



# **RHODE ISLAND DEPARTMENT OF HEALTH BEACH PROGRAM**

## **2009 Season Report**



Newport Bridge, Newport, RI <http://asergeev.com/pictures/archives/compress/2004/425/12.htm>

**March 2010**

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\* Due to the size of this appendix it is attached as a separate document

## **Executive Summary**

The Rhode Island Department of Health (HEALTH) is responsible for the licensing and regulation of bathing beach facilities in the State of Rhode Island. This includes both fresh and saltwater beaches. Funding for the beach Program is provided by the United States Environmental Protection Agency (USEPA). These funds support primary Beach Program activities which include: sanitary surveys, development and implementation of a risk-based monitoring plan, and bacteriological testing at marine beaches. Currently, the USEPA does not provide funds to monitor freshwater bathing beaches. Freshwater beach managers are responsible for sampling and following HEALTH approved regulations.

From May through September 2009, approximately 1,770 samples were collected from all 68 monitored saltwater bathing beaches. All samples were analyzed for Enterococci as required in the Federal Beaches Environmental Assessment and Coastal Health (BEACH) Act.

The 2009 bathing season saw a significant increase in beach closures and closure days from the 2008 season. Whereas 40 beach closure events resulted in the 124 beach closure days recorded for 2008, 79 closure events resulted in the 181 beach closure days recorded for 2009. The total volume of rainfall was significantly higher during the summer of 2009 (May 25 through September 7) than the summer of 2008. Total rainfall increased from 9.64 inches in 2008 to 17.24 inches in 2009. Significant rainfall instances (> 0.50 inches in a 24-hour period) greatly increased in 2009, with 6 instances in 2008 and 13 instances in 2009.

## 1.0 Program Standards

### *Mission*

The mission of the Rhode Island Department of Health's (HEALTH) Beach Program is to protect the public from illness associated with swimming in contaminated bathing waters. The Beach Program achieves this goal by licensing recreational bathing beaches throughout the state under the authority of the General Laws of Rhode Island (Appendix A). We further this mission by assisting beach owners and managers with finding and eliminating sources of contamination.

### *History*

HEALTH began monitoring beaches in the summer of 1995. Prior to 1995, the Rhode Island Department of Environmental Management (RIDEM) was responsible for monitoring beaches. All facilities monitored under this program are licensed as Recreational Facilities by HEALTH.

A "bathing beach" is defined by HEALTH as a natural area or tract of land that is used in connection with swimming and/or bathing in any waters of the state provided:

- a) It is open to the public by permit and/or payment of a fee; or
- b) It is maintained as a private club or association requiring membership fees or dues; or
- c) It is maintained with or without charge for the recreation of groups of ten (10) or more children.

Licensing requires facilities to have electrical service; refuse storage and disposal; sewage disposal facilities; adequate toilets, showers, or lavatories with hot and cold running water; a drinkable water supply; and the water adjacent to a bathing beach must meet bacteriological standards.

In 1999, development of a comprehensive beach-monitoring program began under a USEPA Environmental Monitoring for Public Access and Community Tracking (EMPACT) Grant titled Bacterial Water Quality Monitoring at Upper Narragansett Bay Bathing Beaches. This grant enabled HEALTH to establish a public notification system including a website, telephone hotline, and beach flagging system. HEALTH also evaluated conditions in Upper Narragansett Bay, which has long been impacted by urban runoff, point source discharges, and combined sewer overflows (CSOs).

The EMPACT Program provided HEALTH with the resources to sample 23 stations in the Upper Narragansett Bay in wet and dry weather. The conclusion of this study determined that additional sampling was needed at the licensed Upper Bay beaches to adequately protect the public. Also, the areas north of Conimicut Point in Warwick and Nayatt Point in Barrington were deemed unsuitable for licensing.

In 2000, Congress enacted the Beaches Environmental Assessment and Coastal Health (BEACH) Act, an amendment to the Federal Water Pollution Control Act (a.k.a. The Clean Water Act). This act authorizes USEPA to distribute grants to eligible states and Indian tribes to reduce the risk of disease and illness in the nation's bathing waters. State objectives under this program were published by the USEPA in June 2002. The National Beach Guidance and Required Performance Criteria for Grants document outlines several requirements of the BEACH Act which include: a

tiered categorization of beaches according to risk, identification and mitigation of pollution sources, a risk communication plan, and specific beach monitoring information<sup>1</sup>.

Since 2000 the USEPA has provided HEALTH with over \$1 million in beach grants to manage Rhode Island's Beach Program. These grants have provided HEALTH the resources to vastly improve the Beach Program and to develop a broad base of knowledge regarding Rhode Island's monitored beaches.

### ***Program Staff***

The Beach Program consists of two full time employees, a Beach Program Coordinator and a Beach Program Assistant. The Beach Program is designated under the Office of Food Protection. As a result the Chief of the Office of Food Protection and Chief Environmental Health Food Specialist provide additional oversight and coordination.

Three interns are hired during the summer months to conduct sampling efforts. Two interns are designated as beach water samplers. The samplers collect samples daily at beaches determined by the Beach Program Coordinator and/or Beach Program Assistant. After samples have been collected and submitted to the laboratory the samplers come into the office to enter in their daily observations from the beaches. One intern is stationed in the laboratory and handles all necessary set-up/prep of sample containers and analysis equipment.

To aid in the 2009 Sand Sampling Project, the Beach Program hired three additional interns. Two interns were assigned to the Sanitary Microbiological section of the laboratory, and one was designated to collect beach sand samples at the ten study beaches.

### ***Funding***

During the 2009 beach season, EPA provided HEALTH with \$209,650 for the Beach Program. These funds support primary activities which include: sanitary surveys to identify risk and potential sources of fecal contamination at beaches; development and implementation of a risk-based monitoring plan; and bacteriological testing at saltwater beaches.

### ***Standards***

RIDEM and USEPA set Rhode Island's water quality standard, which states: saltwater bathing waters must not exceed a single sample standard of 104 Enterococci per 100 milliliters (mL) of water.

### ***Performance Criteria***

EPA has developed nine performance criteria for the implementation of monitoring, assessment, and notification programs. To be eligible for a grant to implement a monitoring and notification program, the state, tribal, or local government's program must be consistent with these performance criteria. The performance criteria also apply to federal agency programs and programs directly implemented by EPA. These performance criteria are based on and incorporate other requirements of the sections of the BEACH Act<sup>3</sup>.

### **Risk-Based Beach Evaluation and Classification Plan (Criterion 1)**

To evaluate and classify risk at Rhode Island's licensed facilities the Beach Program identified coastal recreational waters and bathing beaches throughout the state. Beach evaluations, sanitary surveys and water quality evaluations were conducted to determine risk.

### **Tiered Monitoring Plan (Criterion 2)**

To develop a tiered monitoring plan HEALTH identified the following factors: period and extent of use, frequency of monitoring needed, location of monitoring, methods to be used, and assessment procedures for short term increases in pathogen indicators.

### **Monitoring Report Submission (Criterion 3)**

HEALTH submits all beach monitoring data to EPA. Currently, HEALTH submits information annually through EPA's Central Data Exchange (CDX). To collect and submit this information HEALTH employs a web-based data manager (Garrison Enterprises).

### **Methods and Assessment Procedures (Criterion 4)**

To assess levels of pathogen indicators, HEALTH will use the IDEXX Enterolert™ method to enumerate Enterococci. Enterolert™ provides HEALTH a range of Enterococci from <10 to >24,192 MPN/100ml.

