Legion Park	Weekly	E. Coli	12	1	400	400	
Georgetown	Camp Leslie	Weekly	E. Coli	10				
Goshen	Camp Holy Cross	Weekly	E. Coli	5				
Goshen	Camp Howe	Weekly	E. Coli	15				
Goshen	Hammond Acres	Weekly	E. Coli	16				
Goshen	Upper Highland Lake - Campers Beach	Weekly	Enterococci	15				
Goshen	Upper Highland Lake - Day use area beach	Weekly	Enterococci	15				
Grafton	Silver Lake Beach	Weekly	E. Coli	11				
Great Barrington	Green River	Weekly	E. Coli	14				
Great Barrington	Green River	Weekly	Enterococci	3	2	79	147	1
Great Barrington	Lake Mansfield	Weekly	E. Coli	16				
Greenfield	Greenfield Municipal Bathing Beach	Weekly	E. Coli	15				
Groton	Baby Beach Lost Lake	Weekly	E. Coli	10				
Groton	Groton Town Beach	Weekly	E. Coli	9				
Groton	Grotonwood Camp	Weekly	E. Coli	9				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Halifax	17 Lake Street	Weekly	E. Coli	13				
Halifax	Annawon Street	Weekly	E. Coli	13				
Halifax	Cooke's Beach	Weekly	E. Coli	13				
Halifax	Halifax Beach	Weekly	E. Coli	13				
Halifax	Holmes Street	Weekly	E. Coli	12				
Halifax	Lingan Street	Weekly	E. Coli	13				
Halifax	Wamsutta	Weekly	E. Coli	12				
Hanson	Arlene	Weekly	E. Coli	10	2	360	1080	2
Hanson	Camp Kiwanee	Weekly	E. Coli	10				
Hanson	Cranberry	Weekly	E. Coli	15	2	500	1400	2
Hanson	Ocean Ave.	Weekly	E. Coli	10	4	340	2900	4
Hanson	Wilkey's	Weekly	E. Coli	10				
Harvard	Harvard Town Beach	Weekly	E. Coli	11				
Harwich	Aunt Edie's Pond	Weekly	E. Coli	12				
Harwich	Buck's Pond	Weekly	E. Coli	12				
Harwich	Great Sands	Weekly	E. Coli	24				
Harwich	Hinkley's Pond	Weekly	E. Coli	12				
Harwich	Long Pond Rte 124	Weekly	E. Coli	12				
Harwich	Long Pond-Cahoon St.	Weekly	E. Coli	12				
Harwich	Long Pond-Long Pond Drive	Weekly	E. Coli	12				
Harwich	Robbins Pond	Weekly	E. Coli	12				
Harwich	Sand Pond	Weekly	E. Coli	12				
Harwich	Seymour Pond	Weekly	E. Coli	12				
Harwich	Skinequit Pond	Weekly	E. Coli	12				
Haverhill	Plug's Pond	Weekly	E. Coli	10				
Heath	Mohawk Estates	Weekly	E. Coli	13				
Heath	Mohawk Estates	Weekly	E. Coli	13				
Hinsdale	Camp Ashmere Beach	Weekly	E. Coli	15				
Hinsdale	Camp Emerson Beach	Weekly	E. Coli	11				
Hinsdale	Camp Emerson Marina	Weekly	E. Coli	12				
Hinsdale	Camp Emerson Marina	Weekly	Coliform	12				
Hinsdale	Camp Romaca	Weekly	E. Coli	7				
Hinsdale	Camp Romaca	Weekly	E. Coli	7				
Hinsdale	Camp Taconic Beach	Weekly	E. Coli	12				
Hinsdale	Dan Duquette Sports Academy	Weekly	E. Coli	10				
Hinsdale	Plunkett Lake Beach	Weekly	E. Coli	20	1	270	270	1
Holden	Camp Kinneywood Beach	Weekly	E. Coli	10				
Holden	Eagle Lake	Weekly	E. Coli	10				
Holland	Holland Pond	Weekly	E. Coli	17				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Holliston	Pleasure Point	Weekly	E. Coli	12				
Holliston	Stoddard	Weekly	E. Coli	12				
Hopkinton	Hopkinton Reservoir-Main Beach	Weekly	Enterococci	15				
Hopkinton	Hopkinton Reservoir-Upper Beach	Weekly	Enterococci	15				
Hopkinton	Sandy Beach	Weekly	E. Coli	12	1	600	600	
Hopkinton	Sandy Beach	Weekly	E. Coli	12	1	520	520	
Hopkinton	Sandy Beach	Weekly	E. Coli	11				
Hubbardston	Comet Pond Beach	Weekly	Enterococci	16	1	64	64	1
Hubbardston	Pinecrest Property Owners Assoc.	Twice	E. Coli	2				
Hudson	Hudson Centennial Beach	Weekly	E. Coli	10				
Huntington	Camp Sandy Brook	Weekly	E. Coli	10				
Huntington	Westfield River Beach	Once	Enterococci	1	1	102	102	1
Ipswich	Hood Pond-boat ramp	Weekly	Enterococci	14				
Kingston	Camp Mishannock	Weekly	E. Coli	6				
Lakeville	Big Beach	Weekly	E. Coli	15	1	380	380	1
Lakeville	Clark Shores 3	Weekly	E. Coli	14	1	400	400	1
Lakeville	Clear Pond	Weekly	E. Coli	11				
Lakeville	Heaven Heights	Weekly	E. Coli	8				
Lakeville	Ted Williams	Three times	E. Coli	3				
Lancaster	Camp Lowe Beach	Weekly	E. Coli	11	1	600	600	1
Lancaster	Lancaster Town Beach	Weekly	E. Coli	9				
Lanesborough	Camp Mohawk Beach	Weekly	E. Coli	10				
Lanesborough	Sunrise Beach	Weekly	E. Coli	12				
Lee	Sandy Beach	Weekly	E. Coli	10				
Lenox	Laurel Lake	Weekly	E. Coli	11				
Leominster	Ricker's Kindercamp	Weekly	E. Coli	7				
Lexington	Old Reservoir Swim Area Left #1	Weekly	Enterococci	13				
Lexington	Old Reservoir Swim Area Right #1	Weekly	Enterococci	13				
Littleton	Littleton Town Beach	Weekly	E. Coli	11				
Lowell	Merrimac River - Boat House	Weekly	E. Coli	11				
Ludlow	Haviland Pond	Weekly	E. Coli	16	1	2000	2000	
Ludlow	Haviland Pond	Weekly	E. Coli	16	1	2000	2000	
Lunenburg	Hickory Hill	Weekly	E. Coli	10				
Lunenburg	Hickory Hills Island Rd.	Weekly	E. Coli	10				
Lunenburg	Lunenburg Town Beach	Weekly	E. Coli	13	3	238	600	2
Lunenburg	Shady Point Campground	Weekly	E. Coli	6				2
Lynn	Flax Pond - Railing	Weekly	E. Coli	6	4	470	2000	
Lynn	Flax Pond - Rocks	Weekly	E. Coli	6	4	270	1690	
Lynn	Sluice Pond - Briarcliff Lodge	Weekly	E. Coli	6	1	1000	1000	

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Lynn	Sluice Pond - Four Winds	Weekly	E. Coli	6				
Marlborough	Boat Ramp	Twice	E. Coli	2				
Marlborough	Grove	Twice	E. Coli	2				
Marlborough	McDonald Beach	Weekly	E. Coli	7				
Marlborough	Memorial - Left	Weekly	E. Coli	12				
Marlborough	Memorial - Middle	Weekly	E. Coli	12				
Marlborough	Memorial - Right	Weekly	E. Coli	12				
Marlborough	Rodger's Beach	Weekly	E. Coli	7				
Mashpee	Ashumet Pond (20 Wheeler Road)	Weekly	E. Coli	14				
Mashpee	Attaquin	Weekly	E. Coli	13	1	800	800	1
Mashpee	Camp Farley - Wakeby Pond	Weekly	E. Coli	13				
Mashpee	Fells Pond	Weekly	E. Coli	12				
Mashpee	John's Pond	Weekly	E. Coli	7				
Mashpee	John's Pond (Briarwood)	Weekly	E. Coli	12				
Mashpee	John's Pond (North)	Weekly	E. Coli	12				
Mashpee	John's Pond (Public)	Weekly	E. Coli	26				
Mashpee	Mashpee Shores Assoc.	Weekly	E. Coli	12				
Mashpee	Santuit Pond	Weekly	E. Coli	32	6	240	800	4
Mashpee	Santuit Pond Estate Assoc. - Santuit Pond	Weekly	E. Coli	14	2	400	800	1
Mashpee	Trustee's of the Reservation (Mashpee Pond)	Weekly	E. Coli	12				
Mashpee	Trustee's of the Reservation (Wakeby Pond)	Weekly	E. Coli	12				
Medfield	Hinkley	Weekly	E. Coli	9				
Medfield	Hinkley	Weekly	Enterococci	9				
Medford	Wrights Pond - Deep End	Weekly	E. Coli	12				
Medford	Wrights Pond - Shallow End	Weekly	E. Coli	14	2	300	448	2
Medway	Choate Pond	Weekly	E. Coli	5				1
Medway	Choate Pond	Weekly	E. Coli	5				
Mendon	Town Beach	Weekly	E. Coli	9				
Merrimac	Indian Head Park	Weekly	E. Coli	13				
Methuen	Forest Lake - Center	Weekly	E. Coli	16				
Methuen	Forest Lake - North Ramp	Weekly	E. Coli	16				
Methuen	Forest Lake - Right	Weekly	E. Coli	16				
Methuen	Forest Lake - South Ramp	Weekly	E. Coli	15				
Middleborough	Camp Avoda	Weekly	E. Coli	8				
Middleborough	Camp Yomechas	Weekly	E. Coli	16	1	400	400	
Middleborough	Woods Pond Cabins	Weekly	E. Coli	8				
Middleton	Thunderbridge	weekly	E. Coli	11	1	270	270	1
Milton	DCR - Houghton's Pond @ Bathouse	Weekly	Enterococci	16	1	62	62	1
Monterey	Benedict Pond Beach	Weekly	Enterococci	15				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Monterey	Camp Half Moon	Weekly	E. Coli	11				
Monterey	Lake Garfield	Weekly	E. Coli	16				
Mt. Washington	Camp Hi Rock - Bear Rock Beach	Weekly	E. Coli	18				
Mt. Washington	Camp Hi Rock - Main Beach	Weekly	E. Coli	18				
Nantucket	Miacomet Pond	Weekly	E. Coli	11				
Nantucket	Sesachacha Pond	Weekly	E. Coli	11				
Natick	Camp Arrowhead	Weekly	E. Coli	11				
Natick	Camp Nonesuch	Weekly	E. Coli	10	1	264	264	1
Natick	Cochituate Lake-North Beach	Weekly	Enterococci	15				
Natick	Dug Pond - Diving	Weekly	E. Coli	11				
Natick	Dug Pond - Kiddie	Weekly	E. Coli	12				
Newton	Crystal Lake	Twice per week	E. Coli	29	1	252	252	
Newton	Crystal Lake	Twice per week	Enterococci	19	3	108	268	1
North Andover	Berry Pond Beach	Weekly	Enterococci	15				
North Andover	Frye Pond Beach	Weekly	Enterococci	16	1	3400	3400	1
North Andover	Stevens Pond - Right	Weekly	E. Coli	10				
North Attleboro	Falls Pond	Weekly	E. Coli	29	4	250	830	
North Attleboro	Whitings Pond	Weekly	E. Coli	42	9	240	700	
North Brookfield	Brooks Pond	Weekly	E. Coli	11				
North Brookfield	Camp Atwater	Weekly	E. Coli	7	1	260	260	
Northampton	Musante Beach	Weekly	E. Coli	10				
Northbridge	Camp Hickory Hills	Weekly	E. Coli	6				
Northbridge	Memorial Beach	Weekly	E. Coli	6				
Oakham	Lake Dean - Dean Campground	Weekly	E. Coli	15				
Oakham	Lake Dean - Pine Acres Campground	Weekly	E. Coli	15				
Orange	Camp Selah	Twice	E. Coli	2				
Orange	Mattawa Beach	Weekly	E. Coli	15				
Orleans	Baker's Pond	Weekly	E. Coli	12				
Orleans	Crystal Lake	Weekly	E. Coli	12				
Orleans	Pilgrim Lake	Weekly	E. Coli	12				
Otis	Camp Bonnie Brae	Weekly	E. Coli	11				
Otis	Camp Nawaka	Weekly	E. Coli	11				
Otis	Camp Overflow Beach	Weekly	E. Coli	16				
Otis	Otis Reservoir Beach	Weekly	Enterococci	15				
Otis	Otis Woodlands	Weekly	E. Coli	18				
Otis	Otis Woodlands	Weekly	Enterococci	1				
Otis	Otis Woodlands	Weekly	Coliform	1				
Otis	Otis Woodlands	Weekly	Coliform	18				
Otis	Otis Woodlands	Weekly	E. Coli	18				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Otis	Otis Woodlands	Weekly	Enterococci	1				
Otis	Otis Woodlands	Weekly	Coliform	1				
Otis	Otis Woodlands	Weekly	Coliform	18				
Otis	Otis Woodlands	Weekly	E. Coli	18				
Otis	Otis Woodlands	Weekly	Enterococci	1				
Otis	Otis Woodlands	Weekly	Coliform	1				
Otis	Otis Woodlands	Weekly	Coliform	18				
Oxford	Carbunkle Pond	Weekly	E. Coli	15	4	240	680	
Pembroke	Finn Camp	Weekly	E. Coli	15	2	490	2400	2
Pembroke	Furnace Colony	Weekly	E. Coli	14	1	1400	1400	1
Pembroke	Hobomoc Pond	Weekly	E. Coli	14				
Pembroke	Little Sandy	Weekly	E. Coli	15	1	1640	1640	1
Pembroke	Oldham	Weekly	E. Coli	14				
Pembroke	Stetson	Weekly	E. Coli	15	1	248	248	1
Peru	Camp Danbee	Weekly	E. Coli	15				
Phillipston	Queen Lake Beach	Twice	E. Coli	1				
Phillipston	Queen Lake Beach	Twice	Enterococci	2	2	200	332	1
Pittsfield	Camp St. Michael	Weekly	E. Coli	8				
Pittsfield	Camp Witaweintin	Weekly	E. Coli	8				
Pittsfield	Country Club of Pittsfield	Weekly	E. Coli	9				
Pittsfield	Lakeside Christian Camp	Weekly	E. Coli	10				
Pittsfield	Lulu Pond Beach	Weekly	Enterococci	19	6	66	600	5
Pittsfield	Onota Lake	Weekly	E. Coli	10				
Pittsfield	Onota Lake	Weekly	E. Coli	9				
Pittsfield	Onota Lake	Weekly	E. Coli	9				
Pittsfield	Onota Lake	Weekly	E. Coli	10				
Pittsfield	Pontoosuc Lake	Weekly	E. Coli	10				
Pittsfield	Pontoosuc Lake	Weekly	E. Coli	9				
Pittsfield	Pontoosuc Lake	Weekly	E. Coli	10				
Plainfield	Plainfield Pond	Biweekly	E. Coli	7				
Plymouth	Barrett Pond	Weekly	Enterococci	14	2	200	297	1
Plymouth	Bloody Pond - Baird Center	Weekly	E. Coli	10				
Plymouth	Blueberry Hill Camp - Curlew Pond	Weekly	E. Coli	12				
Plymouth	Camp Bournedale - Great Herring Pond	Weekly	E. Coli	7				
Plymouth	Camp Clark YMCA - Hyles Pond	Weekly	E. Coli	8				
Plymouth	Camp Dennen - Hedges Pond	Weekly	E. Coli	9				
Plymouth	Camp Massasoit - Elbow Pond	Weekly	E. Coli	8				
Plymouth	Charge Pond	Weekly	Enterococci	13	1	177	177	1
Plymouth	College Pond Day Use	Weekly	Enterococci	15	3	70	183	2

