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# NORTH HAMPTON STATE BEACH

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## Water Quality Report Summer 2009



**North Hampton State Beach, North Hampton  
Water Quality Report  
Summer 2009**



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## **History of the Beach Program**

The New Hampshire Department of Environmental Services (NHDES) recognizes a public health threat may exist within recreational waters and tests the water at the state's beaches to ensure swimmers are not exposed to disease-causing pathogens or cyanobacteria scums. The NHDES has operated a Public Beach Inspection Program, commonly called the Beach Program, for over 20 years.

The New Hampshire coastal beach monitoring program was initiated in 1989 with the DES inspecting five beaches. In October 2000, the United States Congress amended the Clean Water Act to include the BEACH Act. The Environmental Protection Agency (EPA) was then authorized to award grants to eligible states to develop and implement monitoring and notification programs. These programs protect the public from exposure to pathogenic microorganisms in coastal recreation waters.

The DES first received grant funds in 2002. Since then the New Hampshire Beach Program has successfully met all of the EPA's performance criteria requirements (National Beach Guidance and Required Performance Criteria for Grants) and continues to expand the monitoring and notification program. Weekly summer monitoring throughout the state was conducted at nine beaches in 2002, and has since nearly doubled to 17 by 2009. The Beach program strives to expand sampling to include all coastal New Hampshire beaches.

Coastal beaches are monitored for the presence of the fecal bacteria *Enterococci* which are present in the intestines of warm-blooded animals including humans. Fecal bacteria, when present in high concentrations and ingested, can commonly cause gastrointestinal illnesses such as nausea, vomiting and diarrhea. These indicator organisms signify the possible presence of other potentially disease-causing organisms in the waterbody.

Beach monitoring and bacteria source tracking have been implemented to protect public health. In a collaborative effort, the NHDES Beach program, towns, beach managers, recreational directors and health inspectors encourage public awareness of sources of pollution and environmental responsibilities. Thank you for your interest and concern in New Hampshire's water quality.

## **Beach Statistics**

North Hampton State Beach is owned and maintained by the New Hampshire Division of Parks and Recreation, State Parks Bureau. It is located on Route 1A in North Hampton. The beach season runs from mid-June to the beginning of September. During the season, beach use is allowed from sunrise to 1 a. m.

State Beach is a 1,260-foot long sandy beach, with rocks exposed during low tide. The beach is used by the public for swimming and general relaxing, among other recreational activities. Lifeguards are present throughout the bathing season between the hours of 10:00 A.M. and 4:45 P.M., and toilet facilities are available.



Figure 1. State Beach Access Points and Restroom Facilities.

Waterfowl are frequently observed at the beach; the most commonly observed are gulls, especially at the northern end of the beach. There are restrictions for dogs on the beach, but two dogs were noted during one routine inspection this summer.

### **State Beach Ordinances**

The Department of Resources and Economic Development has the following administrative rules that apply to all coastal state beaches:

1. Glass containers of any kind are prohibited. Alcohol is also prohibited.
2. Dogs are not permitted on state beaches at any time.
3. Horses are only permitted on Hampton State Beach and only from October 1 to April 30.
4. Digging holes is only allowed on beaches if the holes are less than 12 inches deep and completely filled in when done.
5. Fires and portable grills are prohibited.
6. Beaches are open from sunrise to 1 a.m.
7. Inflatables and other floatation equipment, life jackets, swim fins, face masks, diving goggles, snorkel tubes, and skim boards are not permitted.
8. Surfing is only allowed at designated areas of North Beach.
9. Garbage must be carried out.
10. Removing or destroying marine life is prohibited.

### **Assessing Your Beach**

#### **Sampling Frequency and Location**

In 2003, the beach program developed a risk-based evaluation process to determine how often a beach should be monitored. Beaches with a bigger potential impact on the health of visitors are monitored more often than beaches with a smaller impact. Annually, each beach is evaluated by the beach program on several criteria within three main categories: beach history, microbial pathogen sources, and beach use. Additionally, a beach that appears on the most recent 303(d) list as “not supporting primary recreational contact” is elevated to the most intense inspection schedule. The Federal Clean Water Act (CWA) requires each state to present a 303(d) list to the EPA every two years that indicates surface waters that are impaired or threatened by a pollutant or pollutants. A tidal beach is listed if there were two or more exceedances of the state standard of 104 Enterococci counts/100 ml during sampling in the last five years. Exceptions to the rule can be made if a large number of recent samples are all below the state standard.