### **Public Notification and Risk Communication Plan (Criterion 5)**

HEALTH's public notification plan includes: an official beach sign program, 24-hour telephone hotline, publicly accessible website, and daily media releases. The purpose of this plan is to quickly notify the public of potential risk associated with swimming in contaminated bathing waters.

### **Measures to Notify EPA and Local Governments/Beach Managers (Criterion 6)**

EPA will be notified of all beach closures and openings through HEALTH's web-based management system. Every time a beach is opened and/or closed a press release will be emailed to the EPA Region 1 contact. Furthermore, EPA will receive an end of season report containing all violations and closures.

Beach managers will be notified immediately by telephone once a decision to close the facility has been made. The beach manager/operator will inform facility staff and bathers and post closure notification signs. Beach managers and local governments will receive an emailed press release as part of the closure notice distribution.

### **Measures to Notify the Public (Criterion 7)**

HEALTH utilizes several methods to notify the public of beach closures including: a 24-hour telephone hotline, daily updated website, closure sign system at all licensed beaches and a standard format press release.

### **Notification Report Data Submission Plan (Criterion 8)**

The BEACH Program requires HEALTH to submit all beach notification data to EPA. Currently, HEALTH submits information annually through EPA's Central Data Exchange (CDX). To collect and submit this information HEALTH employs a web-based data manager (Garrison Enterprises)

### **Public Evaluation of Program (Criterion 9)**

During the development of the Beach Program HEALTH conducted two public comment periods. First EPA, DEM and all licensed beach managers were given the opportunity to evaluate the sanitary survey procedures. Comments were used to better classify risk at licensed bathing beaches in Rhode Island. Second, the public was given an opportunity to comment on monitoring and public notification plans. Notices were sent out to all licensed beaches. An online notification was given for an informal public hearing to be held at HEALTH. Following the hearing, the public were given additional time to comment electronically or in writing.

During the 2008 beach season a marketing intern from the Bryant College of Business assisted HEALTH in a program evaluation. The evaluation assisted the Beach Program to more efficiently serve the needs of the public and provide a higher level of customer satisfaction and service to beach owners. Extensive research was used to track program performance in providing effective monitoring information and helpful support throughout the summer season.

## **2.0 Flagship Beaches**

USEPA defines flagship beaches as high-use beaches selected for targeted attention. Beaches were designated based on three criteria: a history of closures; extended periods of poor water quality; and service to a diverse socioeconomic user group. During the 2002 season, Goddard Park in Warwick, Warren Town Beach in Warren, and King Park Swim Area in Newport were designated as Rhode Island's Flagship Beaches. As a result of the closure of King Park Swim Area in 2004 by the City of Newport, Scarborough State Beach in Narragansett was designated as a flagship beach.

During the summer of 2003, the environmental health of Narragansett Bay was questioned. Rhode Island experienced the highest number of beach closures in recorded history and Greenwich Bay experienced the worst fish kill in the last fifty years. In response to these events, Governor Donald Carcieri formed the Governor's Narragansett Bay and Watershed Planning Commission to coordinate and plan for the environmental and economic health of the Bay. Ten study panels were formed with experts from state and federal government, academia, non-governmental organizations, private firms, and the public.

In March of 2004, the Commission issued a report detailing recommendations to improve the health of Narragansett Bay. On July 22, 2004, Governor Donald Carcieri responded to the report, charging HEALTH, DEM and the Department of Transportation (DOT) with developing an improvement strategy for the ten priority beaches. In December 2004, HEALTH, DEM and DOT issued *Joint Improvement Strategy for 10 Priority Beaches*, a document outlining the steps to be taken to identify and eliminate sources of contamination.

### ***Greenwich Bay***

Beaches located in the City of Warwick accounted for the largest percentage of closures by town over the last several years. From 2008 to 2009, closures in Warwick decreased from 73 to 58 closure days as rainfall increased from 9.64 inches to 17.24 inches. The decrease in closure days may be attributed to the increased stormwater holding capacity of the State Tunnel Project. With decreased contaminated discharge, water quality in upper Narragansett Bay has improved.

In 2009 the City of Warwick continued their efforts with connecting homes in Greenwich Bay to municipal sewer systems. Over six thousand connections have been made since the beginning of the project. These connections are also attributed to the decrease in beach closures.

### ***Easton's and Atlantic Beach Club***

In 2009 the City of Newport again granted money to a local Aquidneck Island volunteer organization, Clean Ocean Access (COA), to continue sampling Easton's Beach during the off-season when surfers utilize the beach area. This study is unique since HEALTH does not sample any of Rhode Island's beaches during the off-season (with the exception of short-term special studies). The City of Newport agreed to pay for sample analysis from January through December and COA agreed to provide all necessary manpower .

In the summer of 2009 Easton's Beach began using a seaweed harvester to remove excess seaweed from the waterline. Removal has resulted in reduced beaches closures and improved the aesthetic value of the facility.

Atlantic Beach Club worked with the Coastal Resource Management Council (CRMC) and a local waste management company to remove seaweed as necessary during the beach season. This contract will continue throughout the 2010 beach season as well.

## **3.0 2009 Data Summary**

### ***Sample Results***

The number of samples collected by HEALTH has increased from 281 in 1995 to 1770 in 2009. Beach Owners and Managers and non-profit groups under Beach Program guidance collected additional saltwater samples. The number of facilities tested has increased from 82 in 1997 to 118 in 2009, 68 of which are saltwater beaches.

### ***Closures***

During the 2009 beach season there were 79 recorded closure events totaling 181 closure days. This represents a 45.97% increase in closure days from the 2008 bathing season (there were 40 closure events totaling 124 closure days). Detailed information regarding beach closures can be found in Appendix G - *2009 Coastal Beaches Action Summary*. Total rainfall increased drastically from 2008 to 2009, from 9.64 inches to 17.24 inches. Also, significant rainfall events increased greatly from 6 in 2008 to 13 inches in 2009. Beginning in the summer of 2009 the Beach Program began tracking all meteorological data including tidal and lunar cycles at eleven major weather stations throughout the state (Appendix H – *Meteorological Conditions*). This data was used to track precipitation, air/water temperatures and wind direction/speed.

Table 1 contains data regarding closure days for each beach and suspected sources of contamination.