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Plymouth	Curlew Pond	Weekly	Enterococci	14	1	183	183	1
Plymouth	Ellis Haven - Ellis Pond	Weekly	E. Coli	15				
Plymouth	Ellis Haven - Swimming Hole	Weekly	E. Coli	11				
Plymouth	Fearing Pond	Weekly	Enterococci	21	2	137	200	2
Plymouth	Fresh Pond - End Pond	Weekly	E. Coli	9				
Plymouth	Fresh Pond - Mid Pond	Weekly	E. Coli	9				
Plymouth	Indian Head	Weekly	E. Coli	8				
Plymouth	Morton Park - Left	Weekly	E. Coli	9				
Plymouth	Morton Park - Right	Weekly	E. Coli	9				
Plymouth	Pinewood Camp - Camphouse Beach	Weekly	E. Coli	10				
Plymouth	Pinewood Camp - Crew Dock	Weekly	E. Coli	10				
Plymouth	Pinewood Camp - Pinecones Beach	Weekly	E. Coli	10				
Plymouth	Pinewood Lodge - Fresh Meadow	Weekly	E. Coli	12				
Plymouth	Plymouth Estates	Weekly	E. Coli	11				
Plymouth	Sandy Pond Campground	Weekly	E. Coli	11				
Randolph	Ponkapoag Pond	Weekly	E. Coli	7				
Richmond	Camp Marion White	Weekly	E. Coli	18				
Richmond	Camp Russell	Weekly	E. Coli	9				
Richmond	Richmond Shores - East	Weekly	E. Coli	12				
Richmond	Richmond Town Beach	Weekly	E. Coli	12				
Rochester	Perry's Camp	Weekly	Enterococci	11	1	106	106	
Rochester	Snipituit Pond	Weekly	Enterococci	11	2	76	500	
Rockland	Hartstuff Park	Weekly	Coliform	7				
Rowe	Rowe Beach - Center	Weekly	E. Coli	16				
Rowe	Rowe Beach - Inlet	Weekly	E. Coli	15	2	238	479	
Rowe	Rowe Beach - Right	Weekly	E. Coli	16				
Royalston	Tully Lake Campground	Weekly	E. Coli	17				
Russell	H.A. Moses Beach	Weekly	E. Coli	9				
Rutland	Whitehall Pond Beach	Weekly	Enterococci	15				
Sandisfield	York Lake Beach	Weekly	Enterococci	15				
Sandwich	Camp Good News	Weekly	E. Coli	12				
Sandwich	Dunroamin Park & Cottages	Weekly	E. Coli	12				
Sandwich	Hoxie Pond	Weekly	E. Coli	13				
Sandwich	Lakefield Farms Trust	Weekly	E. Coli	13				
Sandwich	Lakewood Hills Property Owners Assoc.	Weekly	E. Coli	12				
Sandwich	Lawrence Pond	Weekly	E. Coli	13				
Sandwich	Lawrence Pond Mobile Home Park	Weekly	E. Coli	12				
Sandwich	Peter's Pond Park (boat ramp)	Weekly	E. Coli	13				
Sandwich	Peter's Pond Town Park 1	Weekly	E. Coli	13				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Sandwich	Pimlico Pond	Weekly	E. Coli	13				
Sandwich	Rolling Ridge Homeowners Assoc.-Lawrence Pond	Weekly	E. Coli	12				
Sandwich	Snake Pond	Weekly	E. Coli	13				
Sandwich	Triangle Pond	Weekly	E. Coli	13				
Sandwich	Wakeby Pond	Weekly	E. Coli	13				
Saugus	DCR - Pearce Lake @ Breakheart	Weekly	Enterococci	18	2	129	223	2
Saugus	DCR - Pecham Pond @ Camp Nihan	Weekly	Enterococci	18	4	81	141	4
Savoy	North Pond Beach	Weekly	Enterococci	16	1	110	110	1
Savoy	South Pond Beach	Weekly	Enterococci	17	2	74	112	2
Sharon	Camp Gannett Beach	Weekly	E. Coli	9				
Sharon	Camp Wonderland Beach	Weekly	E. Coli	8				
Sharon	Town Beach - Boat Landing	Twice per week	E. Coli	26				
Sharon	Town Beach - Concession	Twice per week	E. Coli	26				
Sharon	Town Beach - Docks	Twice per week	E. Coli	26				
Sharon	Town Beach-Boat Landing Area	Twice per week	E. Coli	26				
Sheffield	Berkshire School Beach	Weekly	E. Coli	16				
Sherborn	Farm Pond	Weekly	E. Coli	16				
Shrewsbury	Sunset Beach	Weekly	E. Coli	11				
Shutesbury	Lake Wyola	Weekly	Enterococci	16	1	78	78	1
Southwick	South Pond Beach - North	Weekly	E. Coli	10	3	272	400	
Spencer	Camp Marshall - Thompson	Weekly	E. Coli	10	1	440	440	
Spencer	Howe Pond Beach	Twice per week	E. Coli	26				
Spencer	Lake Whittenmore	Weekly	E. Coli	11				
Spencer	Stiles - Camp Larel Wood	Weekly	E. Coli	15				
Springfield	Bass Pond - Left	Weekly	E. Coli	6				
Springfield	Bass Pond - Right	Weekly	E. Coli	6				
Springfield	Five Mile Pond - Left	Weekly	E. Coli	6				
Springfield	Five Mile Pond - Right	Weekly	E. Coli	7	1	400	400	
Springfield	Knights of Columbus - Left	Weekly	E. Coli	8	1	451	451	
Springfield	Knights of Columbus - Right	Weekly	E. Coli	7				
Springfield	Lake Lorraine	Weekly	Enterococci	15				
Springfield	Paddle Club - Left	Weekly	E. Coli	7				
Springfield	Paddle Club - Right	Weekly	E. Coli	7				
Sterling	Lake Waushacum #2	Weekly	E. Coli	11				
Stockbridge	Beachwood Assoc. - Stockbridge Bowl	Weekly	E. Coli	16				
Stockbridge	Berkshire Country Day School	Weekly	E. Coli	8				
Stockbridge	Camp Mahkeenac	Weekly	E. Coli	15				
Stockbridge	Kripalu	Weekly	E. Coli	8				
Stockbridge	Sports School Day Camp	Weekly	E. Coli	7				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Stockbridge	Stockbridge Bowl	Weekly	E. Coli	9				
Stockbridge	White Pines Condos	Weekly	E. Coli	14				
Stoughton	Ames Pond	Weekly	E. Coli	12				
Stow	Lake Boone	Weekly	E. Coli	13				
Sturbridge	Main Beach - Walker Pond Assoc.	Weekly	E. Coli	14				
Sturbridge	Oak Cove - Walker Pond Assoc.	Weekly	E. Coli	14				
Sturbridge	Outdoor World Beach	Weekly	E. Coli	13				
Sturbridge	Streeter Point	Weekly	Enterococci	16	3	94	170	2
Sturbridge	Sturbridge Host Hotel	Weekly	E. Coli	15				
Sturbridge	Sturbridge Recreation - Cedar Pond	Weekly	E. Coli	11	1	260	260	
Sturbridge	Wells State Park	Weekly	Enterococci	15				
Sutton	Camp Blanchard	Weekly	E. Coli	12				
Sutton	Camp Marion	Weekly	E. Coli	12				
Sutton	King's Campground	Weekly	E. Coli	15				
Sutton	Old Holbrook Campground	Weekly	E. Coli	15				
Sutton	Sutton Falls Camp	Weekly	E. Coli	18	3	360	800	
Taunton	Campers Beach / Middle Pond	Weekly	Enterococci	10				
Taunton	Watsons Pond	Weekly	Enterococci	15	2	201	210	2
Templeton	Beamans Pond	Weekly	Enterococci	18	4	70	164	5
Templeton	Beamans Pond Campground	Weekly	Enterococci	17	3	84	116	3
Templeton	Pinewood Shores	Weekly	Enterococci	8	2	96	96	1
Templeton	Templeton Fish and Game Club	Twice	Enterococci	2				
Tisbury	Long Cove (fresh)	Weekly	E. Coli	11				
Tisbury	Tisbury Great Pond	Weekly	E. Coli	12				
Tolland	Camp Kinderland Beach	Weekly	E. Coli	12				
Tolland	Camp Timbertrails	Weekly	E. Coli	10				
Tolland	Twin-Brook Camping Area	Monthly	E. Coli	5				
Topsfield	Hood's Pond	Biweekly	E. Coli	8				
Townsend	Pearl Hill Pond Beach	Weekly	Enterococci	22	4	62	84	5
Tyngsborough	Town	Weekly	E. Coli	13	2	250	1200	
Tyringham	Tyringham Park Beach	Weekly	E. Coli	9				
Upton	Pratt Pond	Weekly	E. Coli	12	1	600	600	1
Upton	Taft Pond Beach	Weekly	E. Coli	11				
Upton	Wildwood Pond Beach	Weekly	E. Coli	11	2	268	490	
Uxbridge	Buffumville Lake	Weekly	E. Coli	17				
Uxbridge	Fairwoods	Weekly	E. Coli	9	1	1600	1600	
Uxbridge	Pout Pond	Weekly	E. Coli	7				
Uxbridge	West Hill Park	Weekly	E. Coli	23	4	250	350	
Wales	Lake Land	Weekly	E. Coli	11	3	400	800	

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Wales	Sichol	Weekly	E. Coli	11	1	640	640	
Wales	Town Beach	Weekly	E. Coli	11				
Walpole	Sharon Country Day Camp Brook	Weekly	E. Coli	9				
Walpole	Sharon Country Day Camp Pond	Weekly	E. Coli	9				
Wareham	Glen Charlie at Shangri-La	Weekly	E. Coli	11				
Warren	Comin's Pond	Weekly	E. Coli	12				
Wayland	Lake Cochituate - Left Buoy (deep)	Weekly	E. Coli	13				
Wayland	Lake Cochituate - Left Shallow	Weekly	E. Coli	13				
Wayland	Lake Cochituate - Middle	Weekly	E. Coli	13				
Wayland	Lake Cochituate - Right Shallow	Weekly	E. Coli	13				
Webster	Beacon Park	Weekly	E. Coli	14				
Webster	Birch Island	Weekly	E. Coli	12				
Webster	Colonial Park	Weekly	E. Coli	13				
Webster	Indian Ranch	Weekly	E. Coli	12				
Webster	Kildeer Island	Weekly	E. Coli	14				
Webster	Lakeside	Weekly	E. Coli	20	2	260	310	2
Webster	Memorial Beach #1	Weekly	E. Coli	15				
Webster	Memorial Beach #2	Weekly	E. Coli	14				
Webster	Nipmuc Cove	Weekly	E. Coli	6				
Webster	Point Breeze	Weekly	E. Coli	6				
Webster	Treasure Island	Weekly	E. Coli	14				
Wellesley	Morses Beach - Deep	Weekly	E. Coli	10	1	260	260	
Wellesley	Morses Beach - Shallow	Weekly	E. Coli	15	5	260	1400	
Wellfleet	Duck Pond	Weekly	E. Coli	13				
Wellfleet	Dyer Pond	Weekly	E. Coli	12				
Wellfleet	Great Pond	Weekly	E. Coli	13				
Wellfleet	Gull Pond	Weekly	E. Coli	12				
Wellfleet	Gull Pond (2)	Weekly	E. Coli	13				
Wellfleet	Higgins Pond	Weekly	E. Coli	12				
Wellfleet	Long Pond	Weekly	E. Coli	13				
Wellfleet	Spectacle Pond	Weekly	E. Coli	13				
Wendell	Ruggles Pond	Weekly	Enterococci	14	1	162	162	1
Wenham	Gull Pond	Weekly	E. Coli	10				
Wenham	Pleasant Street Pond	Biweekly	E. Coli	5	1	1400	1400	
West Brookfield	Lake Wickabog - Main Beach	Weekly	E. Coli	16				
West Stockbridge	Card Pond Beach	Weekly	E. Coli	16				
West Stockbridge	Crane Lake Camp	Weekly	E. Coli	12				
West Tisbury	Coca-Cola Brook @ Beach	Weekly	E. Coli	12	3	246	389	
West Tisbury	Coca-Cola Brook @ Road	Twice	E. Coli	2				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
West Tisbury	Seth's Pond Beach #1 (Focus)	Weekly	Enterococci	13				
West Tisbury	Seth's Pond Cove #2 (Focus)	Weekly	Enterococci	14	1	104	104	
Westborough	Lake Chauncy Beach #1	Weekly	E. Coli	10				
Westfield	Kingsley	Weekly	Enterococci	21	6	62	204	3
Westfield	Lambert's	Weekly	Enterococci	21	6	64	246	5
Westford	American Legion	Weekly	E. Coli	14				
Westford	East Boston Camps - Boys Beach	Weekly	E. Coli	13				
Westford	East Boston Camps - Day Care	Weekly	E. Coli	13				
Westford	Edwards Town Beach	Weekly	E. Coli	15				
Westford	Forge Village Beach	Weekly	E. Coli	15				
Westford	Lakeside Meadows	Weekly	E. Coli	15				
Westford	Marylou's Beach - NIA Beach	Weekly	E. Coli	15				
Westford	Nashoba Ski Area - Day Campers Beach	Weekly	E. Coli	14				
Westford	Nashoba Ski Area - Swim Club Beach	Weekly	E. Coli	14				
Westford	North Beach - NIA Beach	Weekly	E. Coli	15				
Westford	Sandy Beach - NIA Beach	Weekly	E. Coli	15				
Westford	Wymans Campers Beach	Weekly	E. Coli	15				
Westford	Wymans Main Beach - North	Weekly	E. Coli	16	1	600	600	1
Westford	Wymans Main Beach - South	Weekly	E. Coli	16				
Westminster	Crocker Pond	Unknown	E. Coli	4	1	410	410	
Westminster	Crocker Pond	Unknown	Enterococci	2	1	1120	1120	
Westminster	Crow Hill Pond Beach	Weekly	Enterococci	15				
Westminster	Wyman Pond	Once	E. Coli	1				
Weston	River Day Camp	Weekly	E. Coli	9				
Weston	Valley Pond	Weekly	E. Coli	15				
Westport	Sawdy Pond	Weekly	E. Coli	12				
Westport	South Watuppa Pond	Weekly	E. Coli	12	2	580	1000	1
Westwood	Membership Beach	Weekly	E. Coli	15				
Westwood	North Beach	Weekly	E. Coli	18	1	530	530	
Wilbraham	9 Mile Pond	Weekly	E. Coli	10				
Wilbraham	Spec Pond Beach	Weekly	E. Coli	10				
Wilbraham	Spec Pond Camp	Weekly	E. Coli	10				
Williamstown	Margaret Lindley Park	Biweekly	E. Coli	8				
Wilmington	Baby Beach	Weekly	E. Coli	12	1	240	240	
Wilmington	Town Beach	Weekly	E. Coli	1				
Wilmington	Town Beach	Weekly	E. Coli	11				
Wilmington	Town Beach	Weekly	E. Coli	12				
Winchendon	Lake Dennison State Park	Weekly	Enterococci	15				
Winchendon	Lake Dennison State Park	Weekly	Enterococci	15				

Table 22

Water quality data for freshwater public and semi-public bathing beaches in Massachusetts in 2006.