Based on the evaluations, beaches are assigned a Tier I, Tier II, or Tier III status. Tier I beaches are considered “high priority” and have an increased potential to affect public health due to heavy beach use, previous elevated bacteria levels sampled, potential bacteria sources near the beach, inclusion on the 303(d) list, or a combination of these factors. Tier II beaches are “medium priority” and Tier III are “low priority” beaches that have less potential to affect public health. Beach sample frequency is

based on Tier status; Tier I beaches are sampled twice per week, Tier II beaches are sampled once per week, and Tier III beaches are sampled every other week.

The number of samples collected at each beach is determined by the beach length. Beaches less than 100 feet in length are sampled at left and right locations one-third of the distance from either end of the beach. Beaches greater than 100 feet in length are bracketed into thirds and sampled at left, center and right locations. Routine sample collection may be enhanced by sampling known or suspected pollution sources to the beach area. Storm event sampling may be conducted at beaches where watershed runoff resulting from wetfall is expected to impact beach water quality.

State Beach is listed as impaired for primary recreational contact on the 303(d) list since eleven samples exceeded the state standard during the last the assessment period. Based on the past beach use, sample results, and 303(d) assessment, State Beach is classified as a Tier I beach indicating high priority and sampling is conducted twice a week. The sampling frequency at State Beach has increased since the launch of the beach evaluation process implemented in the 2003 sampling season. Sampling increased from every other week to weekly sampling in 2004 due to increased use. In 2006, State Beach was listed on the 303(d) impaired list, thus requiring sampling twice each week.

At State Beach, samples are collected at the left, center, and right stations regularly (Table 1, Figure 1). All stations are evenly distributed along the shoreline and can be accessed via the parking lot. Samples are also collected from Little River, which is north of State Beach and discharges at the northern end of the beach area (Table 1).

Table 1. State Beach Station Descriptions and Latitude/Longitude Points.

Station Description	Latitude	Longitude
<b>Left Sample Station:</b> Located in front of the northern entrance to the beach, straight out from the concrete steps near the bath house.	42.956003°	-70.780729°
<b>Center Sample Station:</b> Located in front of the center entrance to the beach.	42.955336°	-70.781328°
<b>Right Sample Station:</b> Located in front of the southern entrance to the beach.	42.954702°	-70.781764°
<b>Little River Sample:</b> Located on the west side of Route 1A in the center of the river before it flows through the culvert.	42.9575°	-70.779167°

## Coastal Water Quality Standards and 2009 Results

Beaches are monitored to ensure compliance with state water quality standards. Marine waters are analyzed for the presence of the fecal bacteria Enterococci. Enterococci are known as indicator organisms, meaning their presence may indicate the presence of other pathogenic organisms. The state standard for Enterococci at tidal swimming waters is 104 counts/100 ml of water in one sample. When either two or

more samples taken at a beach exceed the standard or when one sample exceeds 174 counts/100 ml, a beach advisory is issued. At that time, beach managers are notified, notices are posted on the DES beach inspection website, and beach managers post signs at beach entrances to warn the public of the potential health threat posed by water contact at the beach. Beach advisories remain in effect until subsequent beach sampling reflects results below the state standard.

The 2009 sampling season began May 26th. The summer sampling season encompassed 99 days. Additional sampling was conducted weekly at each coastal beach until September 23. Precipitation was recorded on 45 days during the summer sampling season and twice during the September sampling, based on precipitation recorded at the Pease Air National Guard weather station. Wetfall during the May sampling totaled 1.39 inches and June wetfall totaled 6.07 inches. July and August yielded 8.35 and 3.64 inches of rain respectively. In September, 0.59 inches of rain was measured on the 12<sup>th</sup> and a trace was recorded on the 18<sup>th</sup>.

