State Beach, North Hampton

BEACH WATER QUALITY REPORT
SUMMER 2005

January 2006

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

BACKGROUND

The New Hampshire Department of Environmental Services (NHDES) has operated its Public Beach Inspection Program, or Beach Program, for over twenty years. Coastal beach monitoring began in 1989 and has continued through the present. NHDES recognizes the threat to public health at public beaches and continues to monitor public beaches throughout the state for the presence of pathogenic organisms. Coastal beaches are monitored for the presence of the fecal bacteria Enterococci. These fecal bacteria 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. They are also known as indicator organisms, meaning their presence in water may indicate the presence of other potentially pathogenic organisms.

In October of 2000, the United States Environmental Protection Agency (EPA) signed into law the Beaches Environmental Assessment and Coastal Health (BEACH) Act. The BEACH Act is an amendment to the Clean Water Act that authorizes the EPA to award grants to eligible states. The purpose of the BEACH Act is to reduce the risk of disease to users of the nation's recreational waters. BEACH Act grants provide support for development and implementation of monitoring and notification programs that help protect the public from exposure to pathogenic microorganisms in coastal recreation waters.

NHDES received grant funding in 2002 to develop and implement a beach monitoring and notification program consistent with EPA's performance criteria requirements published in the *National Beach Guidance and Required Performance Criteria for Grants* document (www.epa.gov/waterscience/beaches/grants). NHDES has successfully met all requirements and continues to expand the monitoring and notification program. In 2002, only nine coastal beaches were monitored, while in 2003 and 2004, 15 and 16 beaches, respectively, were monitored on a routine basis. There were 15 beaches sampled again in 2005, as the Star Island Beach was not sampled. In 2004, volunteers sampled the beach, but circumstances did not allow for this cooperative effort in 2005.

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Beach Description

State Beach is owned and maintained by the New Hampshire Division of Parks and Recreation, State Parks Bureau.

State Beach is a sandy beach with rocky portions at low tide. Its total length is 1,260 feet. State Beach is bordered to the South by Plaice Cove. The beach is frequently used by residents and vacationers for various recreational activities. There are three access points to the beach area from the parking lot off Route 1A (Figure 1). Parking is available for a fee (meters). Lifeguards are present and sanitary facilities are available during the summer.