Community	Beach Name ¹	Testing Frequency	Indicator Type	# of Tests	# of Single Sample Exceedances	Minimum Exceedance	Maximum Exceedance	Number of Postings ²
Winchester	Sandy Beach @ Upper Mystic	Weekly	Enterococci	27	8	70	785	8
Winchester	Wedge Pond - North	Weekly	Enterococci	12	2	75	210	2
Winchester	Wedge Pond - South	Weekly	Enterococci	11	2	89	330	2
Windsor	Westfield River Beach	Weekly	Enterococci	11	3	74	300	2
Worcester	Bell Pond Beach	Weekly	E. Coli	11	1	253	253	2
Worcester	Coes Pond Mill St. Beach	Weekly	E. Coli	9				
Worcester	Indian Lake Public Beach	Weekly	E. Coli	9				
Worcester	Indian Lake Shore Park	Weekly	E. Coli	9				
Worcester	Lake Quinsigamond-Lake Park Beach	Weekly	Enterococci	16	1	82	82	2
Worcester	Lake Quinsigamond-Regatta Point Beach	Weekly	Enterococci	18	3	90	246	3
Wrentham	Lake Archer	Weekly	E. Coli	14				
Wrentham	Lake Pearl Park	Weekly	E. Coli	16	3	260	1300	
Wrentham	Sweatt Beach	Weekly	E. Coli	10	1	990	990	
Yarmouth	Big Sandy Pond	Weekly	E. Coli	12				
Yarmouth	Camp Greenough - Boy Scouts	Weekly	E. Coli	6				
Yarmouth	Dennis Pond	Weekly	E. Coli	13				
Yarmouth	Elijah's Pond, Camp Wingate	Weekly	E. Coli	12				
Yarmouth	Flax Pond	Weekly	E. Coli	13				
Yarmouth	Horse Pond	Weekly	E. Coli	13				
Yarmouth	Horse Pond - Halcyon Condos	Weekly	E. Coli	12				
Yarmouth	Little Sandy Pond	Weekly	E. Coli	13				
Yarmouth	Long Pond - Indian	Weekly	E. Coli	13				
Yarmouth	Long Pond - Lyman	Weekly	E. Coli	13	1	320	320	
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.								

Table 23

Number of exceedances for public and semi-public beaches which reported environmental sources of pollution
Massachusetts in 2006

Marine beaches			
	# of Exceedances	# of Samples	%
Recorded environmental pollution source	75	802	9.4%
No recorded pollution source	330	7,568	4.4%
Exceedance	405	8,370	4.8%
Freshwater beaches			
Recorded environmental pollution source	42	849	4.9%
No recorded pollution source	237	6,589	3.6%
Exceedance	279	7,438	3.8%

Table 24

Exceedances Reported Based on the Number of Days Since Last Rainfall at Massachusetts Public and Semi-public Bathing Beaches During the 2006 Season

Marine beaches		
Number of Days Since Rain	Number of Exceedances	%
0	282	69.6%
1	74	18.3%
2	13	3.2%
3	10	2.5%
4	14	3.5%
5	5	1.2%
6	1	0.2%
7	1	0.2%
8	0	0.0%
9	4	1.0%
10	0	0.0%
Indeterminant	1	0.2%
Total	405	100.0%
Freshwater beaches		
0	128	45.9%
1	33	11.8%
2	18	6.5%
3	15	5.4%
4	11	3.9%
5	17	6.1%
6	4	1.4%
7	5	1.8%
8	2	0.7%
9		0.0%
10		0.0%
Indeterminant	46	16.5%
Total	279	100.0%

Table 25

Comparison of 2005 Top 10 Marine Beaches in terms of number of single sample exceedances versus sampling events to its respective 2006 data.

2005 Marine Beach Data

Community	Beach	Indicator Type	# of Tests ¹	# Exceedances	Range of Exceedances	% of Samples Exceeding Standard
Chatham	Cockle Cove Creek ²	Enterococci	11	8	115-1710	72.7%
Danvers	Sandy Beach	Enterococci	11	6	170-6000	54.5%
Eastham	Cook's Brook	Enterococci	30	12	110-400	40.0%
Braintree	Smith Beach	Enterococci	15	6	110-560	40.0%
Lynn	Kings (DCR - DUPR)	Enterococci	15	5	140-460	33.3%
Marion	River Road ³	Enterococci	12	4	113-6200	33.3%
Salem	Pickman	Enterococci	12	4	210-5000	33.3%
Provincetown	Johnson Street	Enterococci	20	6	104-256	30.0%
Nahant	Black Rock	Enterococci	14	4	123-940	28.6%
Cohasset	Bassing's (Sailing Club)	Enterococci	14	4	107-182	28.6%

2006 Marine Beach Data

Community	Beach	Indicator Type	# of Tests	# Exceedances	Range of Exceedances	% of Samples Exceeding Standard
Chatham	Cockle Cove Creek ²	Enterococci	15	10	175-1670	66.7%
Danvers	Sandy Beach	Enterococci	13	3	126-510	23.1%
Eastham	Cook's Brook	Enterococci	13	0	---	0.0%
Braintree	Smith Beach	Enterococci	14	2	126-159	14.3%
Lynn	Kings (DCR - DUPR)	Enterococci	24	5	106-585	20.8%
Marion	River Road	Enterococci	11	6	260-790	54.5%
Salem	Pickman	Enterococci			not monitored -beach closed entire season	
Provincetown	Johnson Street	Enterococci	15	2	106-144	13.3%
Nahant	Black Rock	Enterococci	12	0	---	0.0%
Cohasset	Bassing's (Sailing Club)	Enterococci	13	0	---	0.0%

1 - Only beaches with 6 or more samples during the season were considered for inclusion

2 - Beach closed during 2005 and 2006 Beach Seasons

3 - Beach closed during 2005 Beach Season

Table 26

Comparison of 2005 Top 10 Freshwater Beaches in terms of number of single sample exceedances versus sampling events to its respective 2006 data.

2005 Freshwater Beach Data

Community	Beach	Indicator Type	# of Tests ¹	# Exceedances	Range of Exceedances	% of Samples Exceeding Standard
Lynn	Flax Pond - Railing ²	E. Coli	6	6	348-2000	100.0%
Lynn	Flax Pond - Rocks ²	E. Coli	6	5	264-5320	83.3%
Great Barrington	Green River	E. Coli	14	8	240-798	57.1%
West Tisbury	Coca-Cola Brook @ Beach	Enterococci	9	5	64-300	55.6%
Georgetown	American Legion Park	E. Coli	11	6	310-800	54.5%
Huntington	Westfield River Beach	Enterococci	12	5	62-2000	41.7%
Springfield	Lake Lorraine	Enterococci	22	9	80-600	40.9%
Ashby	Damon Pond Beach	Enterococci	19	7	74-440	36.8%
Lakeville	Heaven Heights	E. Coli	6	2	410-2000	33.3%
Lynn	Sluice Pond - Four Winds ²	E. Coli	6	2	548-790	33.3%

2006 Freshwater Beach Data

Community	Beach	Indicator Type	# of Tests	# Exceedances	Range of Exceedances	% of Samples Exceeding Standard
Lynn	Flax Pond - Railing ²	E. Coli	6	4	470-2000	66.7%
Lynn	Flax Pond - Rocks ²	E. Coli	6	4	270-1690	66.7%
Great Barrington	Green River	E. Coli	14	0	---	0.0%
	Green River	Enterococci	3	2	79-147	66.7%
West Tisbury	Coca-Cola Brook @ Beach	Enterococci	12	3	246-389	25.0%
Georgetown	American Legion Park	E. Coli	12	1	400	8.3%
Huntington	Westfield River Beach ³	Enterococci	1	1	102	100.0%
Springfield	Lake Lorraine	Enterococci	15	0	---	0.0%
Ashby	Damon Pond Beach	Enterococci	23	5	80-150	21.7%
Lakeville	Heaven Heights	E. Coli	8	0	---	0.0%
Lynn	Sluice Pond - Four Winds ²	E. Coli	6	0	---	0.0%

1 - Only beaches with 6 or more samples during the season were considered for inclusion

2 - Beach closed during 2005 and 2006 Beach Seasons

3 - Beach closed during 2006 Beach Season

X. FIGURES

Figure 1: MDPH Public Beach Notification Website: statewide map

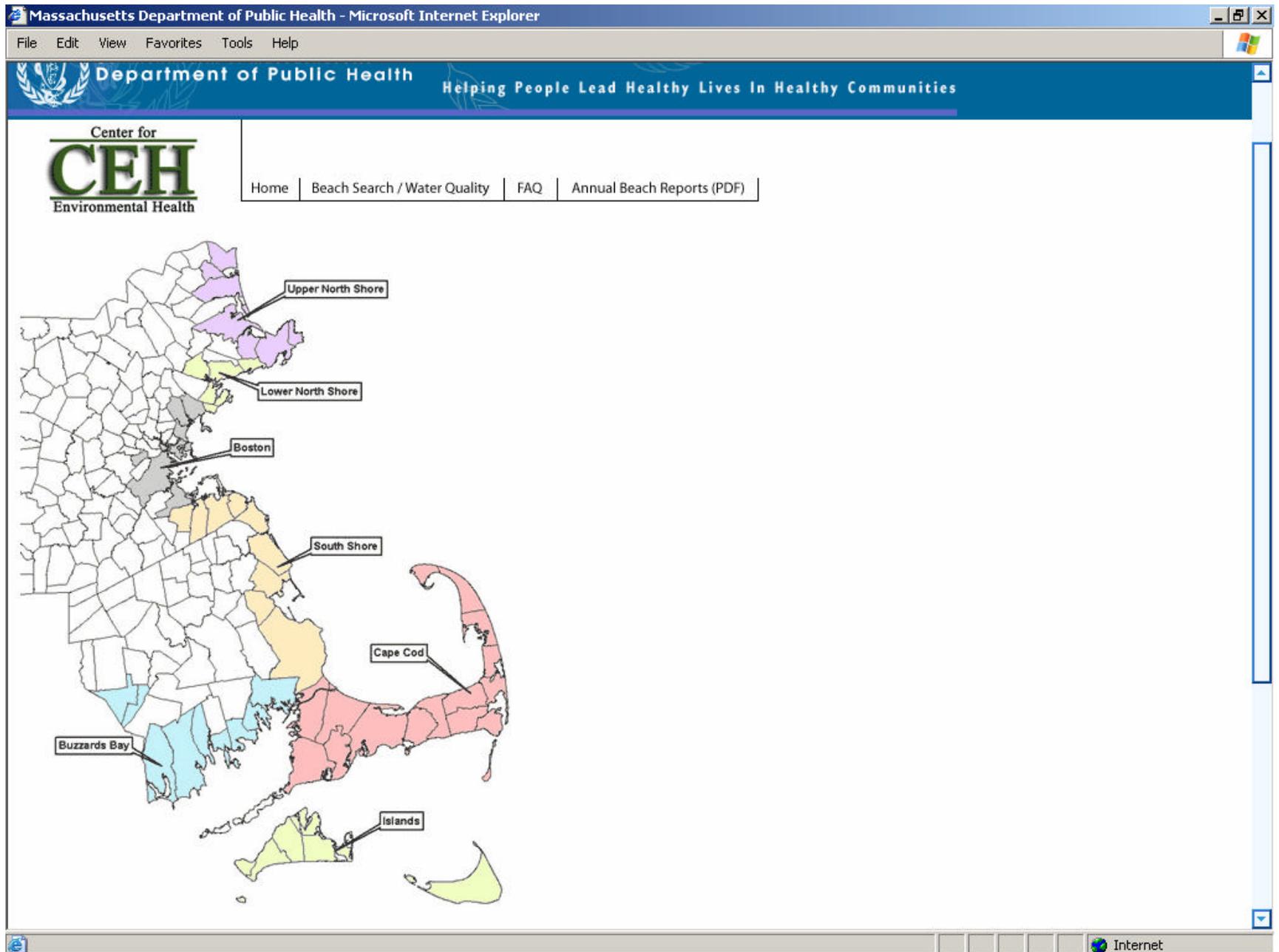


Figure 2: MDPH Public Beach Notification Website: regional map of Cape Cod

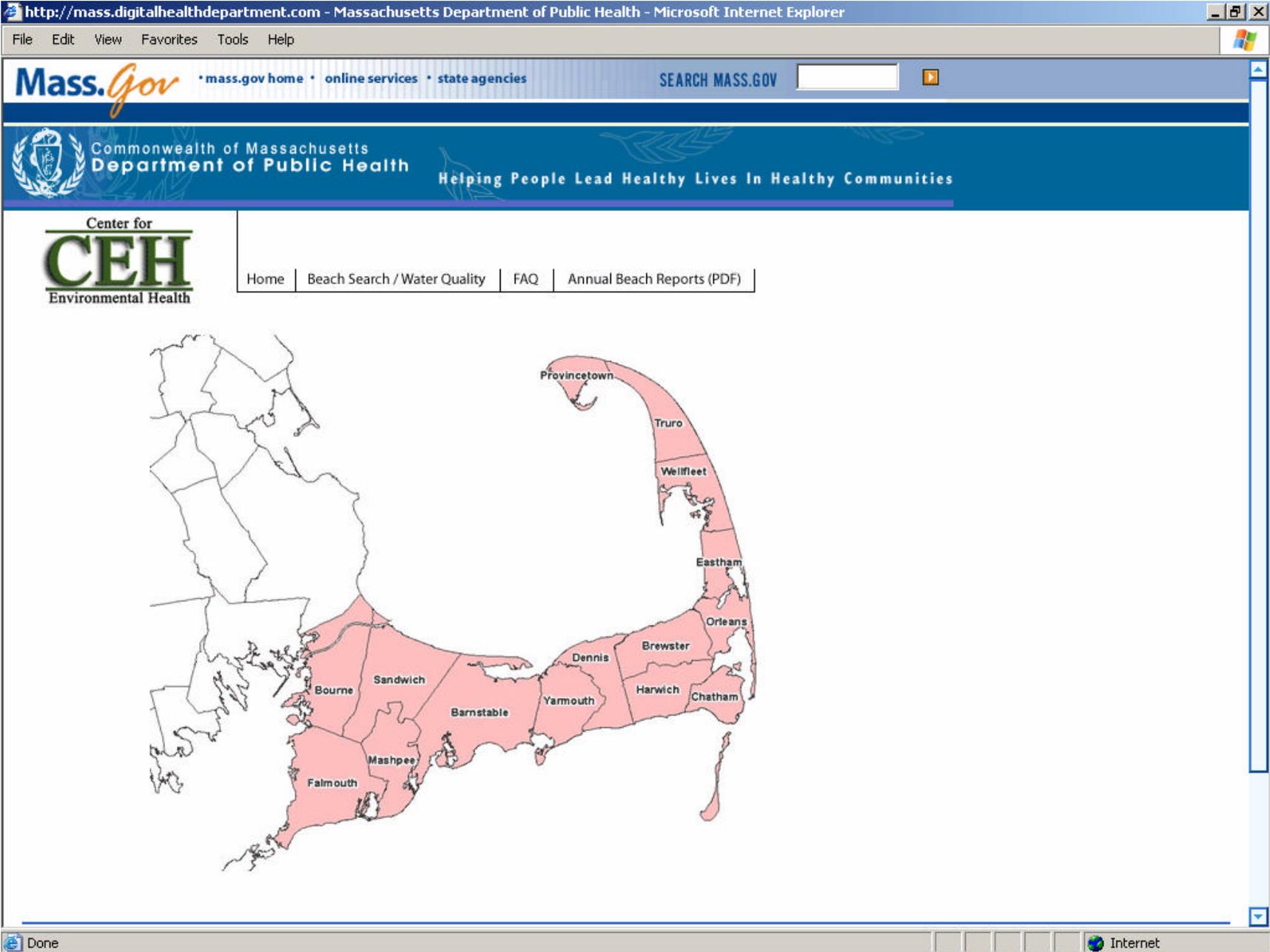


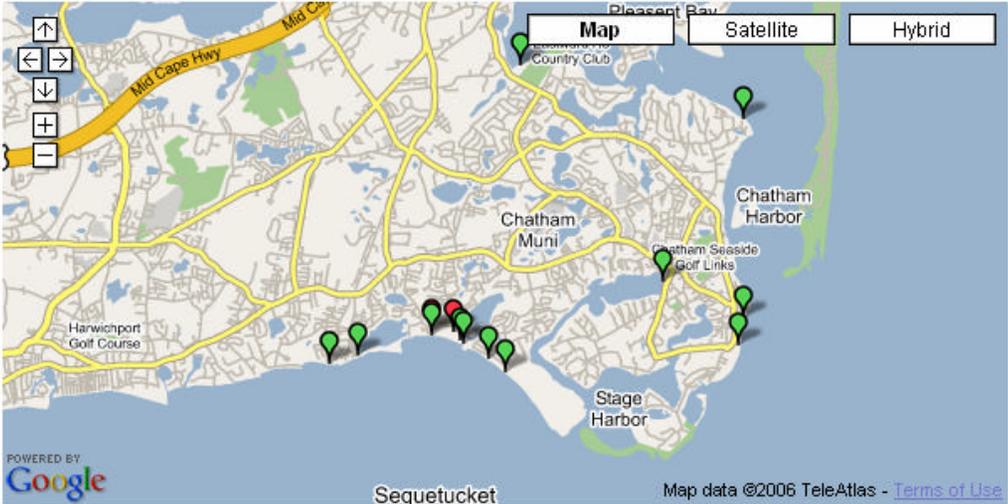
Figure 3: MDPH Public Beach Notification Website: Chatham Beach Posting Data

http://mass.digitalhealthdepartment.com - Massachusetts Department of Public Health - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Beach Search Results by Town:

14 Beaches matched your search. Displaying Beaches 1 - 14



1). **Andrew Harding Lane Beach** ([View Map](#) | [View Lab Data](#))
Sampling Point
Type:
Test Frequency:
Status:

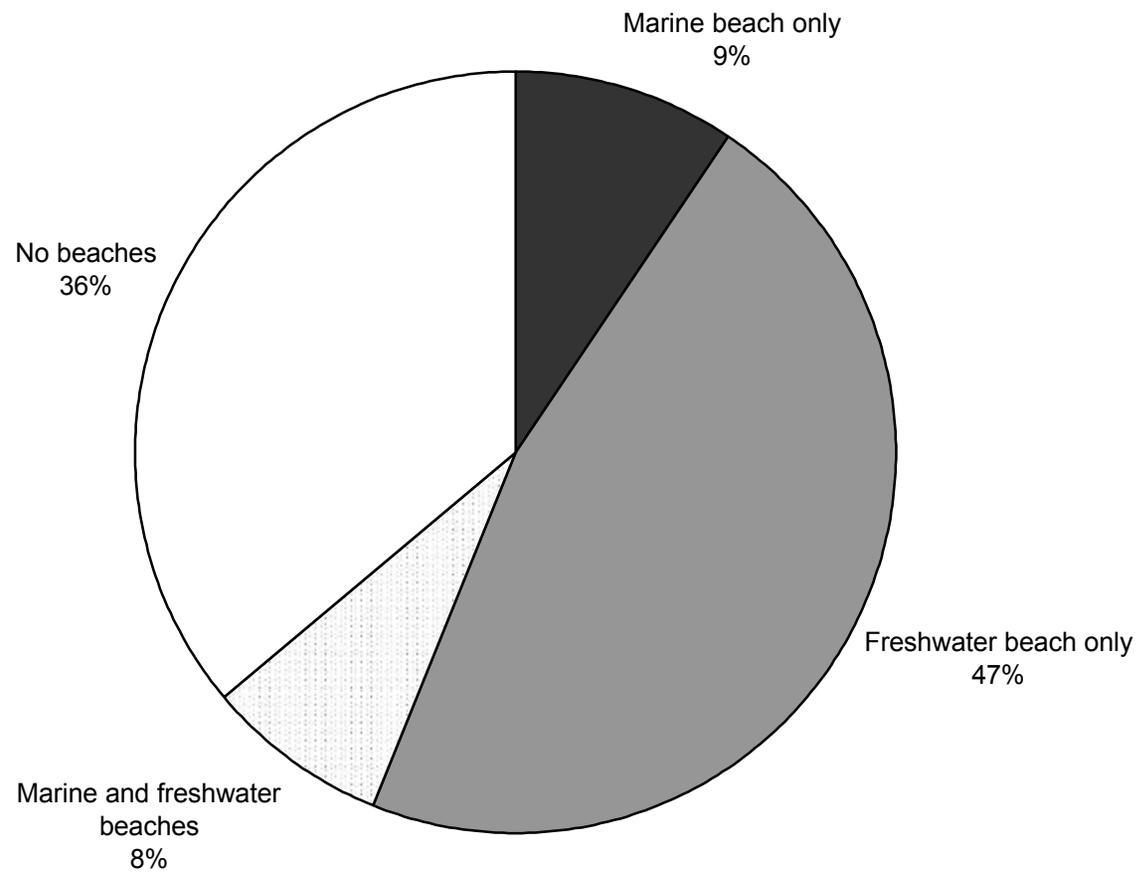
2). **Bucks Creek** ([View Map](#) | [View Lab Data](#))
Sampling Point
Type: Marine
Test Frequency: Twice Per Week
Status:

3). **Cockle Cove** ([View Map](#) | [View Lab Data](#))
Sampling Point
Type: Marine
Test Frequency: Weekly
Status:

4). **Cockle Cove Creek** ([View Map](#) | [View Lab Data](#))

Done Internet

Figure 4:
All Massachusetts communities grouped by type of public/semi-public bathing beach for 2006



**Figure 5:
Coastal communities in Massachusetts grouped by presence or absence of public/semi-public marine beaches and testing data for 2006**

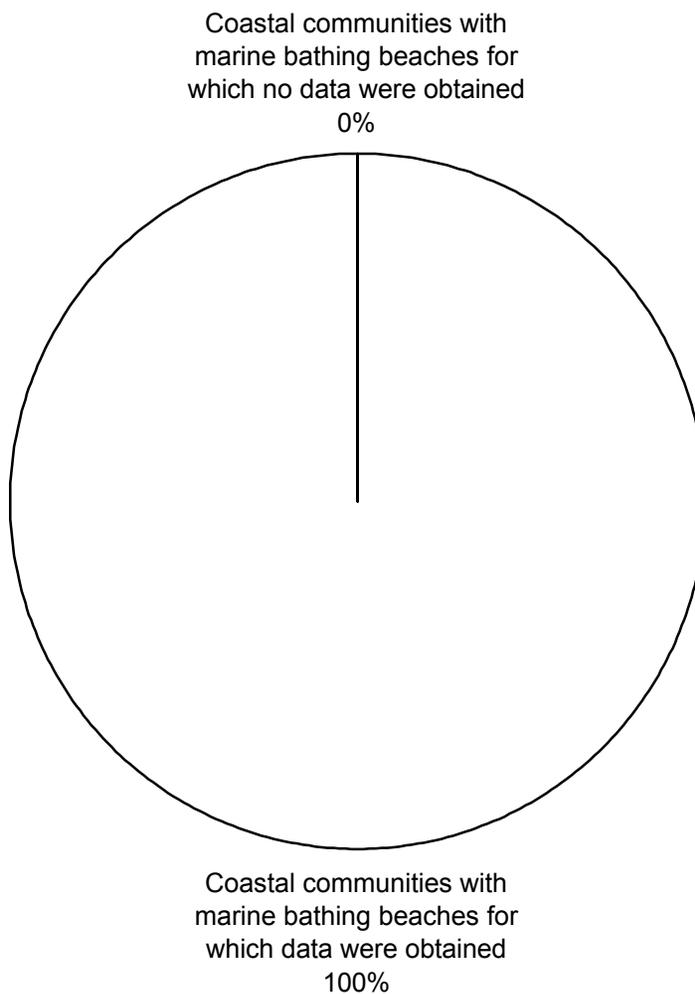


Figure 6:
Bather density at public/semi-public marine bathing beaches at times of water sampling for 2006

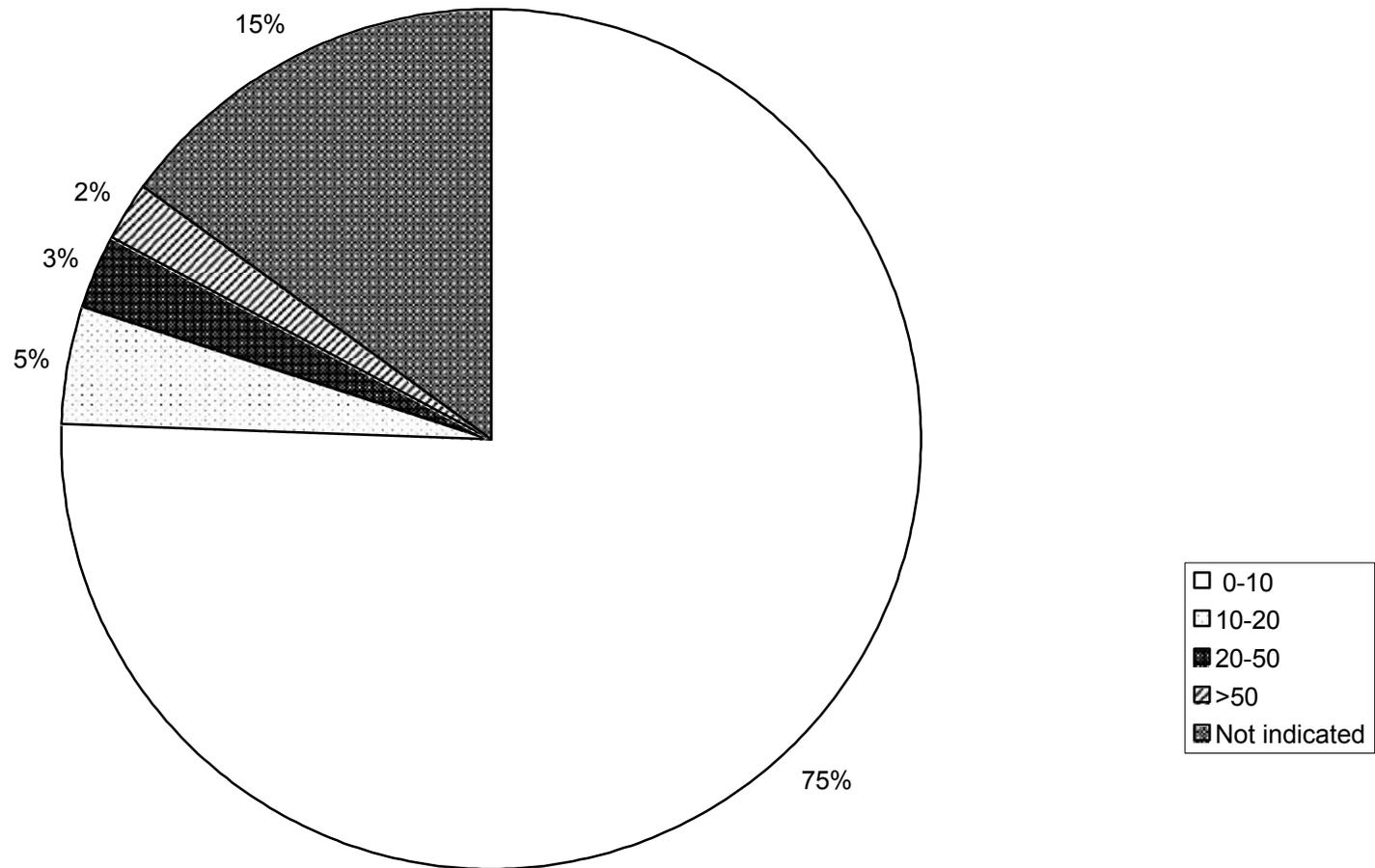


Figure 7:
Water quality indicators used to test public and semi-public marine bathing beaches in Massachusetts for 2006

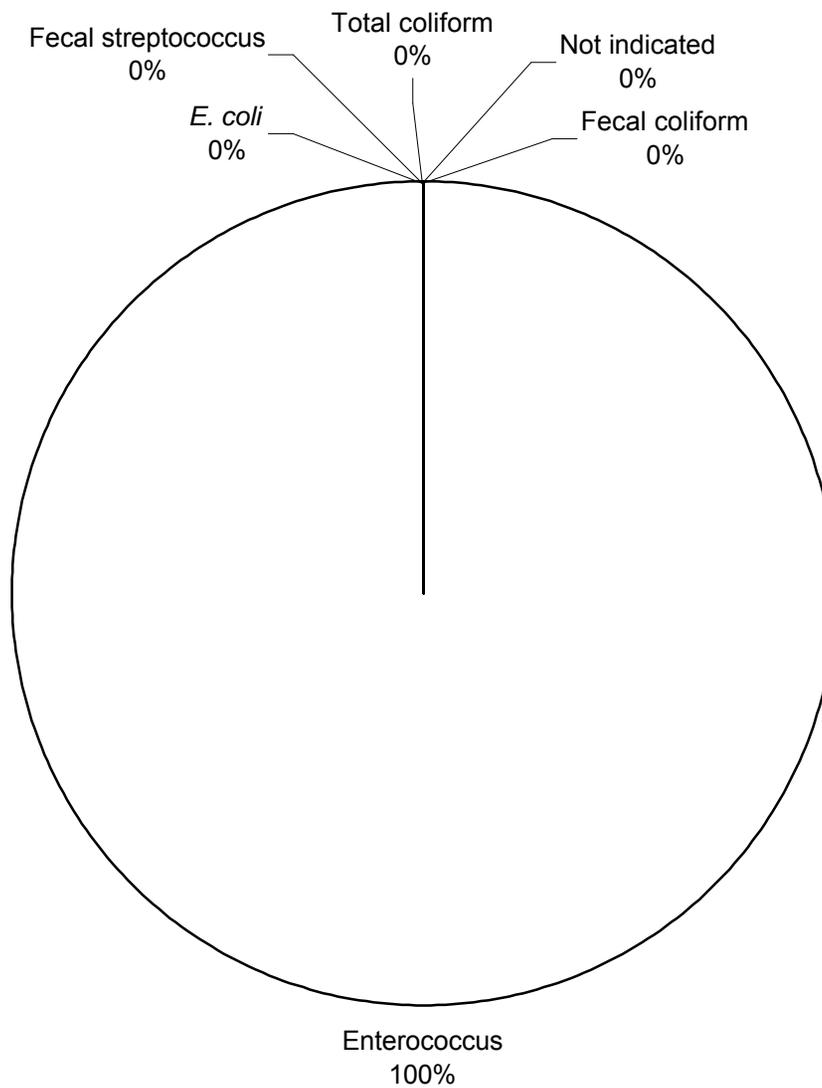


Figure 8:
Frequency of water quality testing at public/semi-public marine bathing beaches in Massachusetts for 2006