At State Beach, 31 inspections were conducted during the 2009 beach season, with three additional inspections occurring after Labor Day. One hundred and fifteen samples were collected and tested for Enterococci (Figure 2, Appendix B). Only three samples collected in 2009 exceeded the state standard for Enterococci with one advisory issued on July 1. The number of exceedances was lower in 2009 than in the previous two seasons despite an increase in wetfall during the 2009 sampling season (Figure 3).

Samples collected at the left, center, and right stations at State Beach on June 30, 2009, revealed counts of 230, 80, and 130 Enterococci/100 ml, respectively. In the 24 hours previous to the sampling, 1.21 inches of rain fell in the area. The left and right station counts exceeded the state standard of 104 counts/100 ml. As a result of the elevated Enterococci levels measured on the 30th, the Beach Program issued an advisory for State Beach. The bacteria results from samples collected on July 2, 2009, were below 10 counts of Enterococci/100ml of water and the advisory was removed on July 3, 2009, when laboratory results were completed.

A sample collected on August 8, 2009, at the right station of State Beach had 130 counts of Enterococci/100ml of water, but an advisory was not issued at that time. The center and left stations both measured less than ten counts of Enterococci/100ml of water. A precautionary resample was conducted the next day and all results were below the state standard.



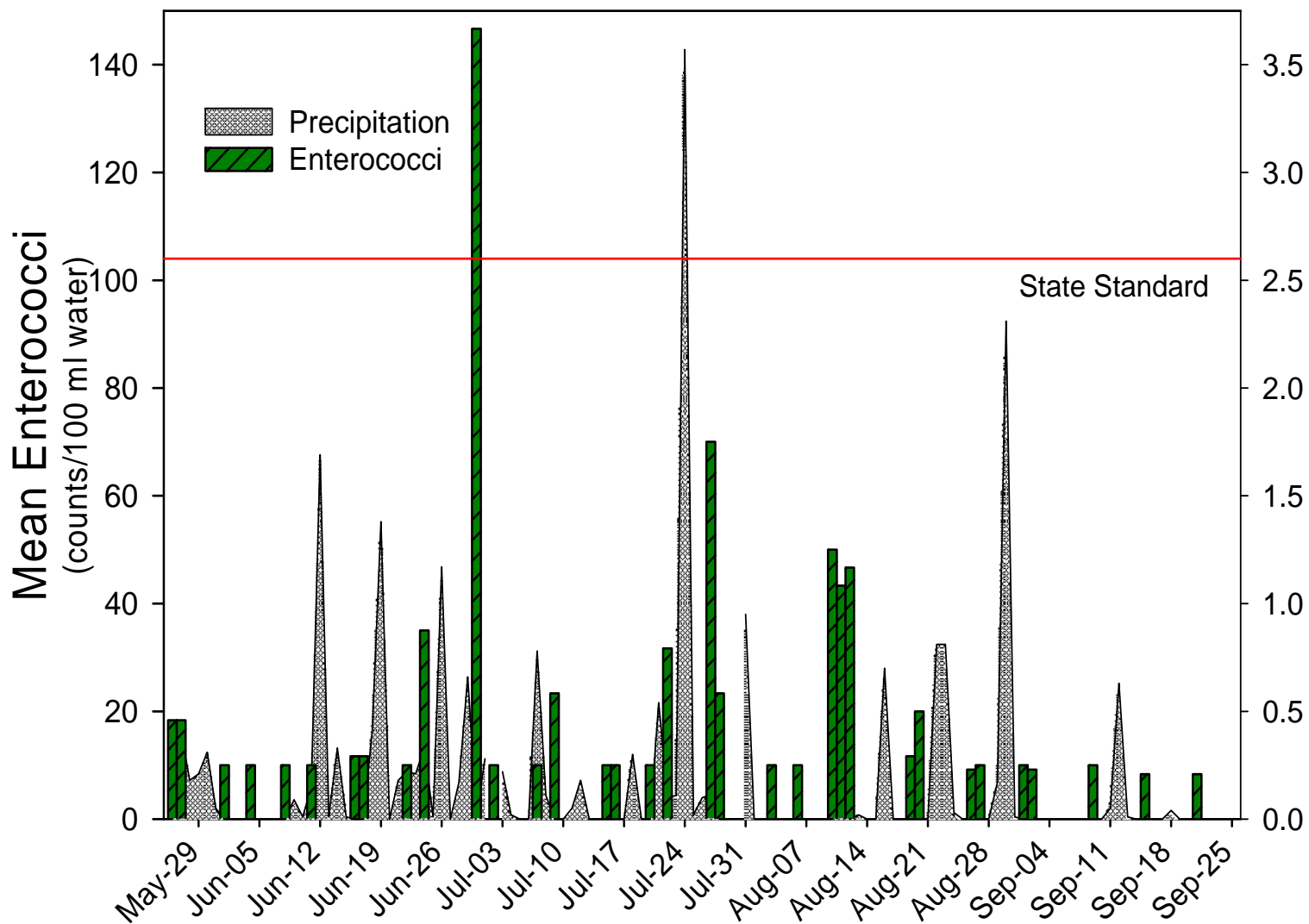


Figure 2. State Beach 2009 Enterococci Data. Enterococci values are the means of the three samples collected at the beach during each inspection. One advisory was posted at State Beach after the sampling on June 30, 2009, as indicated by the bacteria value exceeding the state standard. See Appendix B for all results from all stations for the 2009 sampling season.