**Table 1. 2009 Saltwater Beach Closures**

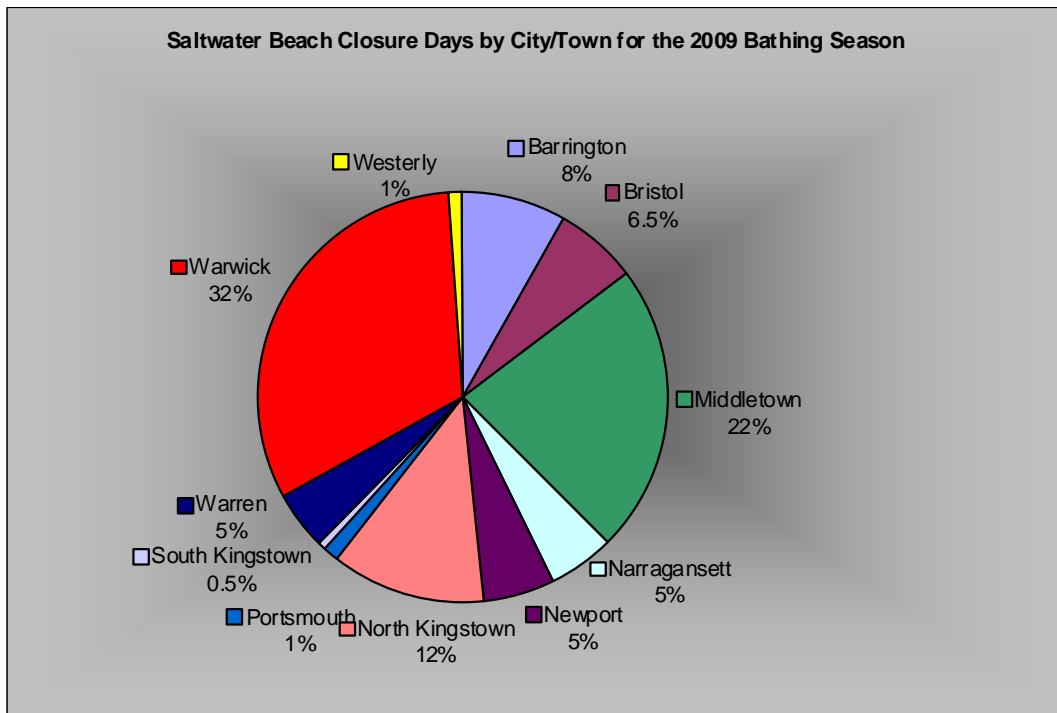
<b>Beach Name</b>	<b>Days Closed</b>	<b>Problems</b>
Atlantic Beach Club	18	Stormwater, Pump station, Newport CSO
Barrington Town Beach	15	Run-off, Providence CSO
Bristol Town Beach	12	Run-off, Wildlife, Providence CSO
Camp Fuller – YMCA Beach	1	Run-off, Wildlife
Camp Grosvenor	10	Run-off, Wildlife
City Park	12	Run-off, Boats, Wildlife
Conimicut Point	19	Providence CSO, Wildlife, Run-off
Easton’s Beach	3	Stormwater, Pump station, Newport CSO
Fort Adams	6	Run-off, Wildlife
Goddard Park	10	Run-off, Boats, Wildlife
Misquamicut Club	1	Sewage Discharge
North Kingstown Town Beach	8	Stormwater Run-off
Oakland Beach	17	Run-off, Wildlife
Peabody’s Beach	11	Stormwater Run-off, Boats, Wildlife
Plum Beach Club	1	Stormwater Run-off
Sandy Point Beach	2	Stormwater Run-off
Saunderstown Yacht Club Beach	3	Stormwater Run-off
Scarborough State Beach – North	5	Stormwater Run-off
Scarborough State Beach – South	5	Stormwater Run-off
Third Beach	11	Run-off, Boats
Warren Town Beach	9	Sewer Issues, Stormwater Run-off, Boats
Watch Hill Carousel Beach	1	Sewage Discharge
<b>Total:</b>	<b>181</b>	

The following table and charts document the percentage of closures attributed to each town. Note: all saltwater closure days occurred within eleven of Rhode Island's coastal towns.

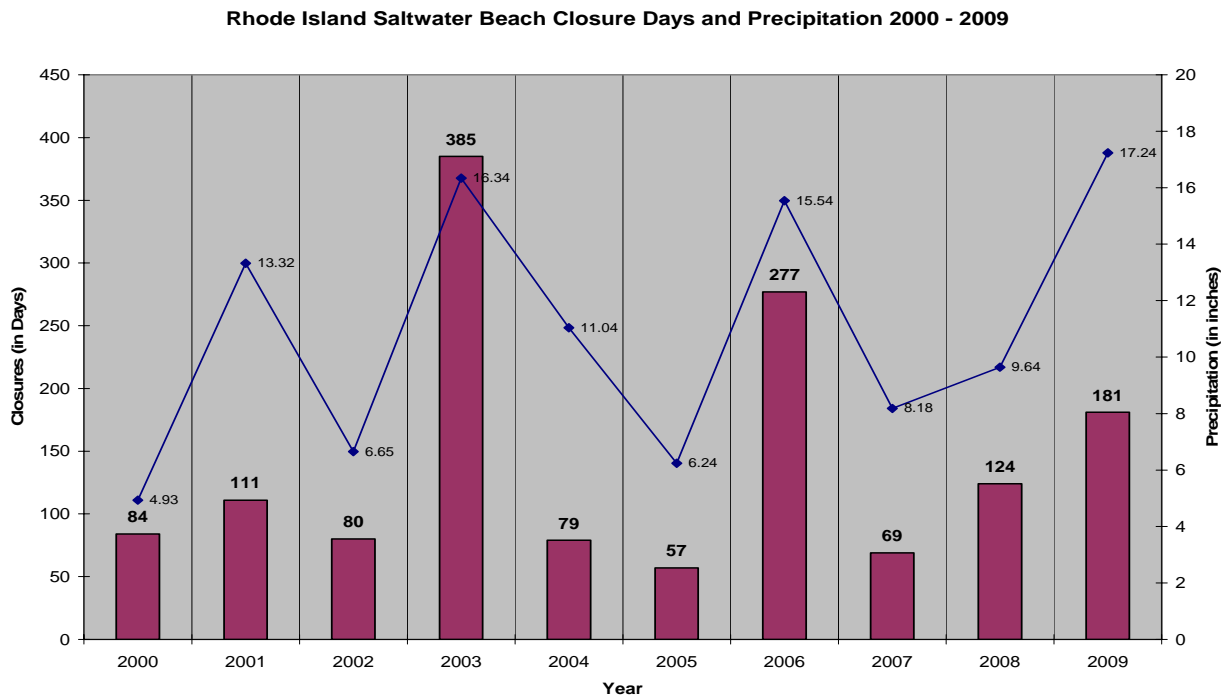
**Table 2. Percentage of Saltwater Beach Closure Days By Town for the 2009 Bathing Season**

<b>Percentage of Total Saltwater Closure Days</b>	<b>City/Town</b>	<b>Number of Closure Days</b>	<b>Facilities Closed</b>
5.0	Warren	9	Warren Town Beach
32.0	Warwick	58	City Park Beach, Conimicut Point Beach, Goddard State Park Beach, Oakland Beach
22.0	Middletown	40	Atlantic Beach Club Beach, Peabody's Beach, Third Beach
12.0	North Kingstown	22	Camp Grosvenor, North Kingstown Town Beach, Plum Beach Club, Saunderstown Yacht Club
8.0	Barrington	15	Barrington Town Beach
6.5	Bristol	12	Bristol Town Beach
6.0	Narragansett	10	Scarborough State Beach North, Scarborough State Beach South
6.0	Newport	10	Easton's Beach, Fort Adams
1.0	Portsmouth	2	Sandy Point Beach
1.0	Westerly	2	Misquamicut Club, Watch Hill Carousel Beach
0.5	South Kingstown	1	Camp Fuller – YMCA Beach
<b>100</b>		<b>181</b>	

**Chart A. Saltwater Beach Closure Days By Town for the 2009 Bathing Season**



**Chart B. Rhode Island Saltwater Beach Closure Days and Precipitation 2000-2009**



**Locational Data**

In summer and fall of 2009 EPA requested that Rhode Island review and correct locational data points for all monitored beaches. Using a web-based application the program found discrepancies at numerous beaches and resolved them. Having accurate locational data provides the EPA and the Beach Program with more precise beach extents. This allows for improved monitoring and notification.

**Geometric Mean**

A single outlier can drastically skew the arithmetic mean of a beach data set. The geometric mean is used to reduce the impact of significant outliers when averaging a large data set. The geometric mean is calculated by multiplying all data points and taking the  $n$ th root of the product, where  $n$  is the number of data points. The Beach Program uses geometric means as another metric to measure beach health.