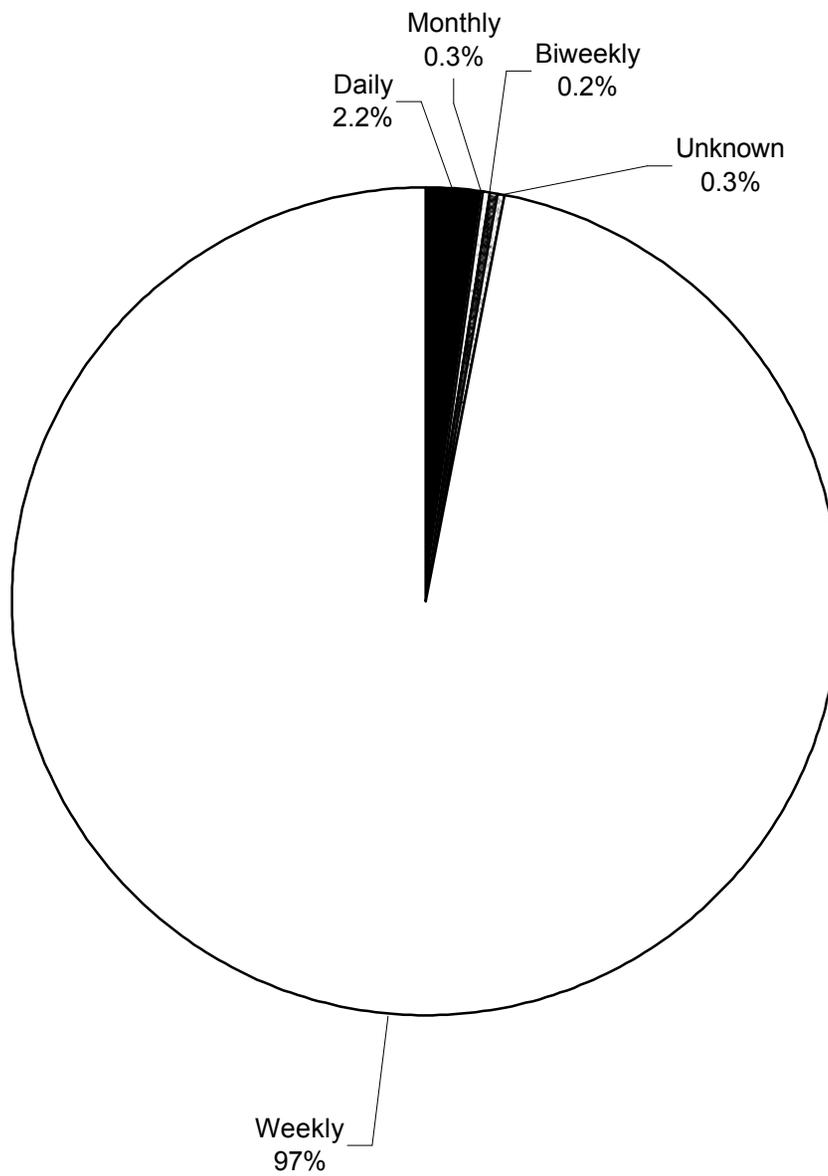


Figure 9:
Communities in Massachusetts grouped by presence or absence of public/semi-public freshwater bathing beaches and testing data for 2006

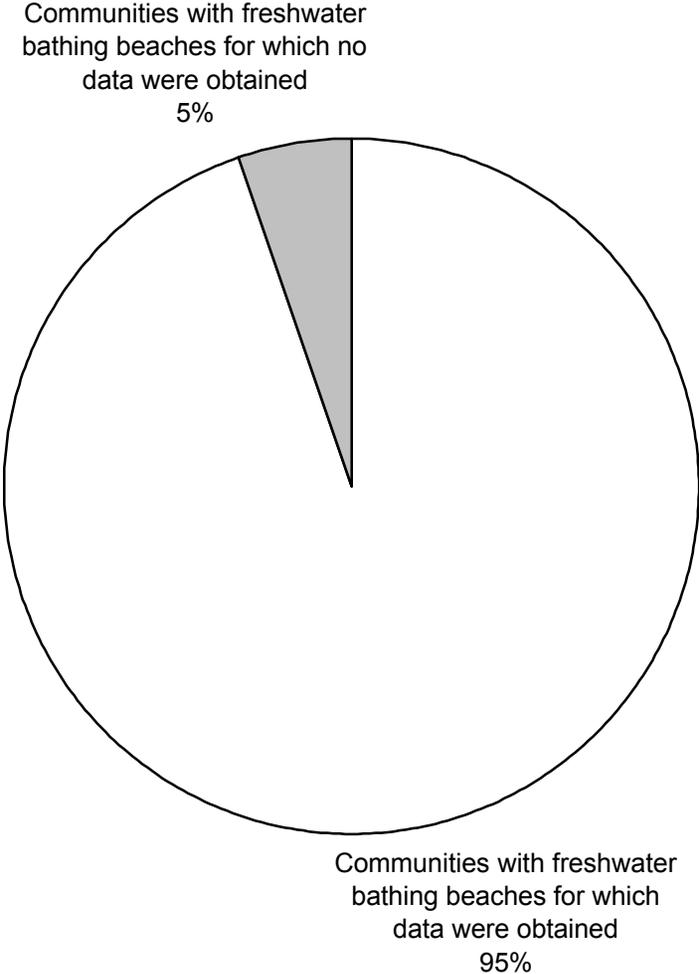


Figure 10:
Bather density at public/semi-public freshwater beaches at times of water sampling for 2006

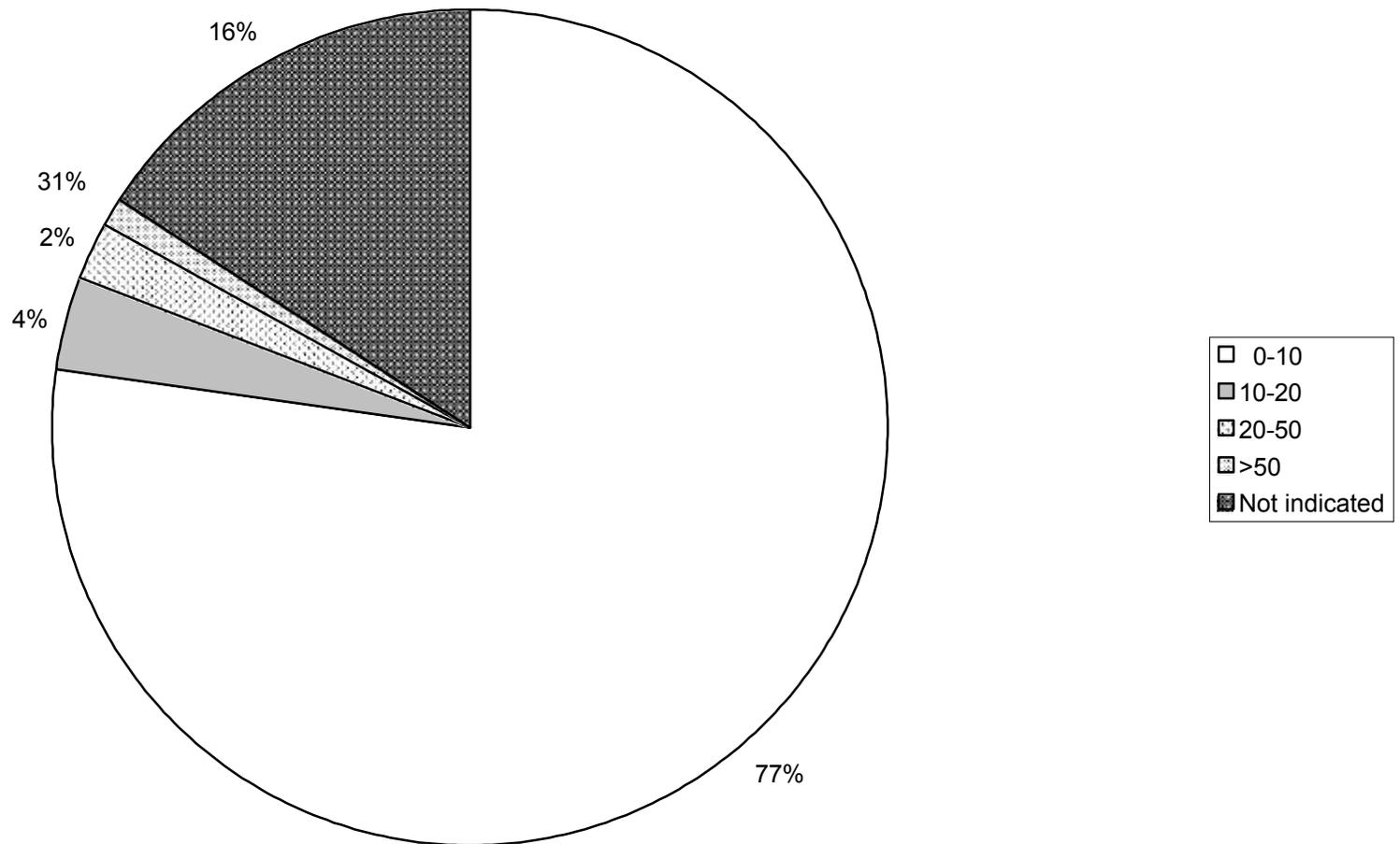


Figure 11:
Water quality indicators used to test public and semi-public freshwater beaches in Massachusetts for 2006

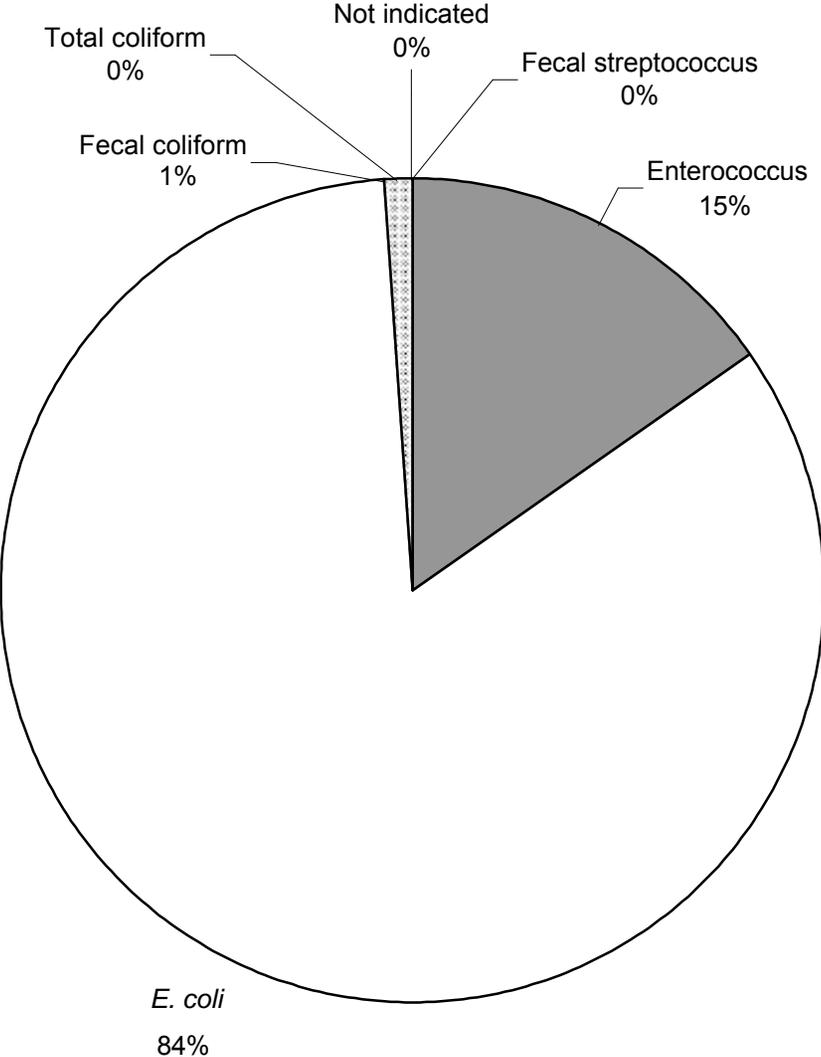


Figure 12:
Frequency of water quality testing at public/semi-public freshwater beaches in Massachusetts for 2006