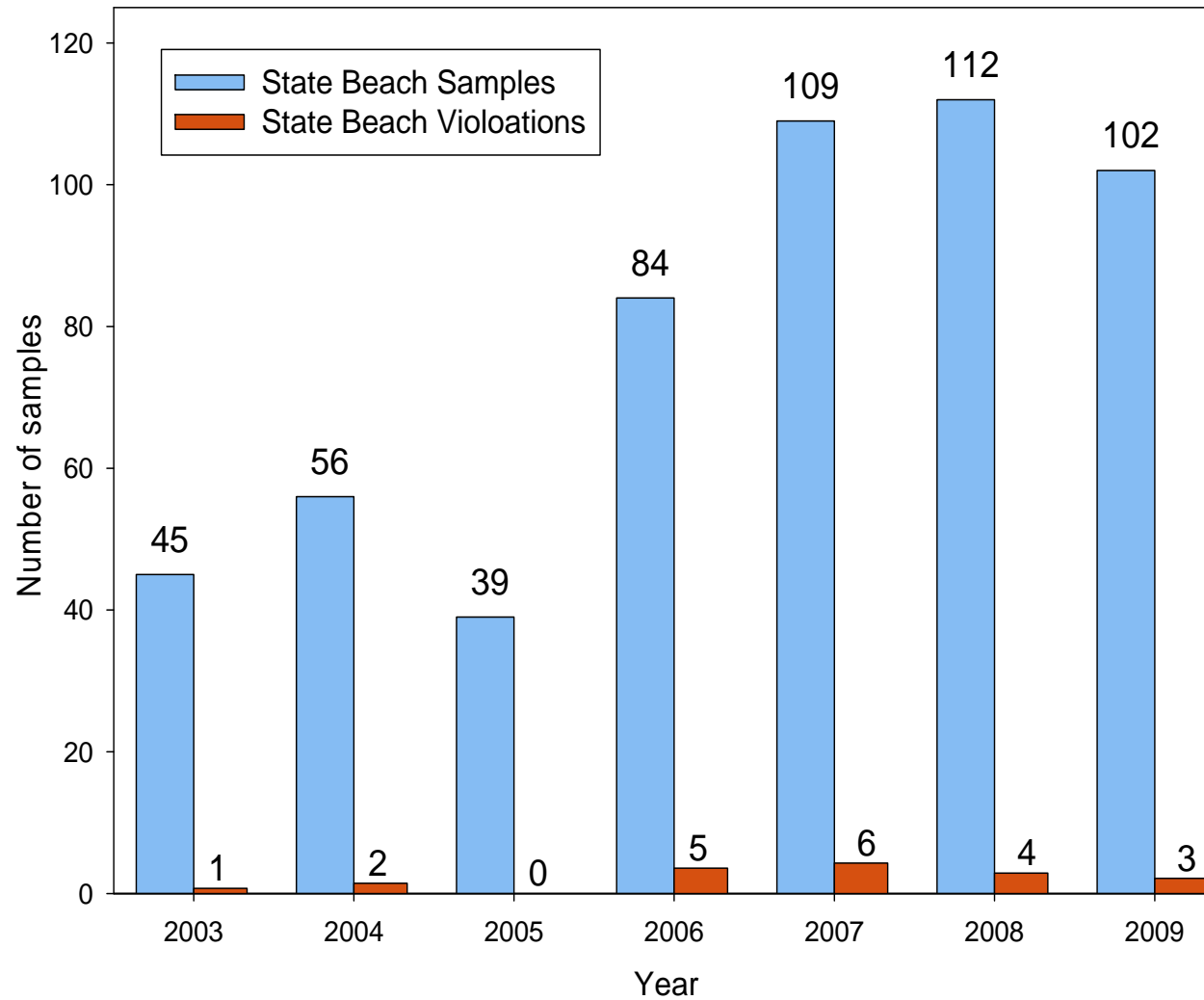


Figure 3. Enterococci samples and violations at State Beach. An exceedance of the state standard for Enterococci bacteria is a violation. All violations recorded at NH coastal beaches when violations occurred at State Beach are: 5 total violations in 2003, 22 total violations in 2004, 23 total violations in 2006, 12 total violations in 2007, 21 total violations in 2008, and 15 total violations in 2009.