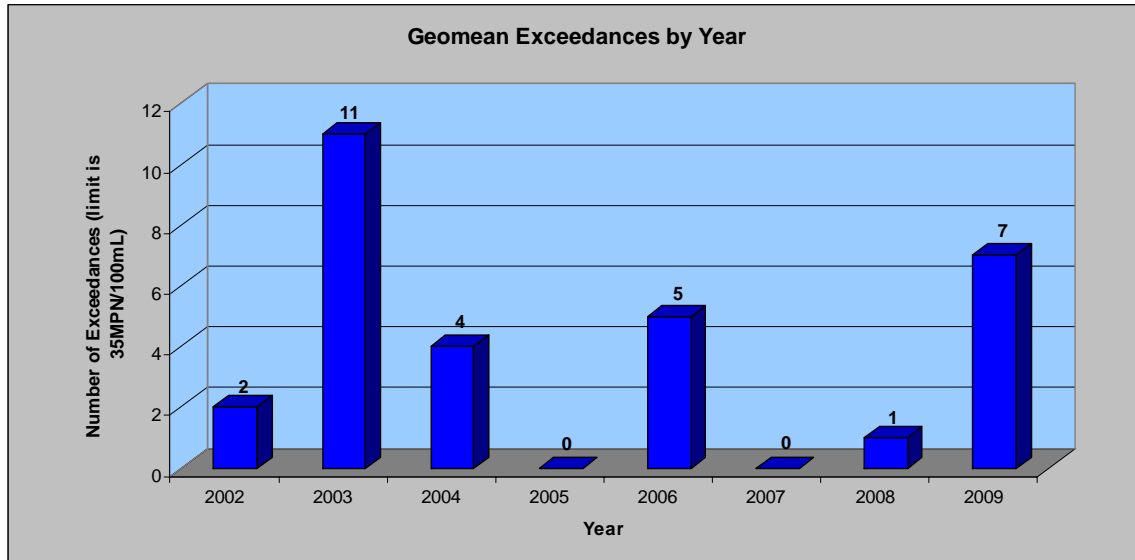
**Table 3. Geometric Mean of Enterococci Bacteria in Rhode Island**

Geometric Mean of Enterococci Bacteria in RI (Safe limit = 35 MPN/100ml)								
Beach	2002	2003	2004	2005	2006	2007	2008	2009
Alfies	17.32	10.00	13.55	13.26	10.00	10.00	10.00	12.65
Andrea Hotel	14.58	10.00	11.67	14.14	10.00	12.23	10.00	21.68
Atlantic Beach Casino	10.00	19.49	11.22	10.00	10.00	10.00	10.00	12.08
Atlantic Beach Club	27.02	87.89	48.40	33.69	76.94	29.23	32.44	55.53
Atlantic Beach Park	10.00	10.00	10.00	11.93	11.70	10.00	10.00	14.92
Atlantic Pizza & Grill	20.25	10.00	11.22	10.00	10.00	10.00	10.00	12.23
Ballards Inn	n/a	11.89	10.00	n/a	20.28	10.00	24.28	10.00
Barrington Town Beach	13.06	59.03	16.45	16.53	26.82	17.01	17.67	23.21
Blue Shutters Beach	11.75	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Bonnet Shores Beach	12.01	13.19	15.42	10.37	19.82	12.58	14.09	19.97
Briggs Beach	10.00	14.31	15.15	10.00	12.66	10.00	11.34	12.28
Bristol Town Beach	45.12	30.31	15.29	20.21	42.86	15.13	19.35	29.76
Camp Grosvenor	22.29	25.14	29.43	20.64	20.44	18.13	51.18	25.64
Camp St. Dorothy	44.40	18.70	20.11	16.98	30.94	14.02	11.08	40.15
C. Roger Wheeler Beach	16.77	12.00	14.98	10.85	15.38	13.77	10.00	12.14
Charlestown Breachway	13.01	12.46	10.00	10.00	10.00	10.00	10.00	14.12
Charlestown Town Beach	12.66	28.89	11.18	10.97	10.00	10.00	10.00	12.30
City Park Beach	17.81	70.25	17.90	28.02	28.04	22.31	20.43	15.53
Conimicut Point Beach	27.93	74.71	22.16	30.27	46.84	20.58	28.64	27.69
Dunes Club	17.69	14.67	11.50	10.35	10.56	10.69	14.78	15.64
Dunes Park	10.00	10.00	16.62	10.00	10.00	10.00	10.00	10.00
East Beach	10.72	26.04	10.63	10.00	10.00	10.00	10.00	10.00
East Matunuck Beach	10.00	10.00	11.16	10.00	10.00	10.80	11.22	10.00
Easton's Beach	19.57	30.61	50.29	20.08	n/a	26.97	34.18	27.18

Fogland Beach	15.52	11.93	14.85	10.71	16.68	10.59	11.53	16.35
Fort Adams State Park	19.62	22.65	18.44	14.00	20.45	12.56	13.03	18.39
Fred Benson Town Beach	n/a	10.00	10.00	10.00	34.79	10.00	10.00	10.00
Galilee Beach Club Assoc.	12.08	19.78	11.49	10.00	10.00	10.00	10.00	13.91
Goddard Park	15.85	33.18	14.96	20.18	19.87	16.69	17.28	36.91
Gooseberry Beach	29.01	16.92	13.00	10.34	13.61	10.44	10.59	13.91
Goosewing Beach	10.00	10.00	14.28	12.54	10.00	10.63	10.00	12.42
Grinell's Beach	24.78	11.22	13.87	13.70	14.70	10.00	10.92	16.99
Hazard's Beach	12.46	13.59	19.33	10.99	12.56	14.75	16.30	16.58
Jim's Trailer Park	10.00	10.00	10.80	10.00	10.00	11.89	13.26	10.00
Mackerel Cove Beach	12.60	36.25	16.92	13.14	18.19	11.48	23.31	12.26
Matunuck Town Beach	10.91	11.22	10.71	11.22	21.29	10.00	19.02	14.37
Misquamicut Club	10.00	58.78	12.20	19.11	15.01	10.00	10.00	10.00
Misquamicut Fire District Beaches	12.08	10.00	11.13	10.00	10.00	10.00	10.55	11.82
Misquamicut State Beach	10.47	11.78	12.32	10.81	10.77	11.27	11.37	13.20
Narragansett Town Beach	11.45	12.78	10.48	10.18	14.28	10.49	11.21	15.62
North Kingstown Town Beach	15.23	28.78	21.05	13.15	16.18	23.69	12.95	24.64
Oakland Beach	17.07	41.46	24.75	27.42	26.78	20.52	20.79	21.12
Ocean House	11.89	10.00	10.00	11.22	10.00	n/a	10.00	13.01
Paddy's Beach	10.00	10.00	10.00	10.00	10.00	12.98	10.00	11.22
Peabody's Beach	n/a	43.45	24.71	11.97	23.17	10.80	18.61	28.61
Pleasant View Inn	n/a	10.00	10.00	10.00	10.00	10.00	10.00	17.69
Plum Beach Club	12.46	11.22	13.46	12.97	24.23	16.83	11.49	41.68
Roy Carpenter's Beach	20.98	11.89	11.22	10.00	11.79	31.56	10.00	10.72
Sachuest Beach	12.60	10.00	13.21	10.90	13.11	10.95	12.10	17.47
Salty Brine Beach	15.23	24.49	11.93	10.00	13.16	18.24	17.43	18.88
Sam's Beach	17.32	10.00	10.00	10.80	10.00	11.49	13.80	14.45
Sandy Point Beach	10.00	11.22	13.43	14.69	14.54	10.44	12.82	35.54
Sandy Shore Motel	10.00	10.00	13.55	10.00	10.00	10.00	10.00	19.22
Saunderstown Yacht Club	n/a	51.86	37.22	12.88	35.67	14.12	14.80	36.97
Scarborough State Beach North	14.36	16.54	23.00	15.33	18.17	22.87	15.69	17.99
Scarborough State Beach South	19.71	19.40	23.49	16.63	22.11	20.60	12.96	19.52
Seaside Beach Club	10.00	10.00	20.08	10.00	10.00	10.00	12.66	12.54
South Shore Beach	10.00	16.49	15.15	10.00	10.00	10.88	10.59	19.88
Spouting Rock Beach Assoc.	13.16	60.30	39.83	11.04	20.77	10.00	14.74	27.17
Surf Hotel	n/a	10.00	n/a	n/a	14.14	25.25	14.14	10.00
Third Beach	n/a	n/a	16.59	16.35	26.25	15.84	17.49	35.51
Warren Town Beach	23.38	68.30	11.59	24.08	40.85	25.12	17.27	21.96
Warren's Point Beach Club	10.00	19.89	10.91	10.55	10.00	11.22	14.90	11.70
Weekapaug Fire District Beaches	n/a	n/a	13.01	10.00	10.00	10.00	10.56	10.71
Westerly Town Beach New	10.00	10.00	10.00	10.00	12.60	10.00	14.70	16.35
Westerly Town Beach Old	10.00	22.15	12.65	10.00	10.00	10.00	12.25	15.00
Willow Dell Beach Club	n/a	10.00	15.13	10.00	16.04	10.72	12.53	11.22