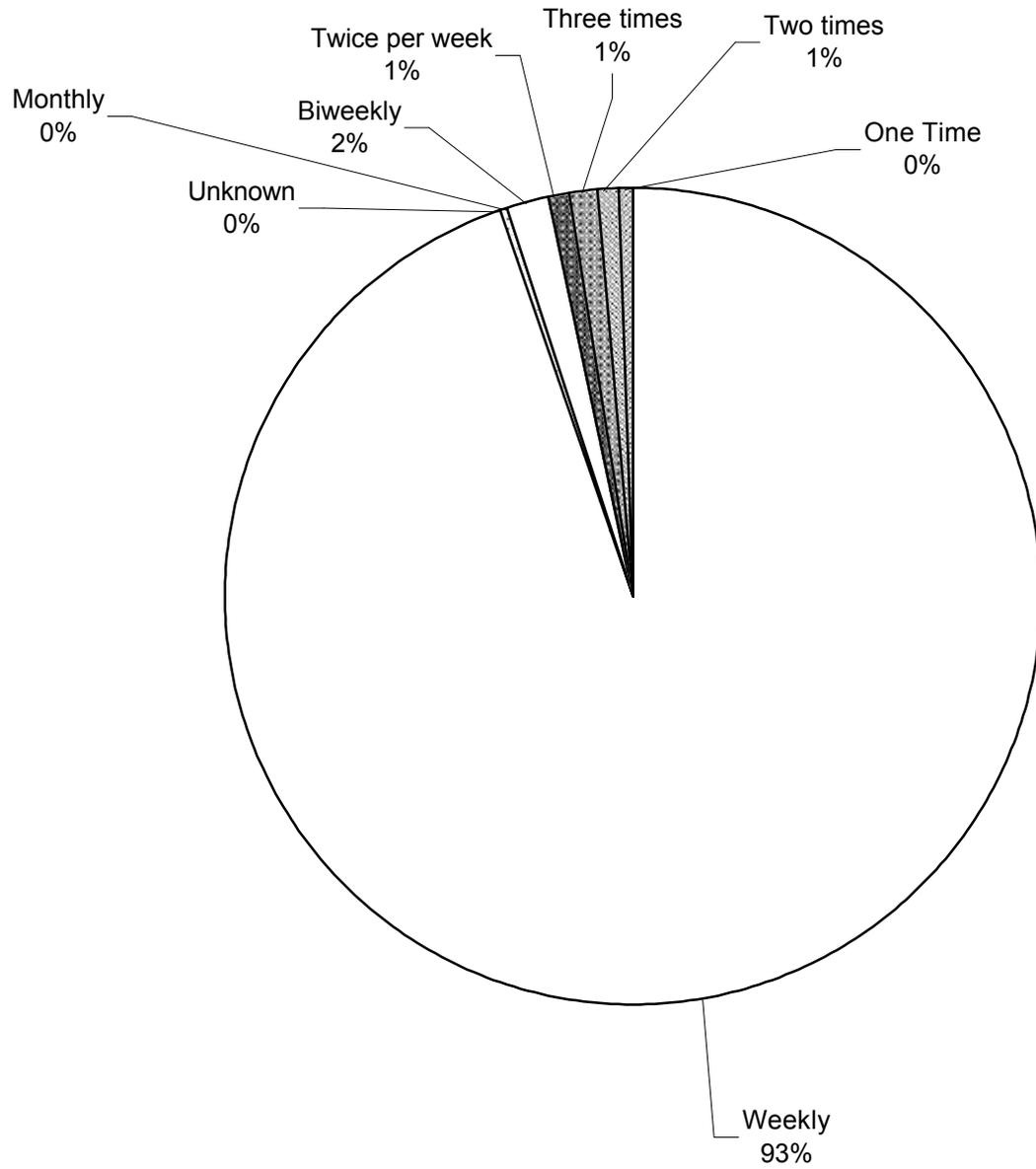


Figure 13. Marine Beach Communities that Reported Data in 2006

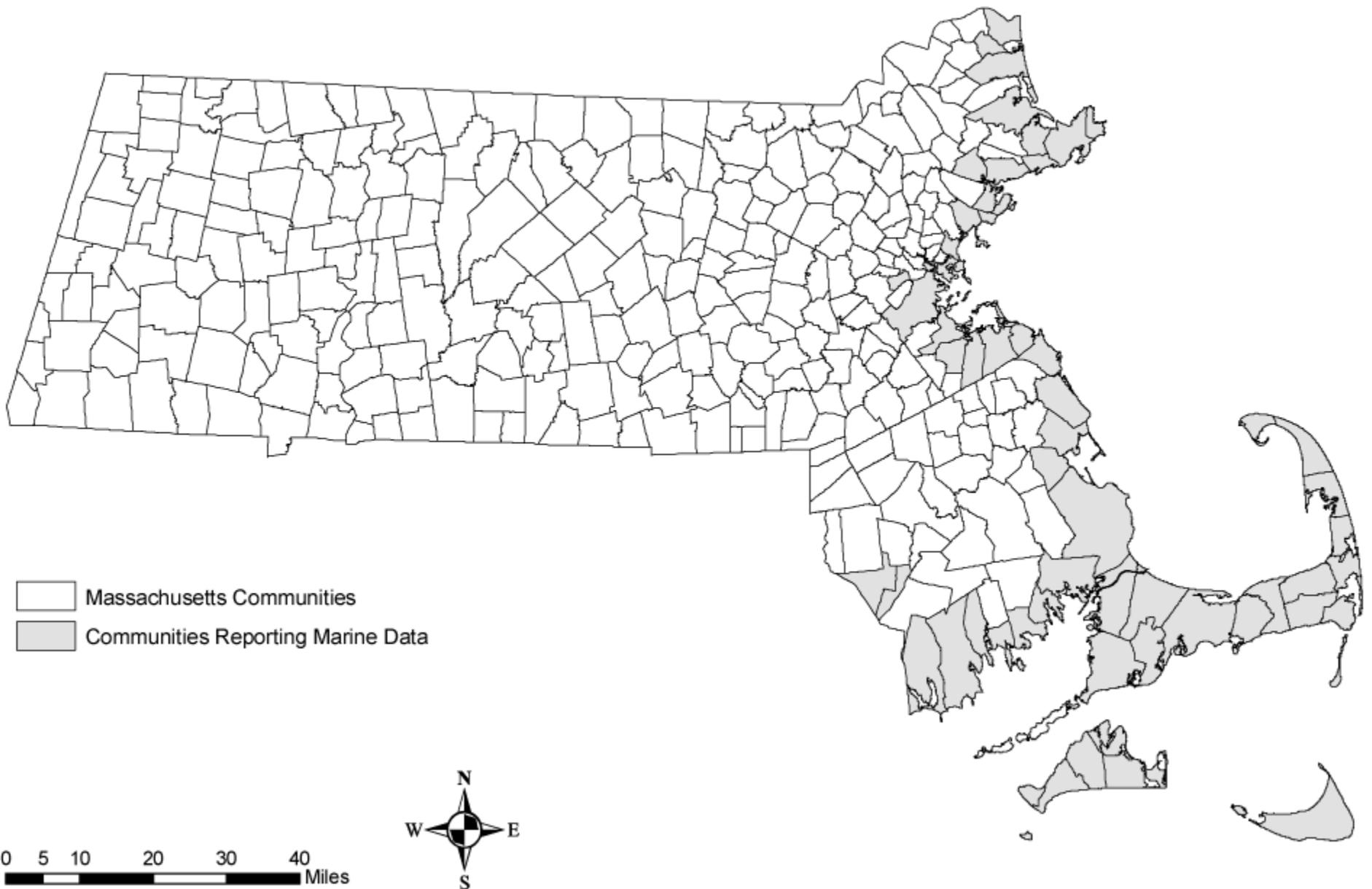


Figure 14. Freshwater Beach Communities that Reported Data in 2006

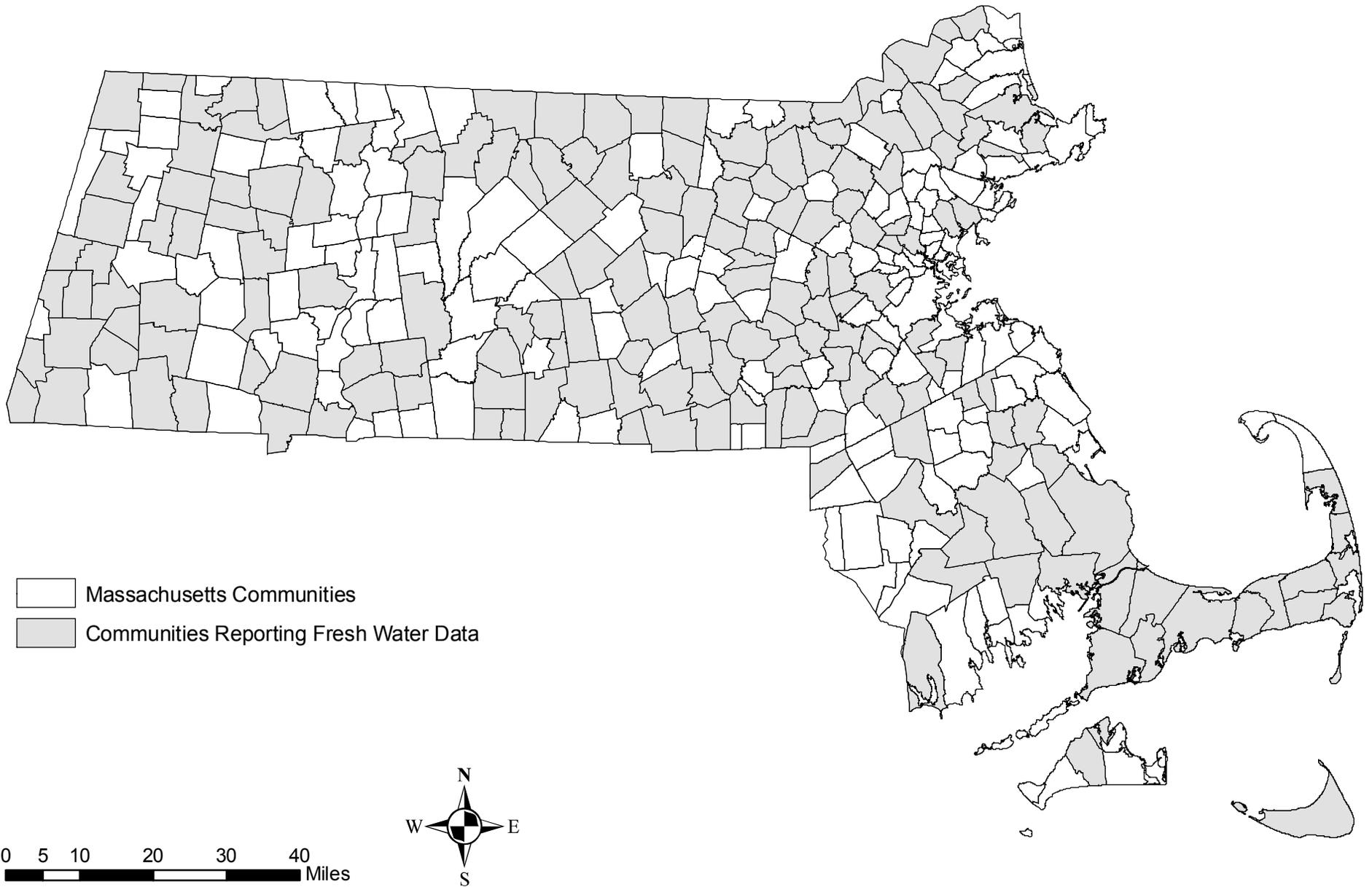


Figure 15
Number of Beach Water Samples Reported to MDPH

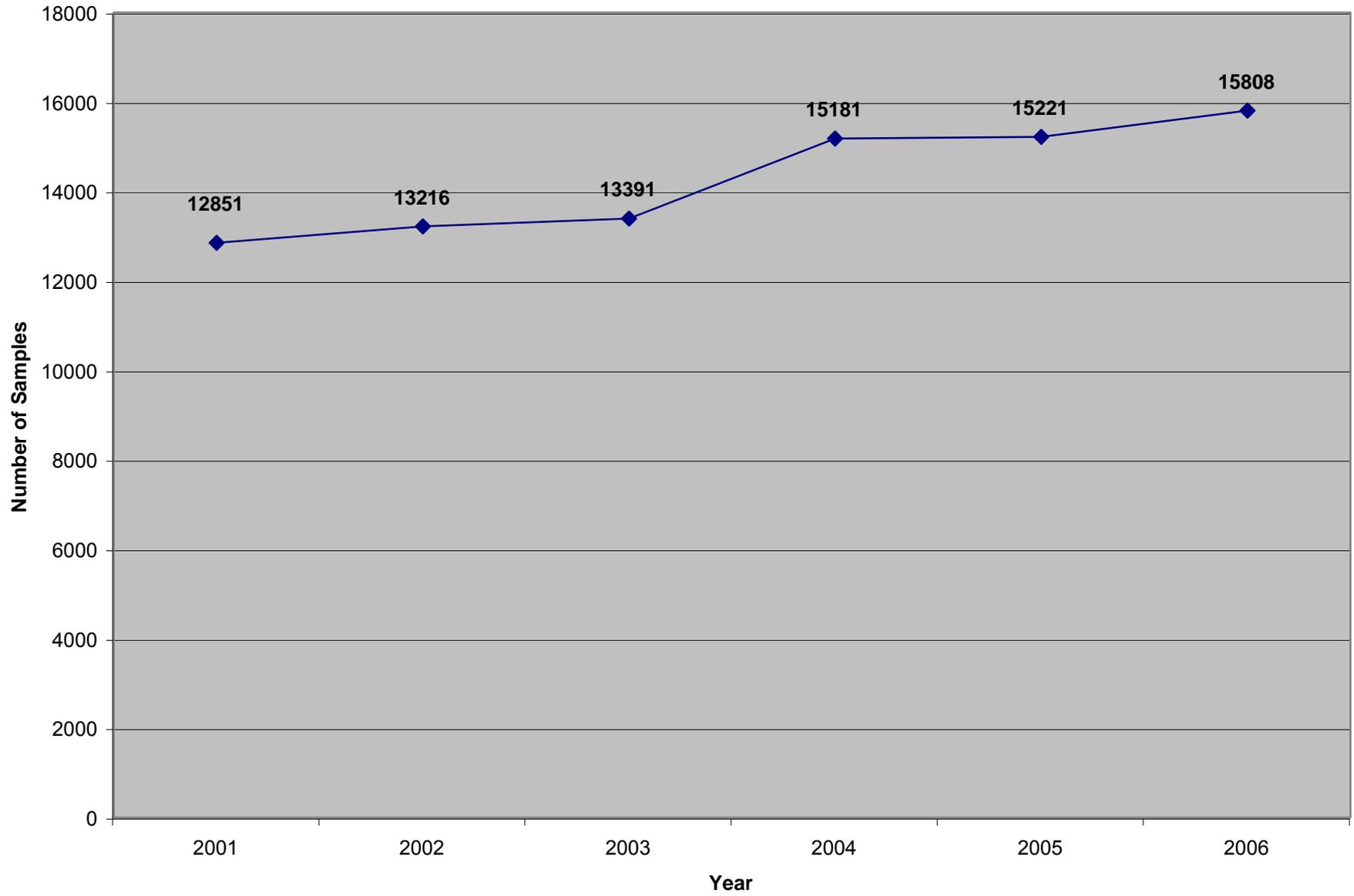


Figure 16
Massachusetts Bathing Beaches that Reported Data to MDPH

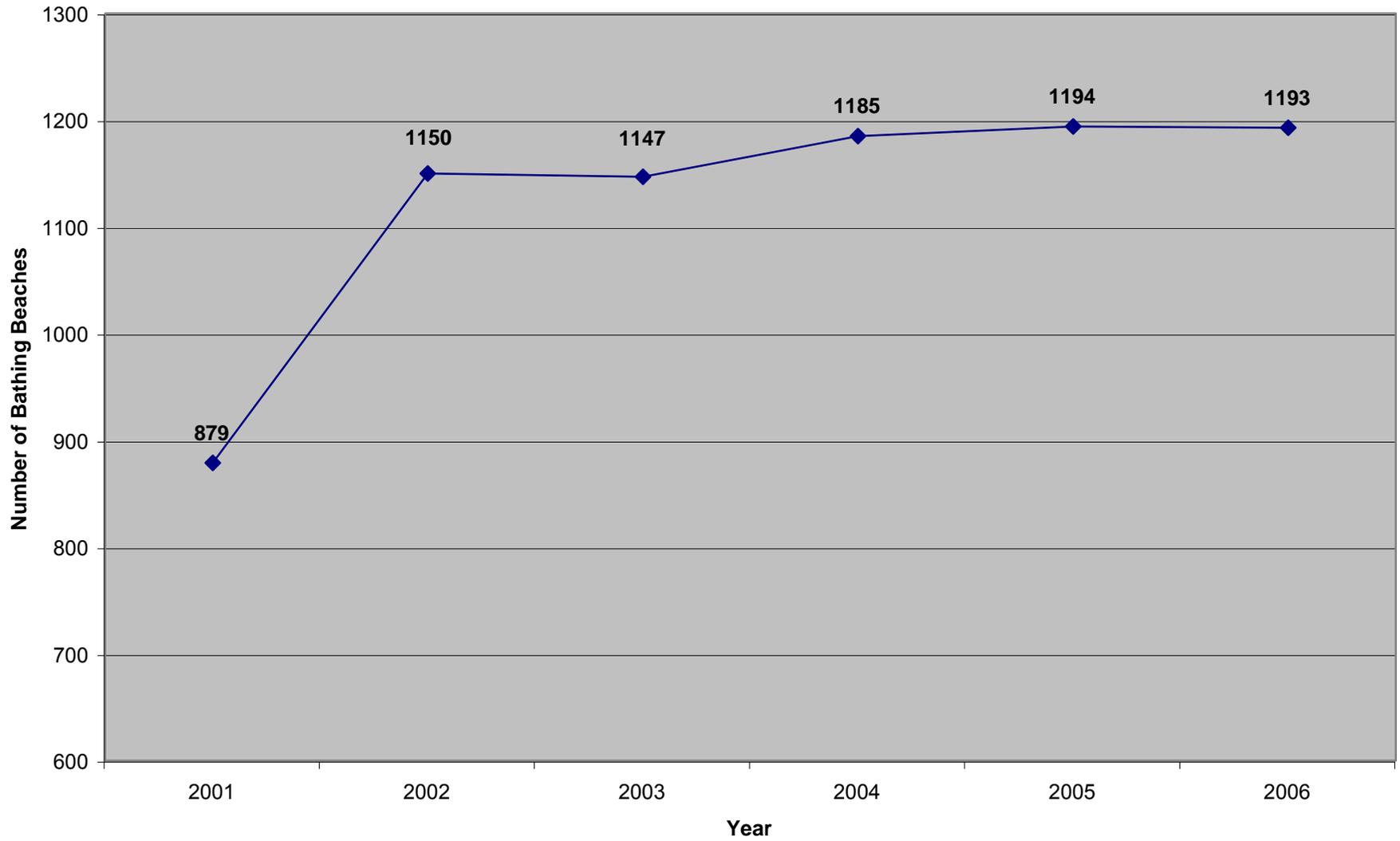


Figure 17
Massachusetts Communities Reporting Beach Data