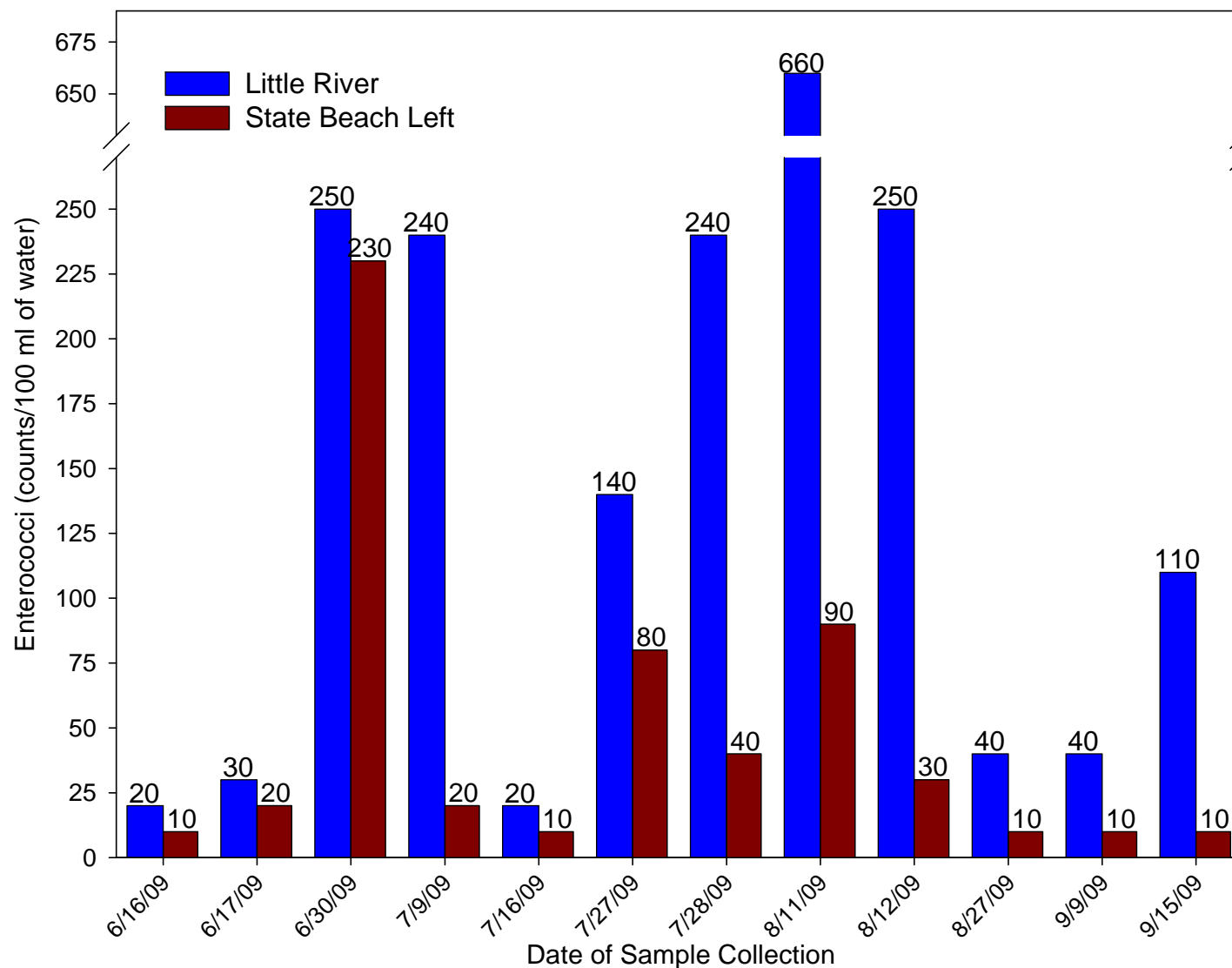


Figure 4. Enterococci data from the Little River and State Beach left stations. On 12 of the 15 sample days at Little River, the result from Little River was 10 or more counts higher than the State Beach left station result. On the remaining three days, both samples were less than 10 counts of Enterococci/100 ml of water.

## State Beach Adopt-a-Beach Program

In response to growing concern over the amount of litter and marine debris impacting visual and environmental aspects of Hampton Beach, the beach program partnered with the Blue Ocean Society for Marine Protection (BOS) from Portsmouth, N.H. Both parties met to discuss the development of an Adopt-a-Beach Program at Hampton Beach in the spring of 2005. A formal Memorandum of Agreement stated that the Blue Ocean Society would add Hampton Beach to their Adopt-a-Beach Program and that the beach program would supply materials such as gloves, garbage bags, scales and pencils to volunteers who clean Hampton Beach.

In the fall of 2009, the Memorandum of Agreement between the DES and the BOS was revised to acknowledge the 16 mainland coastal beaches monitored by DES and divided into 23 sections available for adoption through the BOS. Previously, only five sections at Hampton Beach State Park were recognized. Currently, 19 sections are adopted but State Beach in North Hampton is not adopted by any groups.

The requirements for a volunteer group are to select a group leader, gather once a month to clean the beach, complete the provided trash data cards, and bring the trash to a local dumpster or dump. It is also possible for volunteer groups to work with the BOS to find another group for sharing the clean up dates to clean up every other month or just in winter, for example. More information is available at:  