The following chart depicts the number of beaches exceeding the 35 MPN/100mL standard per year.

**Chart C. Geomean Exceedances by Year**



## 6.0 2009 Projects

### *Sand Study*

Sand sample collection took place at 10 of Rhode Island's highest risk beaches that exhibit unsafe fecal bacteria levels. In addition, two beaches that do not experience elevated bacteria levels in the water were used as control sites. The twelve collection sites incorporated varying wave intensities including low (upper Bay beaches), medium (Warwick beaches) and high (open ocean beaches).

A Daily Beach Survey was completed by the samplers at each of the twelve facilities. Environmental conditions that were not collected in the Daily Survey were collected through [www.weatherunderground.com](http://www.weatherunderground.com). These conditions include precipitation, wind direction and speed, currents, tidal and lunar cycles and air temperature.

Analysis of samples for Enterococci used the 24-hour Enterolert test. Testing took place at the Rhode Island Department of Health State Laboratory. Analysis followed Standard Operating Procedures for the Enterolert Method. Dry weight analysis was conducted on sand samples at the HEALTH laboratory. Analysis for dry weight followed Standard Operating Procedures.

Sample results were emailed to the Project Manager at [amie.parris@health.ri.gov](mailto:amie.parris@health.ri.gov), the Project Assistant at [sean.mccormick@health.ri.gov](mailto:sean.mccormick@health.ri.gov) and Dr. Ernest Julian, Chief for Office of Food Protection at [ernest.julian@health.ri.gov](mailto:ernest.julian@health.ri.gov), upon completion of lab analysis.

With this information, the Beach Program hopes to make more health conscious and proactive decisions when closing beach facilities and to evaluate the current closure methods already in

place. The Program will attempt to answer the following question: Is there is a need to implement more stringent policies when closing a beach to swimming based on sand sample data?

Program Staff collected 338 sand samples from August 11 through September 3, 2009. Sample results ranged from <0.28 MPN/gram through >968.43 MPN/gram of sand. The lowest sample result was taken from the dry sand of Barrington Town Beach (high risk facility) and the highest sample was taken from the wet sand of Galilee Beach Club (control beach). Based on this observation no direct correlation can be made between bacterial contamination in sand and water.

Beach Sand does not have a federally approved standard. Sampling and investigation of fecal bacteria in beach sand is new field of study and therefore cannot be used as a method to measure pollutants. Beach Sand data is collected for research purposes with the intent to one day be used as an additional environmental health factor regarding coastal beaches.

Note: Further project details can be found in the Quality Assurance Project Plan (QAPP) for the Beaches Environmental Assessment and Coastal Health Grant: *Investigating Potential Fecal Bacteria in Rhode Island Beach Sand and Its Effect on Beach Closures* (Appendix F\*).

### ***Bristol Town Beach Improvements***

There are four major projects currently in place at Colt State Park (Bristol Town Beach), one of which has been completed.

First, the completed project consists of six catch basins constructed between the beach and the surrounding park area. These bioswales have been placed along the edge where the *fragmides* meet the water. Rain from the parking lot and park area enters the bioswales before entering the beach. The rainwater is filtered mechanically in the catch basins, and then further filtered by the vegetation in the bioswales. The bioswales also significantly slow down the flow of rainwater to prevent surges of storm water that may carry bacteria and other contamination.

The second project concerns the 36" storm drainpipe that drains approximately 30 feet from the beach facility. This pipe is to be "daylighted" – a large transect (about 400 yards) will be cut open, exposing the water to the sun and outside environment. This open-air section will be a winding stream designed to slow the water flow down. Footbridges will allow for the public to enjoy the new stream while providing valuable access points to travel throughout the park. Around the stream, specialized plants have been chosen that will absorb the water through their root systems, creating a stream that releases cleaner water into Narragansett Bay.

Third, the Town of Bristol has taken a \$1,000,000 loan to remove the parking lot at Bristol Town Beach and replace it with an ecofriendly green parking lot with bioretention swales and specialized vegetation to further absorb and filter storm water.

Finally, the sewage treatment pipe closest to the beach is receiving a major renovation. Underground storage tanks are to be added, which will store water during periods of high-volume rain. When the intense rain has finished, the water will be released at greatly reduced rates, allowing for proper filtration and cleansing of the water.

### ***Barrington Town Beach Source Identification***

HEALTH met with Barrington to discuss recent elevated bacteria levels at the town beach. A full beach survey was conducted including sampling of the bathing water and a nearby storm water

pipe. Sample results from the pipe showed high levels of bacteria and will need to be investigated further in the upcoming beach season.

### ***Middletown Investigation and Survey***

During the 2009 bathing season Middletown saw an increase in high bacteria levels at Third Beach and Peabody's Beach. As a result the Beach Program met with the Middletown Department of Recreation, owners of Peabody's Beach and the Norman Bird Sanctuary. An investigation was conducted at the beaches and along the Maidford River, including a nearby horse farm and vineyards. To further investigate, the town hired a private consulting firm to examine these possible sources of contamination, which will begin in 2010. A detailed map depicting the survey location and sampling points can be found in Appendix I - *Maidford River Survey Map*.

### ***Governor's Bay Day 2009***

In July 2009, the Beach Program participated in the Governor's Bay Day. The purpose of Bay Day is to promote public awareness of the state's beaches. The Beach Program managed a table at Colt State Park to provide information on the Program and educate the public on what they can do to minimize beach closures. Educational materials included an interactive storm-water model that demonstrates how pollutants can be mobilized from urban, suburban, and rural areas into fresh and saltwater environments. Additional educational materials included beach health brochures, informational coloring pages for children, Bristol Town Beach improvements map, sample beach closure sign, a tablet computer displaying the Beach Program website and Program staff to assist patrons with questions.

### ***URI Watershed Watch***

In July of 2009, the Beach Program spoke about beach water quality and sampling efforts on the News Channel 10 URI Watershed Watch Report. A small segment on the news was dedicated to demonstrating how samples are collected at the beach and discussing beach water quality. Both the Beach Program Coordinator and Beach Program Assistant attended the recording of the segment at Oakland Beach in Warwick, RI.