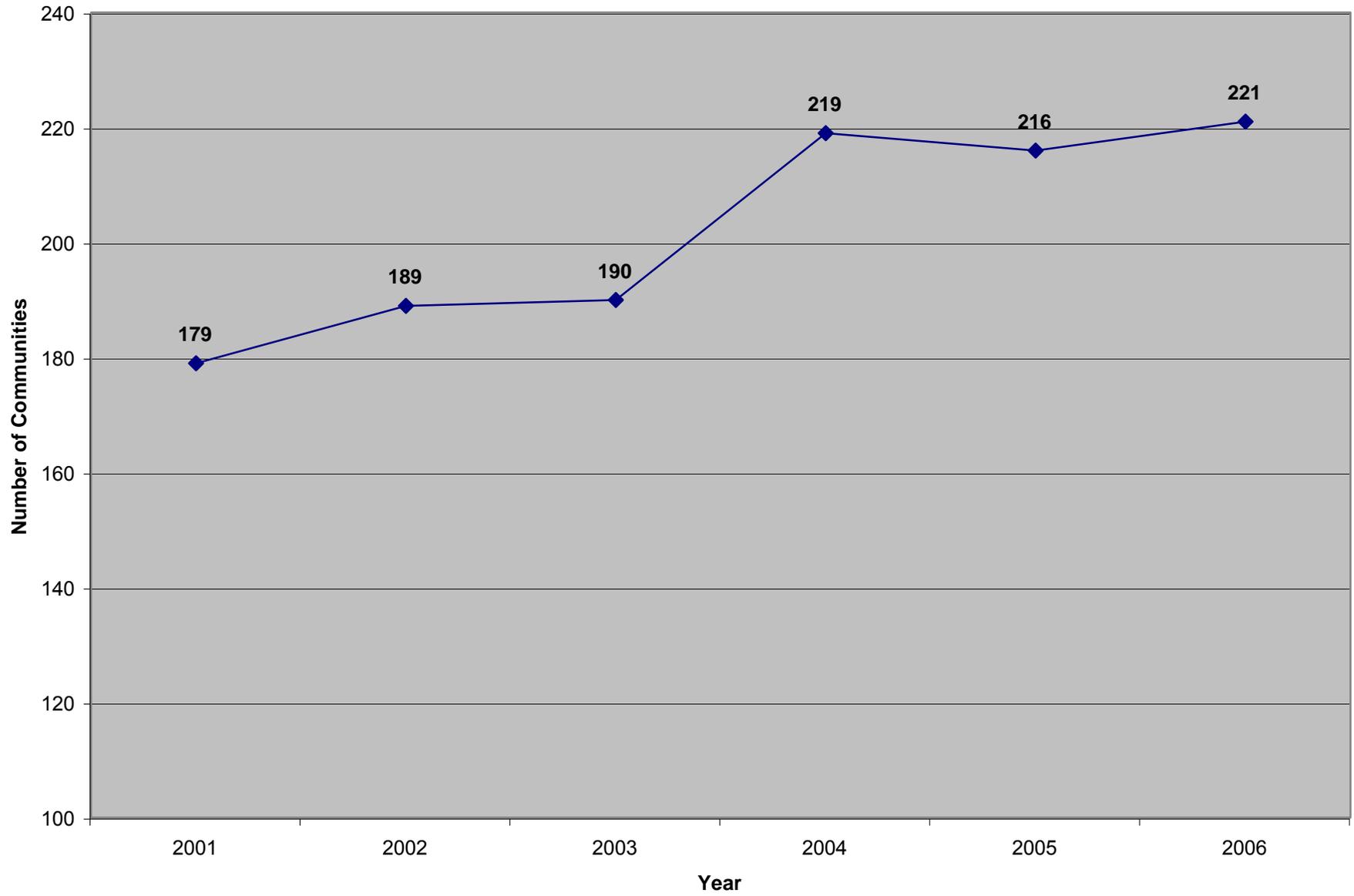


Figure 18:
Water quality samples at public/semi-public marine bathing beaches in Massachusetts for 2006

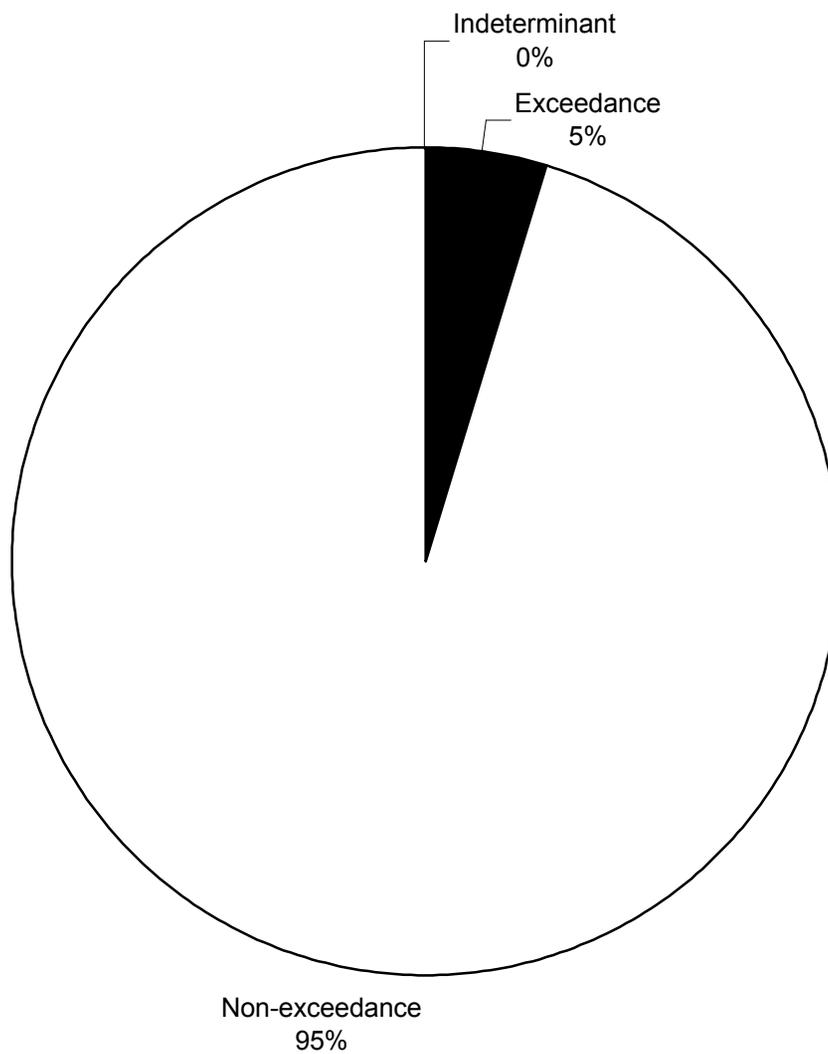


Figure 19. Marine Beach Communities with At Least One Water Sample Exceeding Criteria in 2006

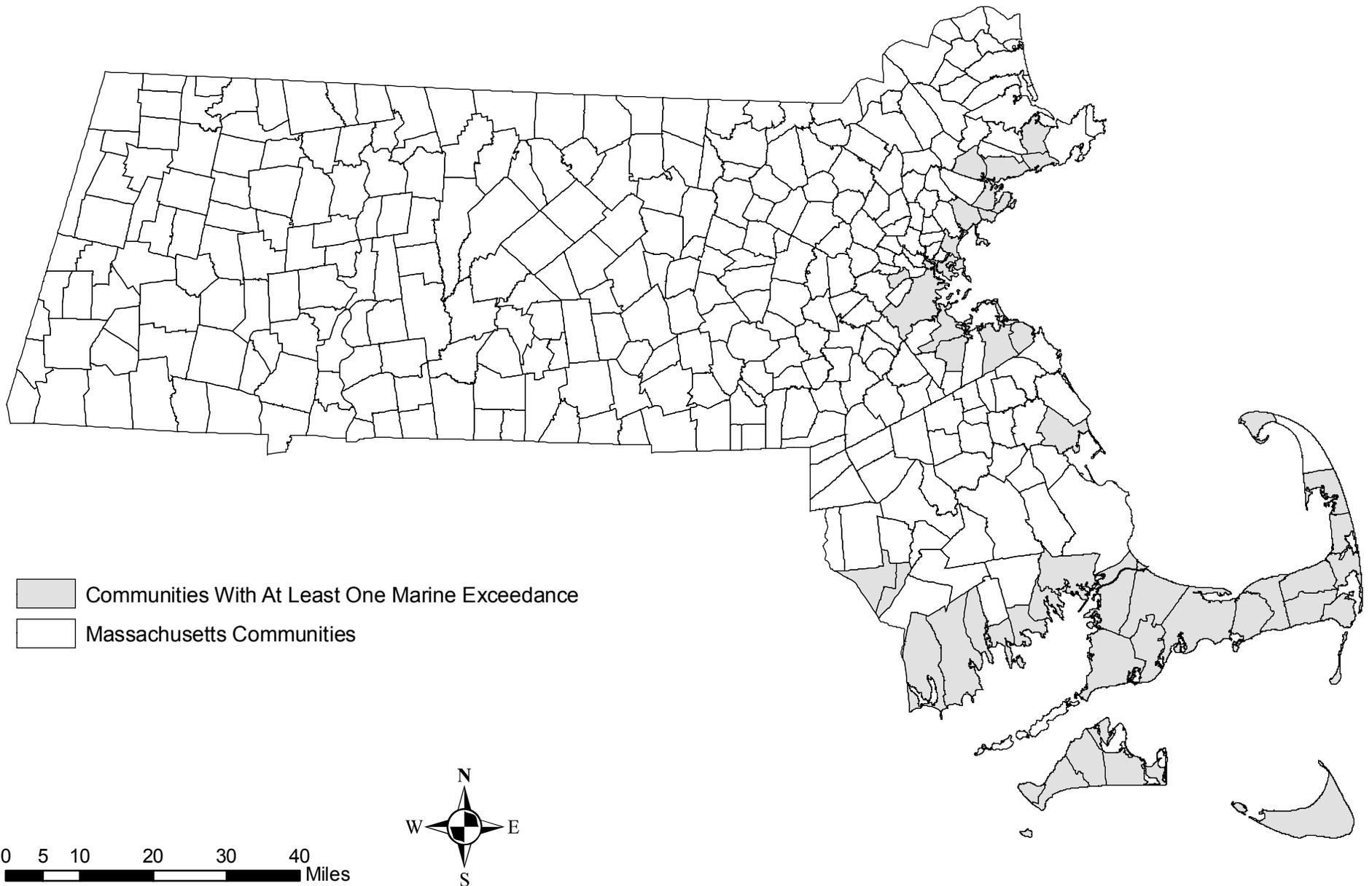


Figure 20:
Water quality samples at public/semi-public freshwater beaches in Massachusetts for 2006

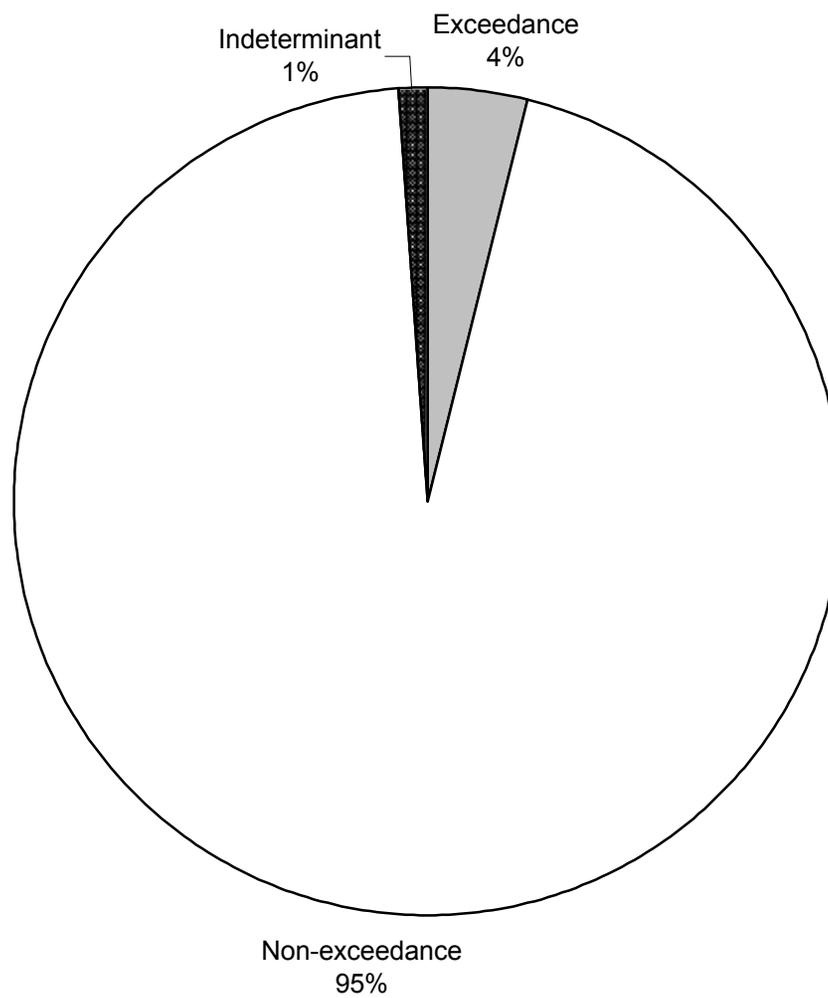


Figure 21. Freshwater Beach Communities with At Least One Water Sample Exceeding Criteria in 2006