[http://www.blueoceansociety.org/Research/Adopt\\_beach.html](http://www.blueoceansociety.org/Research/Adopt_beach.html).

Volunteers conduct beach clean-ups monthly. All litter washed up or left behind at the beach is weighed, categorized and recorded for analysis by the BOS. The most numerous items found at coastal beaches in past years have been cigarette butts, plastic bottles, metal cans, and plastic bags. Often the weight of trash collected during a year is over 1,500 pounds at Hampton Beach State Park alone. The BOS produces an annual summary of clean-ups and litter collected at all coastal beaches. The 2009 report will be available for downloading in early 2010 on the BOS website:  
[www.blueoceansociety.org/Research/pollution\\_research.html](http://www.blueoceansociety.org/Research/pollution_research.html).

Please contact either Sonya Carlson, beach program coordinator, or Jen Kennedy, (603) 431-0260 or [jen@blueoceansociety.org](mailto:jen@blueoceansociety.org) for information about adopting orphaned beach sections.

## Concerns

Little River continues to be a cause for concern at State Beach. The river has been identified as a pollution source to coastal waters, contributing to elevated bacteria levels. Precipitation and associated stormwater run-off to Little River and the subsequent discharge of this bacteria-laden water to the beach area continue to influence Enterococci levels at State Beach. The discharge from Little River especially impacts the left side of the bathing area (Figure 4), posing a potential health risk to the public.