## **5.0 Future Activities**

### ***Monitoring and Data Collection***

Beach interns will conduct sampling at coastal beaches from Memorial Day through Labor Day. Approximately 2,000 samples will be collected, submitted, and analyzed for Enterococci bacteria during the summer season.

### ***Public Notification***

The Beach Program will distribute press releases to beach owners, local governments and RI media. The Program will update the 24-hour telephone hotline on daily basis and produce Public Service Announcements to promote the Beach Program and Public Health.

### ***Source Tracking***

The Beach Program will work with sister agencies and local governments to find and eliminate sources of contamination at Rhode Island beaches. Program staff will coordinate meetings to drive change and lend support to others working for similar causes.

### ***Data Submission***

The Program Coordinator will prepare data for submission to EPA's Storet Warehouse and WQX/CDX Database. S/he will submit data files for the 2011 beach season to EPA Region 1.

### ***Sanitary Surveys***

The Beach Program will conduct sanitary surveys and full beach evaluations at all 68 licensed saltwater bathing beaches. Collected data will include locational data points, daily user populations, unidentified sources of contamination (including discharge pipes), bird populations, nearby farms etc.

### ***Data Merge***

Program Staff will continue work with Garrison Enterprises to upgrade the Beach Program website. Improvements include posting beach evaluation surveys and rain data. The Program would also like to incorporate updated GIS maps to the site to replace the outdated maps. A few beaches in Rhode Island provide live feed cameras to their beaches. We would like to link those beaches to the Beach Program website in order to provide the public with the best, up-to-date information.

### ***Wet Weather Sampling***

The Beach Program will continue to collect wet weather data at Rhode Island's ten priority beaches. This effort will be increased by collecting weekend samples. Work will include: sample collection, data entry and results analysis. Program staff will open communication with other agencies and towns who are conducting similar testing.

### ***Pre-emptive Closure Evaluations***

Based on the successful protocols utilized at Easton's Beach and Scarborough State Beach, the Program will develop further closure evaluations for the remaining Governor's Priority Beaches. This will be accomplished by correcting all data, analyzing closure rates and rate of clean-up and documenting significant rain events.

### ***Urban Beach Initiative***

Program Staff will investigate various unlicensed public access points, for example Gaspee Point in Cranston, RI. This study will include: water quality sampling, property surveys and stakeholder meetings. EPA will assist HEALTH by providing dive team specialists to survey underwater conditions. The goal of this project is restore access/use to communities that have currently impaired beaches.

### ***Education and Outreach***

The Program would like to begin an Education and Outreach Initiative that will utilize written media and interpersonal communication to increase awareness regarding healthy beach practices. The initiative's primary audience will include children and young adults. Potential activities include: Governor's Bay Day, Rhode State Lifeguard training, youth camp presentations and distribution of informational media.

### ***Environmental Stewardship***

The Beach Program will provide beach owners and managers information on environmentally friendly improvements at their facilities. Projects such as porous pavement, rain gardens, buffer planting and pipe day lighting can be used to improve beach and water quality.

### ***Predictive Modeling***

During the 2009 season, HEALTH utilized predictive measures at Scarborough State Beach and Easton's Beach, which tend to have high closure rates. Since sampling has increased steadily over the past several years, more data is available to create models. Currently, the processing time for a sample result is 24 hours. HEALTH's goal is to use past data to create a system that will dictate appropriate closing/opening measures in a timely manner to ensure better public health.

HEALTH is currently in the process of reviewing all data in the beach database to ensure the quality of reported results. Upon completion of the data evaluation, HEALTH plans to assess rainfall and sample data for beaches with chronic closures to look for trends that may help in the development of closure protocols.

## **Works Cited**

1. NOAA Northeast Environmental Climate Data. <http://www.erh.noaa.gov/box/dailystns.shtml>
2. United States Environmental Protection Agency. Beaches Assessment and Coastal Health Act of 2000. 33 U.S.C. 1362 sections 104, 303, 406, 502, and 518(e)  
<http://www.epa.gov/waterscience/beaches/rules/act.html>
3. USEPA National Beach Guidance and Required Performance Criteria for Grants. June 2002.  
[http://www.epa.gov/waterscience/beaches/grants/guidance/Accessible\\_pdf/all.pdf](http://www.epa.gov/waterscience/beaches/grants/guidance/Accessible_pdf/all.pdf)

**Appendix A**

Rules and Regulations for Licensing of Recreational Facilities

**Appendix B**

Sanitary Survey Form



## Rhode Island Department of Health Beach Monitoring Program



**BEACH NAME:**

**DATE OF SURVEY:**

**Beach Contact Information**

**Narrative**

**Beach Monitoring Activities**

**Closure History (Last 5-years)**



## Rhode Island Department of Health Beach Monitoring Program



**BEACH NAME:**

**DATE SURVEY COMPLETED:**

Is beach area marked (i.e. roped off, etc.)? Describe.	
Lat/Long of ends of beach area (N/S or E/W boundaries)	
Length of swimming area	
Lat/Long of Sample Stations	
Length of entire beach	
Location of storm water run-off points? Describe and/or get lat/long	
Comments	



## Rhode Island Department of Health Beach Monitoring Program



**BEACH NAME:**  
**COMPLETED:**

**DATE**

**SURVEY**

### Beach History and Known Sources of Contamination:

Does the Beach meet its use classification?	YES/NO (if no, high risk)						
303d Listed?	YES/NO (add 1 point per impairment)						
Confirmed Illness Reports?	YES/NO (if yes, add 5 points)						
Closed during the 2006 Bathing Season?	1-5days 1 Point	6-10days 2 Points	11-15days 3 Points	16-20days 4 Points	21-25days 5 Points	26-30days 6 Points	
Closed during the 2005 Bathing Season?	1-5days 1 Point	6-10days 2 Points	16-20days 4 Points	21-25days 5 Points	26-30days 6 Points	31-35days 7 Points	
Is the beach located in an UA or DPA?	YES/NO (if yes, add 10 points)						
Number of PS Discharges within a 5 mile radius?	(1 point per discharge)						
Is the area subject to CSO's or SSO's?	YES/NO (if yes, add 25 points)						
Is the area subject to Agricultural run-off?	YES/NO						
The nearest POTW is _____miles away?	0-1 mile 15 points	1-2 miles 10 points	2-3 miles 5 points	3-4 miles 3 points	4-5 miles 1 point		
Number of POTW's within 5 miles?	(1 point per POTW)						
Level of Private Septic Systems?	High 10 points		Medium 5 points		Low 1 point		
Is there a TMDL in progress?	YES/NO (if yes, subtract 5 points)						
Ave. # of times the single sample standard was violated?	(1 point per exceedance)						
How important is this beach to the local economy?	High 10 points		Medium 5 points		Low 1 point		
Number of Marine Pump-Outs within 5 miles?	(Subtract 1 point per facility)						

### Field Survey:

Sanitary facilities located at Beach?	YES/NO (if no, add 5 points)			
Number of Marinas to likely have an effect on the beach?	(1 point per marina)			
Level of boat traffic?	High 10 points	Medium 5 points	Low 1 point	
Wild animals present on/near beach?	YES/NO (if yes, add 5 points)			