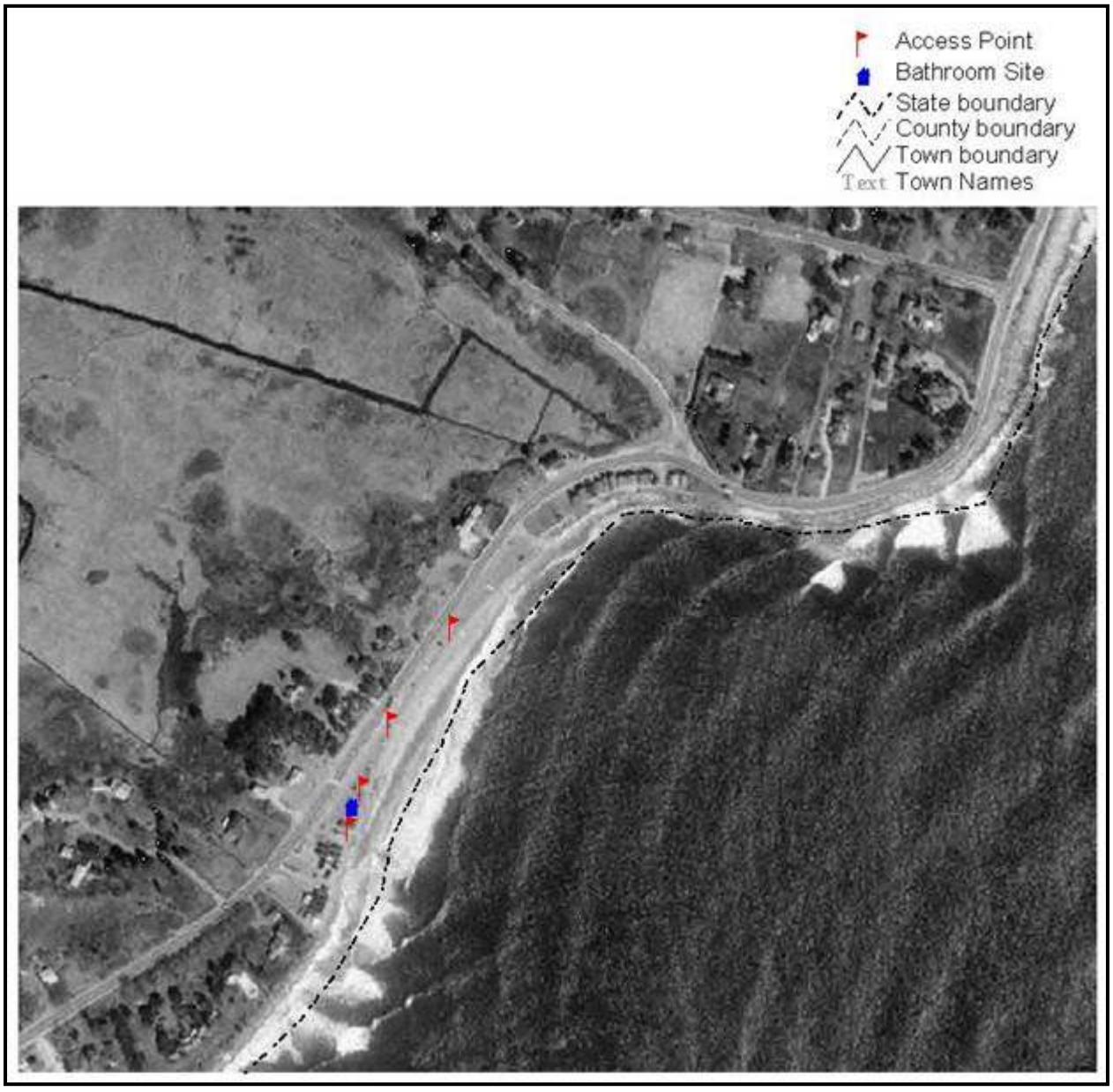

Figure 1. State Beach Access Points.

Waterfowl are frequently observed at the beach. The most commonly observed waterfowl are gulls, which are generally found in flocks at State Beach. No dogs or pet waste were observed this year at State Beach. Dogs are restricted from beach access per the New Hampshire State Parks Division.

Below is a brief description of the sampling stations at North Hampton State Beach (Figure 2).

Table 1. Station Descriptions

Description	Latitude	Longitude
Left sample station: located straight in front of the northern entrance to the beach (off a concrete step).	42˚ 57' 21.612"	-70˚ 46' 50.6255"
Center sample station: located straight in front of the center entrance to the beach.	42˚ 57' 19.2096"	-70˚ 46' 52.7805"
Right sample station: located straight in front of the southern entrance to the beach.	42˚ 57' 16.9279"	-70˚ 46' 52.3503"
Little River sample station: located on the upstream side of Route 1A in the center of the river before it flows through the culvert.	42˚ 57' 27"	-70˚ 46' 45"