Little River was usually sampled at low tide. Sampling conducted at high tide may result in ocean backflow that potentially dilutes the water and decreases the bacteria count. High levels of Enterococci at Little River did not always indicate exceedances of

the state standard at the left station of State Beach (Figure 4, Appendix B). State Beach was sampled 15 times this summer and bacteria levels were over 104 counts of Enterococci/100 ml water on seven of those occasions. Only on June 30, 2009 was the result from sample collected at the left beach station also over 104 counts/100 ml. In the 24 hours previous to the sample collection, 1.21 inches of wetfall was recorded and likely contributed to the elevated Enterococci results.

A bacteria source project is being conducted on the North Hampton State Beach watershed to isolate possible sources of Enterococci to Little River and the beach. In an effort to inform the public of the potentially high levels of Enterococci in Little River, the DES can provide a sign to the state park which can be posted near the Little River outflow north of the beach area. The sign would indicate that this area may be unsafe for water contact due to potentially elevated bacteria during low tide, informing the public of possible health concerns.

### **Future Projects**

- The DES Beach Program encourages participation between the State Parks Division, local businesses, or school groups and the Adopt-a-Beach Program. The program promotes beach clean-ups and water quality monitoring. The DES would conduct training sessions and participate in education and outreach activities for the community.
- Beach officials should consider erecting a sign to warn the public of associated health risks from high bacteria levels measured in Little River. The State Parks division may also consider posting signs warning the public not to feed waterfowl at the beach. The Beach Program could collaborate on this effort by providing funds to purchase signs.
- A pre-emptive wetfall advisory may be necessary at State Beach. Future analysis of historical bacteria data and wetfall may show a predictive relationship between a certain amount of wetfall and beach Enterococci levels that increase the potential of an advisory. Wetfall amounts exceeding this level would result in automatic beach advisories. A pre-emptive advisory plan would need to be devised and discussed by the beach manager and the Beach Coordinator.

If you are interested in any of these future projects, please contact Sonya Carlson at (603) 271-0698 or [sonya.carlson@des.nh.gov](mailto:sonya.carlson@des.nh.gov).

## **Appendix A: Special Topic 2009 - Bacteria Source Identification**

The NHDES Beach Program is responsible for monitoring the quality of New Hampshire's Public Bathing Beaches, conducting special investigations and cooperatively working with local communities to improve beach water quality. The Beach Program also identifies local community actions that reduce pollutants from possible contamination sources.

Potential contamination sources within a watershed include improper disposal of human, pet, and livestock waste, land use, stormwater runoff, and wildlife. Once identified, source reduction can be prioritized by severity of bacteria loading and our ability to manage the source. Human wastewater and livestock contributions are more easily managed than those of wildlife, though the best management practices designed to reduce stormwater runoff will also reduce contributions from wildlife.

In 2008 the Beach Program initiated a bacteria source identification program at New Hampshire's coastal swimming waters. The ultimate goal of this project was to improve our coastal water quality by eliminating major contributors of fecal bacteria at their sources.

The first phase of the study initiated in 2008 was comprised of the following six main tasks:

1. Data collection.
2. Data interpretation, including statistical analysis of elevated beach bacteria events
3. Computer modeling to estimate bacteria loading.
4. Review of existing literature about the study area and study topic.
5. Interviewing local environmental professionals with experience and background in the study areas.
6. Report Production summarizing our findings.

The initial study area for this bacteria source investigation included the watersheds of all 16 coastal beaches monitored by the NHDES Beach Program. Phase one of this project served as a platform to thoroughly review the watersheds of New Hampshire's coastal beaches and allowed DES to narrow the study area to the most impacted watersheds.

DES is conducting the 2009 second phase of this investigation which focuses on three coastal beach watersheds of concern: New Castle Town Beach Watershed, Wallis Sands Watershed in Rye, and North Hampton State Beach Watershed. Extensive wet and dry weather sampling will be conducted throughout each focus watershed to determine where bacteria sources are located. Suspected sources are bracketed by sampling above and below a location in the watershed. A bacteria source is identified when high bacteria counts are measured downstream, but not upstream of a potential bacteria source in the watershed. Once an area of elevated bacteria levels is identified, the area will be investigated further to pinpoint the pollution source.