Domestic animals on/near beach?	YES/NO (if yes, add 5 points)					
Approx. # of Birds on a typical 100ft. section of beach?	(.25 points per bird)					
Ave. # of users during peak beach season?	1-500 5 points	501-1500 10 points	1500-5000 15 points	5001-10000 20 points	>10001 25 points	
Ave # of off-peak users (primary contact)?	1-25 1 point		26-50 5 points		>50 10 points	
Density of susceptible population?	0-33% 5 points		34-67% 10 points		68-100% 15 points	
Visible stormwater run-off?	YES/NO (if yes, 5 points per occurrence)					
Pipes at/adjacent to beach?	YES/NO (if yes, pipe <12"-1 point, >12"-2 points)					
Presence of floatable debris?	YES/NO (if yes, add 5 points)					
Presence of scum/oil sheen?	YES/NO (if yes, add 5 points)					

General Information:

Length of beach			
Location of pipes?			
Location of sampling points?			
Location of stormwater run-off points?			
Distance to stream/river?			
Wrack present?	YES/NO	Width:	Do they rake? YES/NO

Grand Total:	
--------------	--

**Comments:**

**Appendix C**

Daily Survey Form

### Bathing Beach Survey

Name of Beach: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ Water Temp: \_\_\_\_\_

Weather Conditions:

Sunny & Clear \_\_\_\_\_ Cloudy & Overcast \_\_\_\_\_ Rainy \_\_\_\_\_ Foggy \_\_\_\_\_ Windy \_\_\_\_\_

Tidal Conditions:

Slow \_\_\_\_\_ Moderate \_\_\_\_\_ High \_\_\_\_\_ High Tide \_\_\_\_\_ Low Tide \_\_\_\_\_

Activity on Beach:

Approx.# of People \_\_\_\_\_ Adults \_\_\_\_\_ Children \_\_\_\_\_

Swimming \_\_\_\_\_ Sunbathing \_\_\_\_\_ Fishing \_\_\_\_\_ Boating \_\_\_\_\_ Walking \_\_\_\_\_ Other \_\_\_\_\_

Conditions of the Beach:

Overall Appearance \_\_\_\_\_ Debris on Beach \_\_\_\_\_ Debris in Water \_\_\_\_\_

Vegetation in Water: 1      2      3      4      5  
                                 <25%   25%   50%   75%   100% Cover in 1 meter quadrat

Vegetation on Shore: 1      2      3      4      5  
                                 <25%   25%   50%   75%   100% Cover in 1 meter quadrat

Width of Wrack on shore (in meters) \_\_\_\_\_

Visible sewage or sewage odor \_\_\_\_\_

Conditions of Water:

Clear \_\_\_\_\_ Cloudy & Murky \_\_\_\_\_ Oily Film \_\_\_\_\_

Sources of Pollution:

Waterfowl Approx.#-Seagulls \_\_\_\_\_ Ducks \_\_\_\_\_ Geese \_\_\_\_\_ Swans \_\_\_\_\_

Approx. # of Boats \_\_\_\_\_

Wind and Weather Conditions:

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Additional Comments:

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**Appendix D**

Homepage for HEALTH's Beach Monitoring Program

Rhode Island Department of Health - Beach Monitoring - Windows Internet Explorer

http://www.ribeaches.org/

File Edit View Favorites Tools Help

Rhode Island Department of Health - Beach Monitoring

RI.gov R.I. Government Agencies | Privacy Policy | Search RI.gov: Go

Rhode Island Department of Health  
David R. Gifford, MD, MPH, Director  
Donald L. Carcieri, Governor

HOME HEALTH TOPICS NEWS DATA PROGRAMS PUBLICATIONS SITE MAP

Beach Monitoring Home **Beach Water Quality Monitoring** Today is March 26 2010  
News and Publications Today's weather and ozone forecast  
Closures and Advisories  
Water Quality Information  
Fact Sheets for Beach Goers  
Illness Complaint Form  
Related Links  
RIBeach Watch Login  
Content Syndication  
Beach Owners and Managers

The purpose of the Rhode Island Department of Health Beach Monitoring Program is to provide real-time water quality and safety information concerning all 126 monitored bathing facilities. Through effective management of these beaches, the Department of Health can minimize public health risks associated with swimming in contaminated waters.

For information regarding Recent Beach Closures and/or Openings please see the "RECENT BEACH CLOSURES" section in the right-hand menu. Alternatively you can use the "SEARCH BEACH RESULTS" feature on the right-hand menu to search for a specific beach by beach name or by town to see a full water quality monitoring history for that beach.

- Recent Closures and Advisories
- Recent Press Releases
- Fact Sheets for Beach Goers

If you have any questions, comments or suggestions for the Beach Monitoring Program website, please contact us at: [ribeaches@health.ri.gov](mailto:ribeaches@health.ri.gov)

Beach Monitoring Program  
3 Capital Hill Room 203  
Providence, RI 02908-5097  
(401)222-7727 or (401)222-2751  
Amie Parris - Beach Coordinator  
[amie.parris@health.ri.gov](mailto:amie.parris@health.ri.gov)

For questions or comments on the Beach Monitoring Program site, please e-mail [RIBeaches@health.ri.gov](mailto:RIBeaches@health.ri.gov)

**SEARCH BEACH RESULTS**  
Any Beach  
Select a Beach or Select a Town  
Any Town  
Search Click Search

**BEACH SEARCH TIPS**  
Select a Beach or Town to search. When complete you will be presented with an alphabetical list of all beaches that match your search criteria.

**RECENT PRESS RELEASES**  
No Recent Press Releases Available.  
More ...

**RECENT BEACH CLOSURES**  
No Recent Beach Closures Available.  
More ...

Rhode Island Department of Health • 3 Capitol Hill • Providence RI 02908  
Voice: 401-222-2231 • Fax: 401-222-6548 • TTY: 711 • Contact Us  
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**Appendix E**

Rhode Island Beach Closure Days 2000 to 2009

***Rhode Island Department of Health Beach Monitoring Program***

***Closure Evaluation Spreadsheet***

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
<b>Number of Monitored Freshwater Beaches</b>	51	51	49	51	47	50	53	49	50	50
<b>Number of Monitored Saltwater Beaches</b>	31	31	70	72	71	69	69	69	74	68
<b>Total Number of Monitored Beaches</b>	82	82	119	123	118	119	122	118	124	118
<b>Sample Count*</b> (RIDOH - EPA Funded Sampling Only)	515	976	1,779	2,567	2,701	3,211	2,769	1,718	1,655	1,770
<b>Rainfall Total</b> (Memorial Day - labor Day)	4.93	13.32	6.65	16.34	11.04	6.24	15.54	8.18	9.64	17.24
<b>Significant Rain Events</b> (>0.5" in 24-hr)	4	7	6	12	9	4	7	6	6	13
<b>Total Sewege Discharge Volume (Million Gallons)</b>	No Data	215.42	719.34	994.83	998.43	1024.5	854.77	579.03	955.1	207.79
<b>Closure Events</b>	13	26	27	67	41	30	91	43	52	89
<b>Closure Days</b>	103	148	103	459	122	65	351	96	164	230

\* Sample count estimates do not include approximately 1,000 samples submitted by Beach Operators on an annual basis, which are reviewed by RIDOH.

For up to the minute information, visit us online at [www.health.ri.gov](http://www.health.ri.gov) or via our hotline at 401-222-2751.