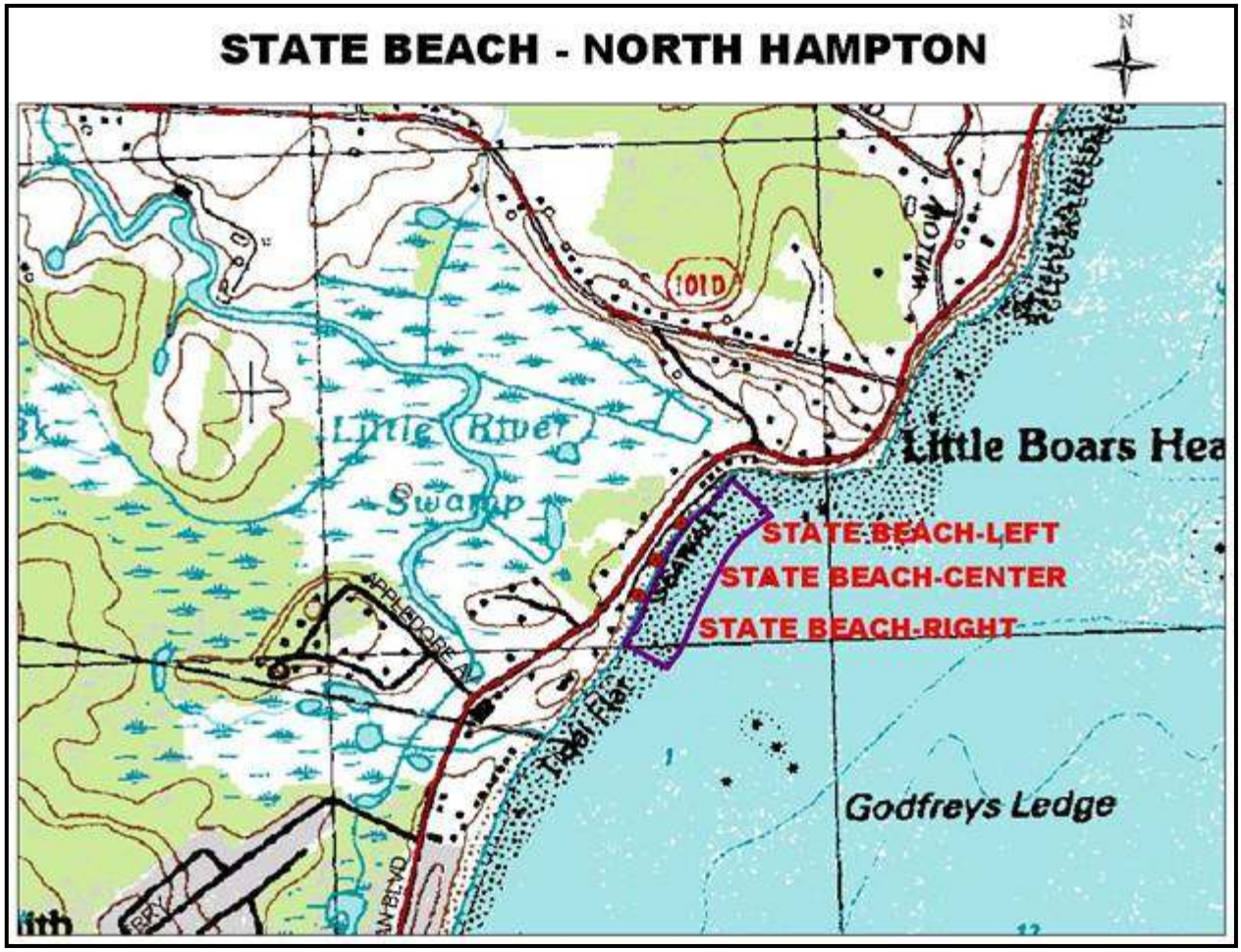

Figure 2. Map of State Beach

Tier Status and Sampling Frequency

The Beach Program developed a risk-based beach evaluation process and tiered monitoring approach and implemented this approach during the 2003 beach season. Beach evaluations are conducted annually to determine potential health threats to the public. Evaluations are based on several criteria in three main categories: beach history, microbial pathogen sources, and beach use. Based on these criteria, beaches are assigned either a Tier I or Tier II status. Tier I are high priority beaches that have an increased potential to affect public health while Tier II are low priority beaches that have less potential to affect public health. Beach sample frequency is based on the Tier statuses; Tier I beaches are sampled weekly and Tier II beaches are sampled every other week.

State Beach was categorized as a Tier I beach based on the Beach Program's Risk-Based Evaluation ranking system. This ranking indicates that the beach is frequently used by the public

and there are potential pollution sources present that may negatively affect public health, specifically Little River.

Current Year Water Quality

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 pathogenic bacteria. The state standard for Enterococci at public beaches is 104 counts/100 mL in one sample, or a geometric mean of 35 counts/100 mL in three samples collected over sixty days. Standard exceedances require the issuance and posting of a beach advisory. Beach advisories remain in effect until subsequent beach sampling indicates safe water quality conditions.

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 1/3 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. Also, storm event sampling may be conducted at beaches where wet-weather events are expected to affect beach water quality.

The 2005 sampling season began June 1st. June was warmer and wetter than normal, while July and August were warmer and drier than normal. The sampling season encompassed 96 days, of which precipitation was recorded on 35 days (based on Seabrook WWTF recorded precipitation). Eleven beach days (normal beach hours are considered 9:00 a.m. to 5:00 p.m.) were directly affected by precipitation. State Beach was sampled once per week from June 1st through Labor Day. Samples were collected at three beach stations and also at Little River. There were a total of 13 routine inspections performed and 39 beach samples and 11 samples from Little River collected in 2005.

Table 2 includes the Enterococci data from each sampling event for this summer for State Beach. Overall, the Enterococci levels were moderately low and below the state standards for public bathing beaches. No advisories were posted this year.