A watershed management plan (WMP) will be developed for each of the focus beach watersheds. These WMP documents will identify the bacteria sources, prioritize them for remediation, and provide remediation options. The NHDES Beach Program looks forward to working with the towns of New Castle, Rye, and North Hampton as well as other local parties to improve the water quality of their coastal swimming beaches.

In the late summer of 2009, Beach Program staff attended public meetings in each town and introduced the idea of developing a municipal and state partnership. As partners, each watershed could apply for EPA Clean Water Act grant monies to help fund the reduction of bacterial pollution to these coastal beaches. All grant funding requires a 40% match in funds from each town which may be matched as services in lieu of payment, such as work performed by town employees or volunteers. Several remediation projects will be outlined in each WMP and the town will then select the corrective actions that can be implemented.

The suggested partnerships were received well by most of the towns. When the watershed management planning documents are finished, the NHDES Beach Program anticipates a positive and productive partnership with the towns of New Castle, Rye, and North Hampton to protect and improve the water quality at the coastal beaches.

Additional phase two tasks include investigating bacteria transport to the beaches by ocean currents and statistical analysis of elevated beach bacteria events. Elevated bacteria results from beach locations will be compared with environmental data such as amount of rain, tide height, temperature, and solar irradiance occurring at the same time. Identifying the environmental factors that best correlate with the observance of high bacteria counts in beach water could allow staff to predict when conditions may cause elevated bacteria levels before they occur.

### Appendix B: State Beach 2009 Data by Date

Date	Enterococci (count/100 ml)				Inspection Type	Rainfall in previous 24 hours (inches)	Number of bathers	Animal Presence
	Left	Center	Right	Little River				
5/26/09	10	30	10		Routine	0	0	0
5/27/09	40	<5	<10		Routine	0.4	0	20 birds
6/1/09	<10	<10	<10	10	Routine	0.09	0	4 birds
6/4/09	<10	<10	<10		Routine	0	1	0
6/8/09	10	<10	<10		Routine	0	9	6 birds
6/11/09	10	10	<10		Routine	0	0	44 birds
6/16/09	<10	20	<10	20	Routine	0	2	2 birds
6/17/09	20	<10	<5	30	Routine	0	11	6 birds
6/22/09	<10	<10	<10		Routine	0.24	6	4 birds
6/24/09	10	30	60		Routine	0.12	0	25 birds
6/30/09	230	80	130	250	Routine	1.21	6	3 birds
7/2/09	<10	<10	<10		Advisory	0.05	0	3 birds
7/7/09	10	<10	<10		Routine	0	1	10 birds
7/9/09	20	30	20	240	Routine	0.1	4	12 birds
7/15/09	<10	<10	<10	10	Routine	0	18	22 birds
7/16/09	10	10	<10	20	Routine	0	5	25 birds
7/20/09	<10	<10	<10		Routine	0	44	20 birds
7/22/09	60	10	40		Routine	0.52	5	5 birds
7/27/09	80	80	70	140	Routine	0	161	1 bird
7/28/09	40	10	20	240	Routine	0.17	35	15 birds
8/3/09	<10	<10	<10		Routine	0	54	25 birds
8/6/09	<10	<10	<10		Routine	0	20	15 birds
8/10/09	<10	<10	130		Routine	0	34	17 birds
8/11/09	90	30	<10	660	Safety	0	6	15 birds
8/12/09	30	50	60	250	Routine	0.59	5	10 birds
8/19/09	20	<10	5		Routine	0	61	0
8/20/09	10	<10	30		Routine	0	24	40 birds
8/26/09	<10	<5	10		Routine	0	1	38 birds
8/27/09	<10	10	<10	40	Routine	0	4	7 gulls
9/1/09	<10	<10	<10	10	Routine	0	0	33 gulls, 1 cormorant
9/2/09	<10	<5	<10		Routine	0	12	28 birds, 2 dogs
9/9/09	<10	<10	<10	40	Fall	0	0	46 gulls
9/15/09	<10	<5	<10	110	Fall	0	0	1 duck
9/21/09	<10	<5	<10		Fall	0	0	39 birds