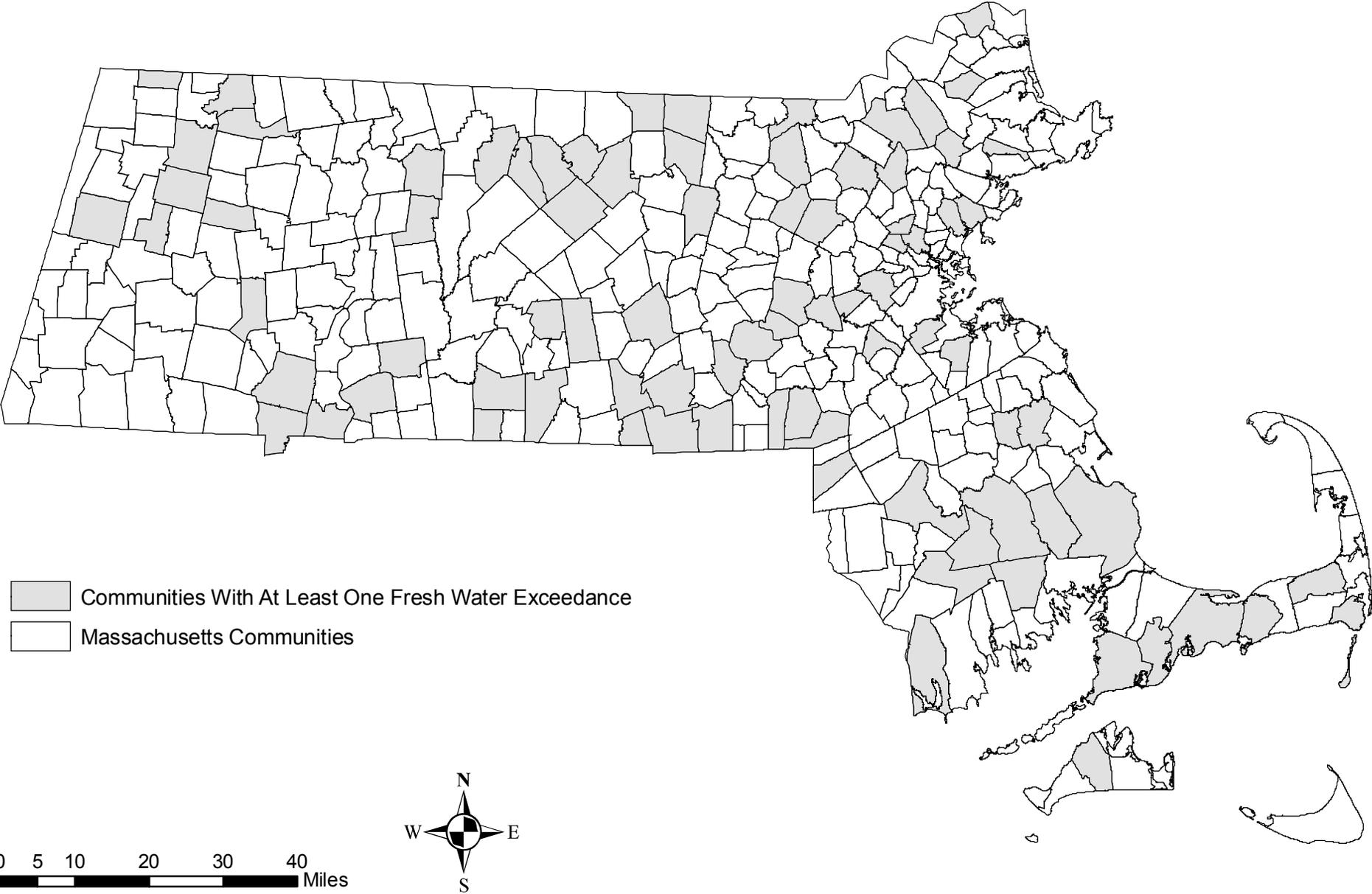
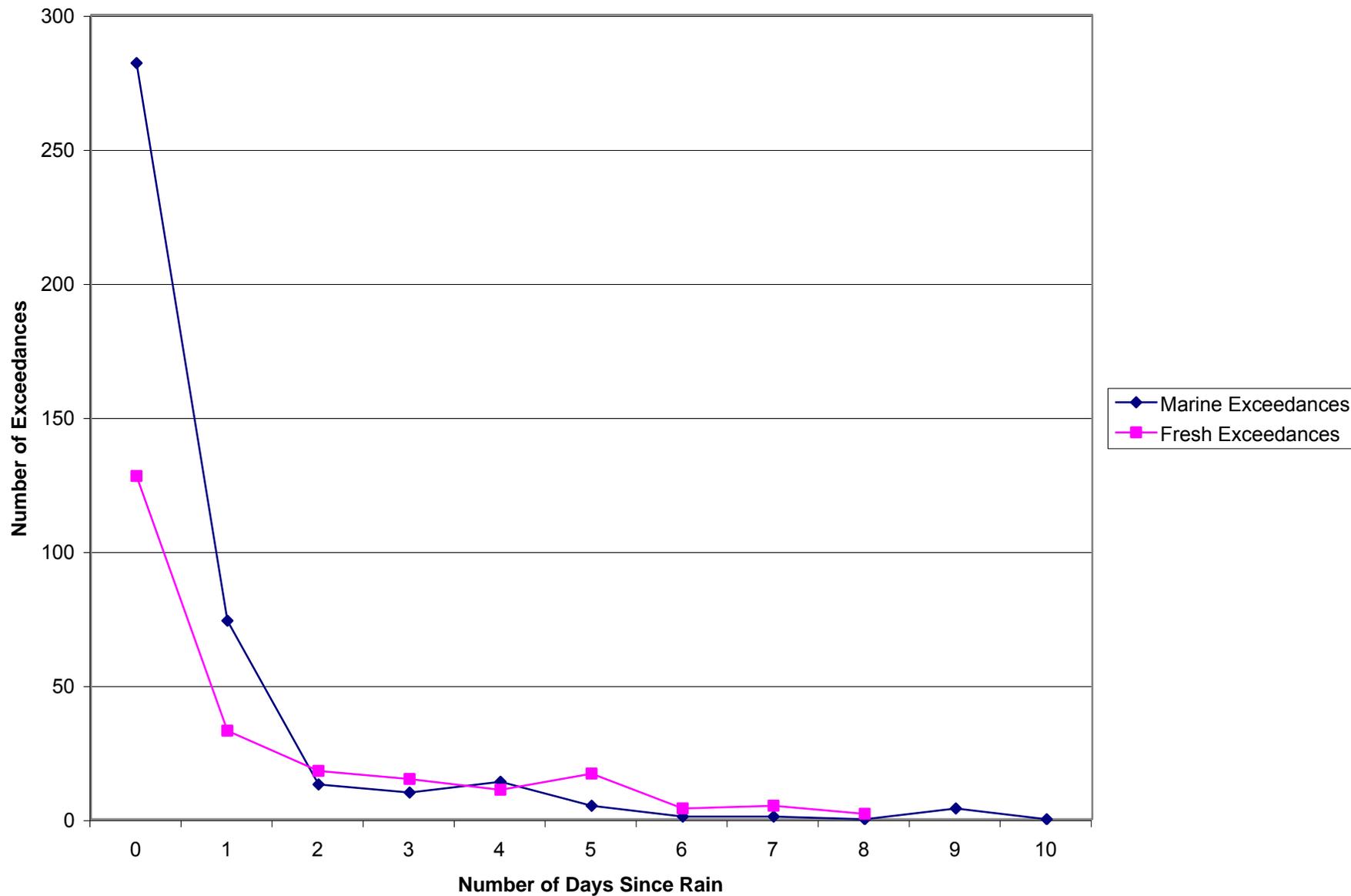


Figure 22
Exceedances Reported Based on the Number of Days Since Last Rainfall at Massachusetts Public and Semi-Public Bathing Beaches During the 2006 Season



XI. APPENDICES

A. MASSACHUSETTS STATE REGULATIONS

B. GENERAL LAWS OF MASSACHUSETTS

C. MASSACHUSETTS' BEACH ACT

D. FEDERAL BEACH ACT

E. MDPH BEACH SAMPLING FIELD DATA FORM

APPENDIX A

MASSACHUSETTS STATE REGULATIONS

105 CMR 445.000

MINIMUM STANDARDS FOR BATHING BEACHES STATE SANITARY CODE, CHAPTER VII

445.001: Purpose

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

445.002: Authority

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

445.003: Citation

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

445.004: Scope

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

445.010: Definitions

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

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

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

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

Department means the Department of Public Health.

Operator means any person who

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

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

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

Semi-Public Bathing Beach means any bathing beach used in connection with a hotel, motel, a manufactured home park, campground, apartment house, condominium, country club, youth club, school, camp or other similar establishment where the primary purpose of the establishment is not the operation of the bathing beach, and where admission to the use of the bathing beach is included in the fee consideration paid or given for the primary use of the premises. Semi-Public Bathing Beach also means a bathing beach operated solely for the use of members and guests of an organization that maintains such a bathing beach.

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

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

445.020: Operation

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

445.030: Bathing Water Quality

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

(A) Physical Quality.

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

(B) Bacteriological Quality.

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

- (2) Epidemiological evidence discloses the prevalence of an infectious disease or other health condition which is considered to be related to the use of the bathing water and is considered by the Board of Health or the Department to be of public health significance; or
- (3) The bacteriological quality of the bathing water is unacceptable as determined by laboratory analysis for the appropriate indicator organisms specified in 105 CMR 445.031 and exceeds the standards established therein.

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

445.031: Indicator Organisms

- (A) For marine water, the indicator organism shall be Enterococci. No single Enterococci sample shall exceed 104 colonies per 100 ml. and the geometric mean of the most recent five (5) Enterococci levels within the same bathing season shall not exceed 35 colonies per 100 ml.
- (B) For fresh water, the indicator organisms shall be E. Coli or Enterococci.
 - (1) No single E. Coli sample shall exceed 235 colonies per 100 ml. and the geometric mean of the most recent five E. Coli samples within the same bathing season shall not exceed 126 colonies per 100 ml; or
 - (2) No single Enterococci sample shall exceed 61 colonies per 100 ml. and the geometric mean of the most recent five (5) Enterococci samples within the same bathing season shall not exceed 33 colonies per 100 ml.

445.032: Collection of Bathing Water Samples

- (A) Location. The Board of Health, for public and semi-public bathing beaches that are not operated by the Commonwealth, and the Department, for bathing beaches that are operated by the Commonwealth, shall approve sampling locations at each bathing beach in its jurisdiction. Samples of bathing water shall be taken at locations within areas of greatest bather load. Additional samples shall also be obtained at any critical location subject to contamination from business developments, dwellings, streams, sewer outfall pipes or other sources. All required samples shall be obtained from these designated locations.
- (B) Sample Collection. Samples shall be obtained in accordance with the procedures recommended by the most recent edition of the Standard Methods for the Examination of Water and Waste Water of the American Public Health Association or as approved by the United States Environmental Protection Agency.
- (C) Frequency.
 - (1) The Board of Health, its agent, or any other authorized person shall collect the bacteriological samples:
 - (a) Within five days of the opening of the bathing season; and
 - (b) At least weekly during the bathing season at a time and day approved by the Board of Health or the Department; and
 - (c) Prior to reopening a beach after closing for any reason.

(2) Testing for oil, hazardous materials, or heavy metals shall only be required if the operator, the Board of Health, or the Department has information indicating possible contamination of the bathing beach or bathing waters from oil, hazardous materials or heavy metals.

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

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

445.033: Laboratory Analysis and Reporting

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

(B) Reporting.

(1) Routine Reporting by Operators. Any operator or authorized agent of a public bathing beach, except public bathing beaches operated by the Commonwealth, and any operator or authorized agent of a semi-public bathing beach shall report the certified results of all testing, monitoring and analysis of bathing water to the Board of Health within five (5) days of receipt of the results from the laboratory.

(2) Reporting by Operators of Levels Exceeding the Established Standards. Any operator or authorized agent of a public or semi-public bathing beach shall immediately report to the Board of Health the results of all testing, monitoring and analysis of bathing water found to exceed the standards established in 105 CMR 445.030.

(3) Reporting by the Board of Health. The Board of Health or its authorized agent shall report the results of all testing, monitoring and analysis of bathing water to the Department no later than October 31 of each year.

445.034: Bathing Beaches Operated by the Commonwealth

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

445.035: Sampling and Analysis at Semi-Public Beaches

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

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

445.036: Public Request for Testing

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

445.040: Posting and Reopening Notifications

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

WARNING! NO SWIMMING
SWIMMING MAY CAUSE ILLNESS

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

(B) Reopening. Prior to reopening bathing water posted due to a violation of the standards established in 105 CMR 445.030, the Board of Health, its agent, or any other authorized person shall verify that the certified results of the laboratory analysis are less than the standard specified in 105 CMR 445.031. The operator of any state operated bathing beach shall notify the Department and the Board of Health within 24 hours, or the next business day, of the reopening of the bathing water.

445.100: Variance

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

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

(B) Any variance granted by the Board of Health shall specify the required

continued bacteriological testing schedule, provided that the frequency of bacteriological testing shall not be less than once prior to the bathing season and at least every 30 days thereafter throughout the duration of the bathing season.

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

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

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

445.101: Variance to be in Writing

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

(B) The Board of Health shall submit to the Department a notice of the intent to grant a variance. The Department shall approve, disapprove, or modify the variance within 45 days from receipt thereof. If the Department fails to comment within 45 days, its approval shall be presumed. No alteration of any requirement in these regulations shall be made under any variance until the Department approves it or 45 days has elapsed without comment, unless the Board of Health certifies in writing to the Department that an emergency exists.

445.300: Severability

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

APPENDIX B

GENERAL LAWS OF MASSACHUSETTS

GENERAL LAWS OF MASSACHUSETTS

**PART I.
ADMINISTRATION OF THE GOVERNMENT**

**TITLE XVI.
PUBLIC HEALTH**

CHAPTER 111. PUBLIC HEALTH

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

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

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

""Department", the department of public health.

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

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

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

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

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

records thereof. The department shall issue an annual report on the state of beach water quality using data that has been reported to the department. The department shall make such data available to the public upon written request.

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

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

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

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

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

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

(i) A municipality or state agency may adopt sanitation standards and testing, monitoring, and analysis requirements for bathing waters within its jurisdiction that are stricter than the standards adopted by the department. In any case where a municipality or state agency adopts such stricter standards, any warning signs required by this section shall display the results of such stricter standards relative to the standards of the department.

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

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

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

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

APPENDIX C

MASSACHUSETTS' BEACH ACT

CHAPTER 248 OF THE ACTS OF 2000

AN ACT RELATIVE TO MINIMUM STANDARDS FOR PUBLIC BATHING WATERS.

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

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

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

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

"Department", the department of public health.

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

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

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

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

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

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

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

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

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

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

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

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

(i) A municipality or state agency may adopt sanitation standards and testing, monitoring, and analysis requirements for bathing waters within its jurisdiction that are stricter than the standards adopted by the department. In any case where a municipality or state agency adopts such stricter standards, any warning signs required by this section shall display the results of such stricter standards relative to the standards of the department.

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

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

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

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

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

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

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

Approved August 11, 2000.

APPENDIX D

FEDERAL BEACH ACT

PUBLIC LAW 106-284 - OCT. 10, 2000

**BEACHES ENVIRONMENTAL ASSESSMENT
AND COASTAL HEALTH ACT OF 2000**

**Public Law 106-284
106th Congress**

1. An Act

**OCT. 10,
2000**

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

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

[H.R.999]

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

SECTION I. 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 sub- section, 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 sub-section (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 sub-section (c)(2)(A) that the criteria protect public health and welfare."

SEC. 3. REVISIONS TO WATER QUALITY CRITERIA.

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

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

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

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

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

"(4) guidance for State application of the 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:

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

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

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

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

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

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

33 USC 1346.

Deadline.
Publication.

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 sub-section (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)(I), the Administrator determines that the State is not implementing a program that meets the requirements of this subsection, regardless of whether the State has received a grant under this subsection.

"(3) OTHER REQUIREMENTS. -

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

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

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

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

"(4) FEDERAL SHARE. -

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

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

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

"(ii) provided in cash or in kind.

"(c) CONTENT OF STATE AND LOCAL GOVERNMENT PROGRAMS. -

As a condition of receipt of a grant under subsection (b), a State or local government program for monitoring and notification under this section shall identify -

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Deadline.

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

"(1) protects the public health and safety;

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

Reports.

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

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

Public Information.

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

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

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

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

"(B) the Administrator determines should be included.

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

"(g) LIST OF WATERS.-

"(1) IN GENERAL.-Beginning not later than 18 months Deadline. 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 -

"(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 Public described in paragraph (1) available to the public through- information.

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

"(B) electronic media. publication.

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

"(h) USEPA 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)(I)(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."

Deadline.

Public
Information

.
Federal Register,
Publication.

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.).

SEC. 8. AUTHORIZATION OF APPROPRIATIONS.

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

Approved October 10, 2000

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

HOUSE REPORTS: No.106-98 (Comm. on Transportation and Infrastructure).

SENATE REPORTS: No.106-366 accompanying S. 522 (Comm. on Environment and Public Works).

CONGRESSIONAL RECORD:

Vol. 145 (1999): Apr. 22, considered and passed House.

Vol. 146 (2000): Sept. 21, considered and passed Senate, amended. Sept. 26, House concurred in Senate amendment.

WEEKLY COMPILATION OF PRESENTIAL DOCUMENTS, Vol. 36 (2000):

Oct. 10, Presidential statement.

APPENDIX E

MDPH BEACH SAMPLING DATA FORM

Beach Sampling Field Data Form

Town/City of Collection: Date Collected: Collected By:	Time Delivered to Lab: Delivered By: Relinquished To:
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Instructions: Collect sample(s) in areas of greatest bather load and at locations subject to contamination at a uniform depth of 3 feet. Collect samples 12 inches below water surface. Do not collect samples within 6 inches of bottom.

Sample ID	Location (Note beach and sampling location)	Time of Sample	Water					Air					Observations of bathing water ⁴
			Type: Salt/Fresh	Temp °F	Clarity ¹ C / NC	Bather Density ²	Last High Tide (if applicable)	Weather ³	Temp °F	Wind Direction	Amount of Last Rain	Days Since Rain	

¹ **Water Clarity:** C=Clear NC=Not Clear If reason is known, specify under observations.
² **Bather Density:** 01=(0-10 bathers) 02=(11-20 bathers) 03=(20-50 bathers) 04>(>50 bathers)
³ **Weather:** S=Sunny C=Cloudy/Overcast R=Rainy F=Foggy W=Windy
⁴ **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

Comments:

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