Table 2. State Beach Enterococci Data 2005

Sample Date	Station Name	Results (counts per 100 mL)
06/01/2005	Left	10
	Center	10
	Right	10
06/13/2005	Left	10
	Center	10
	Right	10
06/21/2005	Left	10
	Center	10
	Right	10
06/28/2005	Left	30
	Center	30
	Right	20
07/05/2005	Left	5
	Center	10
	Right	10
07/13/2005	Left	10
	Center	10
	Right	10
07/19/2005	Left	30
	Center	40
	Right	10
07/25/2005	Left	10
	Center	10
	Right	10
08/03/2005	Left	10
	Center	10
	Right	10
08/09/2005	Left	10
	Center	10
	Right	10
08/15/2005	Left	10
	Center	10
	Right	10
08/24/2005	Left	10
	Center	10
	Right	10
08/30/2005	Left	20
	Center	10
	Right	10

Table 3 includes Enterococci data from Little River. Enterococci levels in Little River fluctuated throughout the summer months (Figure 4). Data was normally collected during low tide conditions when flow from the salt marsh was directed towards the beach area. Precipitation preceded sample events on May 25 (>3 inches for 3 days prior), June 28 (June 27 evening, equal to 0.43 inches), and August 15, 2005 (>0.50 inches for 2 days prior). Enterococci levels after the events were excessively elevated on May 25 and August 15, indicating wet weather can negatively impact Little River. Other elevated Enterococci levels (June 13, July 25, August 9, and August 24) are more difficult to explain. A small rain event the evening of June 12 (0.09 inches) may have resulted in the elevated bacteria level.

Table 3. Little River Enterococci Data 2005

Sample Date	Results (counts per 100 mL)
05/05/2005	10
05/25/2005	1250
06/01/2005	10
06/13/2005	180
06/28/2005	60
07/13/2005	60
07/19/2005	10
07/25/2005	210
08/09/2005	290
08/15/2005	640
08/24/2005	290

Figure 3 depicts the Enterococci data in relation to the state standard for coastal beaches.