Appendix F

Appendix G

**2009 Coastal Beaches Action Summary**

Town/City	Beach Name	Action Type	Action Start Date	Action End Date	Action Duration	Source
Middletown	Atlantic Beach Club	closure	6/10/2009	6/14/2009	4	Storm
Middletown	Atlantic Beach Club	closure	7/22/2009	7/23/2009	1	Storm
Middletown	Atlantic Beach Club	closure	7/24/2009	7/25/2009	1	Storm
Middletown	Atlantic Beach Club	closure	7/31/2009	8/1/2009	1	Storm
Middletown	Atlantic Beach Club	closure	8/12/2009	8/13/2009	1	Heavy Seaweed
Middletown	Atlantic Beach Club	closure	8/14/2009	8/15/2009	1	Heavy seaweed
Middletown	Atlantic Beach Club	closure	8/18/2009	8/25/2009	7	Off-shore tropical storm, Heavy seaweed
Middletown	Atlantic Beach Club	closure	8/29/2009	8/31/2009	2	Storm
Barrington	Barrington Town Beach	closure	7/2/2009	7/8/2009	6	Storm
Barrington	Barrington Town Beach	closure	7/23/2009	7/25/2009	2	Storm
Barrington	Barrington Town Beach	closure	8/20/2009	8/25/2009	5	Off-shore tropical storm
Barrington	Barrington Town Beach	closure	8/29/2009	8/31/2009	2	Storm
Bristol	Bristol Town Beach	closure	6/23/2009	6/25/2009	2	Unknown
Bristol	Bristol Town Beach	closure	7/2/2009	7/4/2009	2	Storm
Bristol	Bristol Town Beach	closure	7/24/2009	7/25/2009	1	Storm
Bristol	Bristol Town Beach	closure	8/20/2009	8/25/2009	5	Off-shore tropical storm
Bristol	Bristol Town Beach	closure	8/29/2009	8/31/2009	2	Storm
South Kingstown	Camp Fuller - YMCA Beach	closure	7/2/2009	7/3/2009	1	Storm
North Kingstown	Camp Grosvenor	closure	7/9/2009	7/14/2009	5	Storm
North Kingstown	Camp Grosvenor	closure	7/22/2009	7/23/2009	1	Storm
North Kingstown	Camp Grosvenor	closure	7/24/2009	7/28/2009	4	Storm
Warwick	City Park Beach	closure	7/2/2009	7/7/2009	5	Storm
Warwick	City Park Beach	closure	7/9/2009	7/10/2009	1	Storm
Warwick	City Park Beach	closure	7/24/2009	7/28/2009	4	Storm
Warwick	City Park Beach	closure	8/29/2009	8/31/2009	2	Storm
Warwick	Conimicut Point Beach	closure	6/30/2009	7/7/2009	8	Unknown (6/30), Storm (7/1-7/7)
Warwick	Conimicut Point Beach	closure	7/9/2009	7/10/2009	1	Storm
Warwick	Conimicut Point Beach	closure	7/24/2009	7/28/2009	4	Storm
Warwick	Conimicut Point Beach	closure	8/21/2009	8/25/2009	4	Off-shore tropical storm
Warwick	Conimicut Point Beach	closure	8/29/2009	8/31/2009	2	Storm
Newport	Easton's Beach	closure	7/24/2009	7/25/2009	1	Storm
Newport	Easton's Beach	closure	8/29/2009	8/31/2009	2	Storm
Newport	Fort Adams State Park	closure	6/24/2009	6/25/2009	1	Unknown
Newport	Fort Adams State Park	closure	7/10/2009	7/11/2009	2	Storm
Newport	Fort Adams State Park	closure	7/22/2009	7/23/2009	1	Storm
Newport	Fort Adams State Park	closure	7/24/2009	7/25/2009	1	Storm
Newport	Fort Adams State Park	closure	8/29/2009	8/31/2009	2	Storm
Warwick	Goddard Memorial State Park	closure	6/23/2009	6/26/2009	3	Unknown
Warwick	Goddard Memorial State Park	closure	7/2/2009	7/4/2009	2	Storm
Warwick	Goddard Memorial State Park	closure	7/24/2009	7/26/2009	2	Storm
Warwick	Goddard Memorial State Park	closure	8/20/2009	8/21/2009	1	Off-shore tropical storm
Warwick	Goddard Memorial State Park	closure	8/29/2009	8/31/2009	2	Storm
Westerly	Misquamicut Club	closure	7/2/2009	7/3/2009	1	Sewage discharge in area
North Kingstown	North Kingstown Town Beach	closure	6/25/2009	6/26/2009	1	Unknown
North Kingstown	North Kingstown Town Beach	closure	7/2/2009	7/4/2009	2	Storm
North Kingstown	North Kingstown Town Beach	closure	7/9/2009	7/11/2009	2	Storm
North Kingstown	North Kingstown Town Beach	closure	7/24/2009	7/25/2009	1	Storm
North Kingstown	North Kingstown Town Beach	closure	8/29/2009	8/31/2009	2	Storm
Warwick	Oakland Beach	closure	7/2/2009	7/7/2009	5	Storm
Warwick	Oakland Beach	closure	7/23/2009	7/28/2009	5	Storm
Warwick	Oakland Beach	closure	7/31/2009	8/1/2009	1	Storm
Warwick	Oakland Beach	closure	8/21/2009	8/25/2009	4	Off-shore tropical storm
Warwick	Oakland Beach	closure	8/29/2009	8/31/2009	2	Storm

Middletown	Peabody's Beach	closure	7/2/2009	7/7/2009	5	Storm
Middletown	Peabody's Beach	closure	7/9/2009	7/11/2009	2	Storm
Middletown	Peabody's Beach	closure	7/24/2009	7/26/2009	2	Storm
Middletown	Peabody's Beach	closure	8/29/2009	8/31/2009	2	Storm
North Kingstown	Plum Beach Club	closure	7/28/2009	7/29/2009	1	Unknown
Portsmouth	Sandy Point Beach	closure	7/2/2009	7/4/2009	2	Storm
Saunderstown	Saunderstown Yacht Club	closure	8/21/2009	8/24/2009	3	Off-shore tropical storm
Narragansett	Scarborough State Beach North	closure	7/2/2009	7/3/2009	1	Storm
Narragansett	Scarborough State Beach North	closure	7/22/2009	7/23/2009	1	Storm
Narragansett	Scarborough State Beach North	closure	7/24/2009	7/25/2009	1	Storm
Narragansett	Scarborough State Beach North	closure	8/29/2009	8/31/2009	2	Storm
Narragansett	Scarborough State Beach South	closure	7/2/2009	7/3/2009	1	Storm
Narragansett	Scarborough State Beach South	closure	7/22/2009	7/23/2009	1	Storm
Narragansett	Scarborough State Beach South	closure	7/24/2009	7/25/2009	1	Storm
Narragansett	Scarborough State Beach South	closure	8/29/2009	8/31/2009	2	Storm
Middletown	Third Beach	closure	7/3/2009	7/4/2009	1	Storm
Middletown	Third Beach	closure	7/9/2009	7/11/2009	2	Storm
Middletown	Third Beach	closure	7/24/2009	7/26/2009	2	Storm
Middletown	Third Beach	closure	7/31/2009	8/1/2009	1	Unknown
Middletown	Third Beach	closure	8/13/2009	8/14/2009	1	Unknown
Middletown	Third Beach	closure	8/29/2009	8/31/2009	2	Storm
Middletown	Third Beach	closure	9/1/2009	9/3/2009	2	Unknown
Warren	Warren Town Beach	closure	7/2/2009	7/4/2009	2	Storm
Warren	Warren Town Beach	closure	7/8/2009	7/10/2009	2	Storm
Warren	Warren Town Beach	closure	7/23/2009	7/26/2009	3	Storm
Warren	Warren Town Beach	closure	8/29/2009	8/31/2009	2	Storm
Westerly	Watch Hill Carousel Beach	closure	7/3/2009	7/4/2009	1	Sewage discharge in area

Appendix H

Appendix I