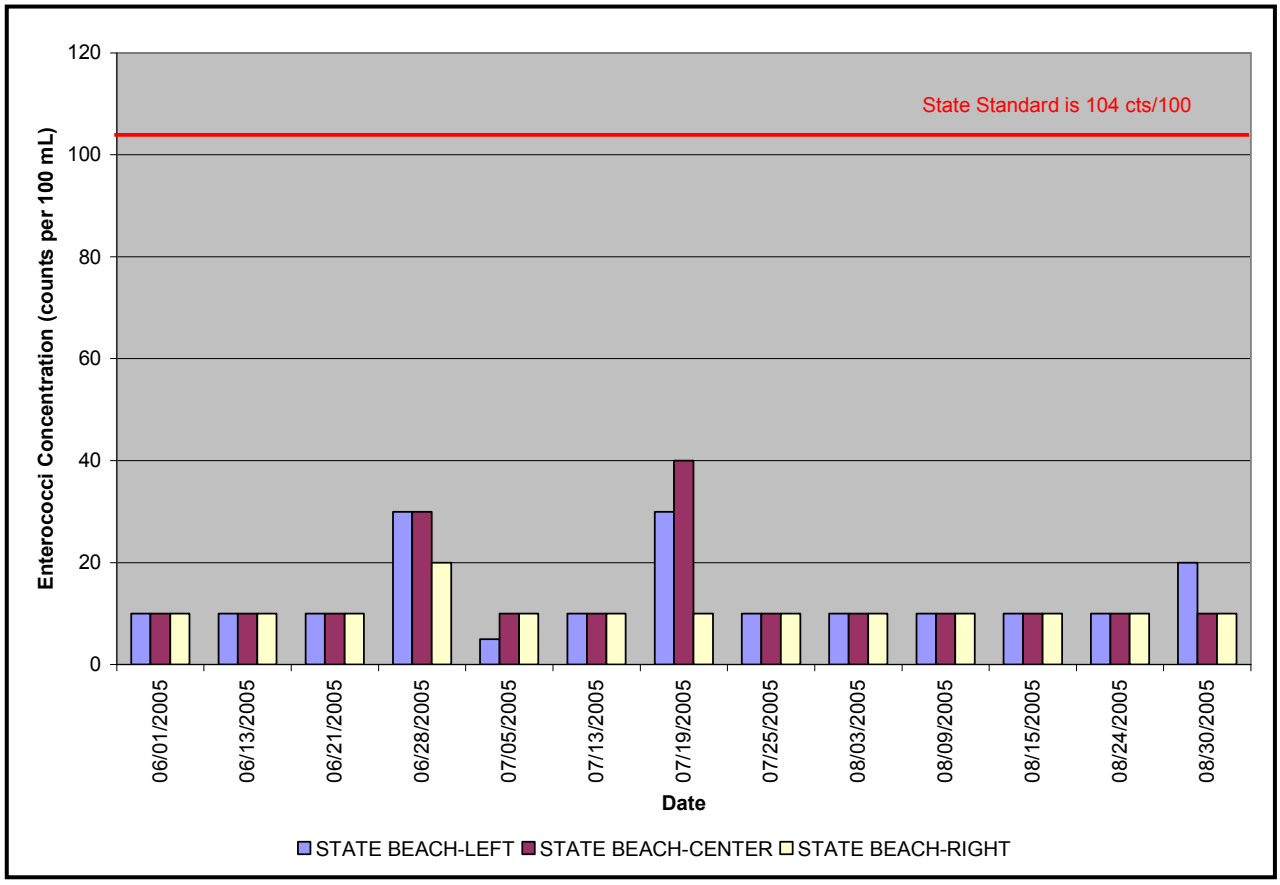

Figure 3. State Beach Enterococci Data 2005

Figure 4 depicts the Enterococci data from Little River.

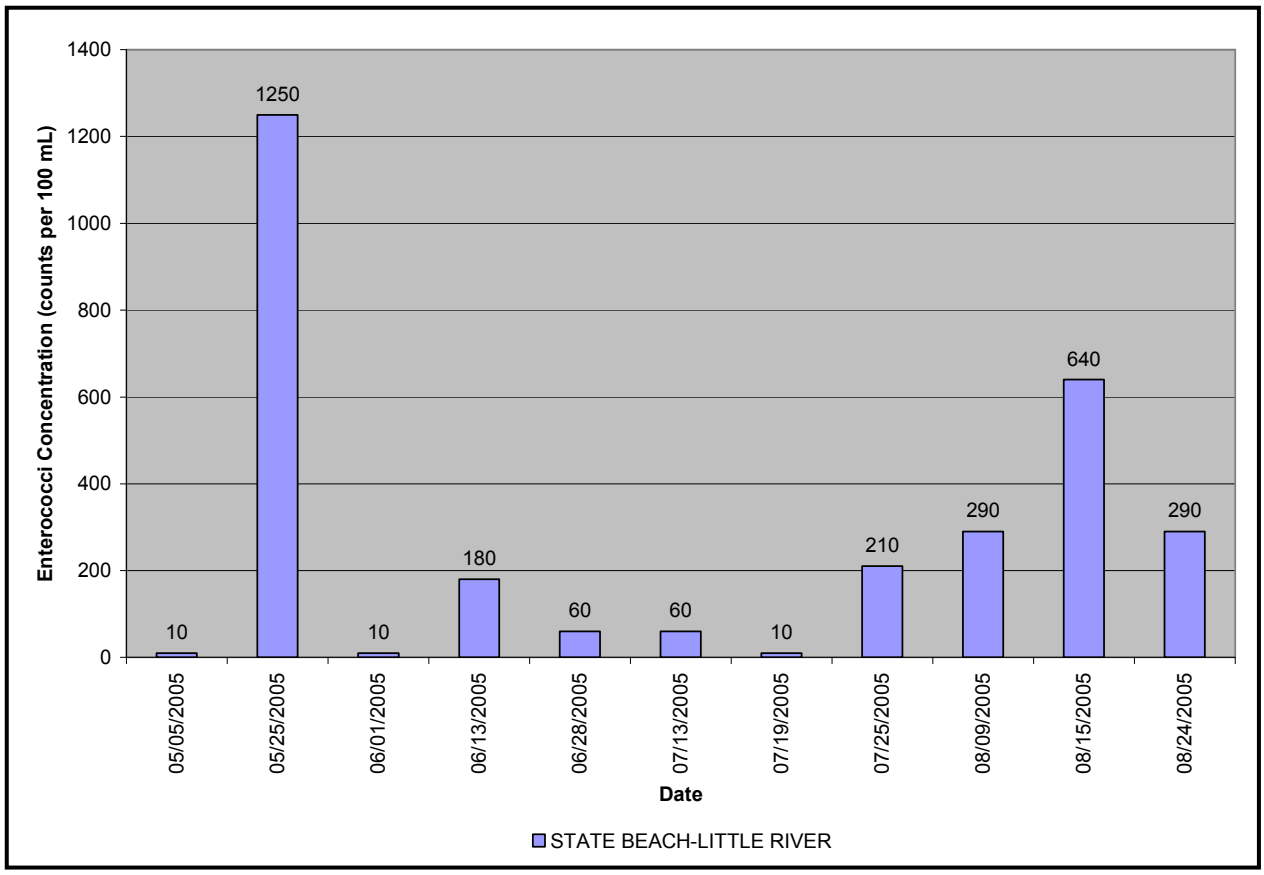

Figure 4. Little River Enterococci Data 2005

Areas of Concern

Little River is an area of concern at State Beach. The river has been identified as a pollution source to coastal waters contributing to elevated bacteria levels.

Waterfowl were frequently observed during the season. Waterfowl can defecate up to 28 times per day, contributing to fecal pollution at the beach. The tides can then cause the fecal material and associated bacteria to become suspended in the water, contributing to a public health risk. An attempt should be made to discourage visitors from feeding the waterfowl.

Thoughts for the Future

- The State Parks division, local businesses, or school groups should consider joining NHDES' Adopt-a-Beach Program. The program would consist of beach clean-ups and water quality monitoring. DES would conduct training sessions and participate in

education and outreach activities for the community. If you are interested, please contact Sara Sumner at 603-271-8803 or ssumner@des.state.nh.us.

- The State Parks division should consider posting signs warning the public not to feed waterfowl at the beach. The Beach Program is willing to collaborate on this effort by providing funds to purchase signs.

Appendix A

Special Topic 2005

Health Threats from Beach Sand: Why You Should be Concerned

As beach managers, one question we are often faced with is: What are the sources of *Escherichia coli* (*E. coli*) plaguing my beach and how must I evaluate management and remedial efforts to prevent further contamination?

E. coli bacteria are natural components of the intestines of warm-blooded animals, including humans. *E. coli* are indicator bacteria, meaning their presence often indicates the presence of other pathogenic organisms (bacteria, viruses, protozoa). Sources of *E. coli* to beach areas include: waterfowl (ducks, geese, gulls, etc.), domestic animals (dogs, cats), agriculture, faulty septic systems, storm water, and sewer overflows. Recently, research efforts have focused on the presence of *E. coli* and other pathogenic organisms in beach sand.

These studies have shown that beach sand can harbor significant levels of bacteria. Various researchers have focused research activities on bacteria in underlying lake sediment, in pore water, in the swash zone, in onshore beach sand (not in direct contact with water), and in near-shore surface waters. A recent study at four Canadian beaches found significant amounts of *E. coli* in pore water at public beaches. Pore or interstitial water inhabits the spaces between sand particles and can be observed in holes when one digs into the sand. Although the study did not find that the pore water significantly affected beach water quality, it does suggest that beach sand is a source of bacteria at beaches. Another study in Ohio found high concentrations of *E. coli* in the swash zone that were attributed to beach sand. The swash zone is the area along the shore that is constantly washed by waves or tides.

It is evident that bacteria are surviving in beach sand but we can only speculate on the potential sources of bacteria to the sand. Waterfowl, wild or domestic animals often defecate on beaches. Bacteria from their feces can contaminate beach sand and beach water. Rainfall can cause bacteria or other harmful organisms to infiltrate directly into the beach sand, as well as transport them directly to beach waters. Contaminated groundwater from septic systems may contribute to bacteria measured in beach sand. Beach goers themselves may contribute by leaving trash on the beach, dirty diapers, or food scraps. Beach sand bacteria populations survive longer than in the water column due to less predation, decreased exposure to UV radiation, and warmer temperatures.

This discussion yields concern about public health issues relating to beach sand as well as beach waters. Children often dig holes or trenches in the sand and are in frequent contact with pore water. Young children are often found playing in swash zone waters. It is important that the public be informed of the potential risks associated with beach sand, but also realizes that not all beaches harbor elevated concentrations of bacteria. If a large number of waterfowl are evident, or if a storm drain outfall is present, consider the fact that both the beach sand and water may

contain pollutants that can create public health related illnesses. It is important to evaluate the area and use your best judgment when recreating at a public beach. Make sure that the beach is regularly monitored and check for advisories that may be posted at a public beach. Never swim at areas that may compromise public health or safety.