

RUTGERS

New Jersey's Coastlines



How Important Are New Jersey's Coastlines to New Jersey?

NJ's beautiful coastlines are

an integral part of the state's vibrant landscape. Shorelines stretch 127 miles along the Atlantic Ocean, with an additional 83 miles of shoreline along the Raritan and Delaware Bays. Today, over half of New Jersey's residents live within 25 miles of the coast.

In addition to providing myriad recreational activities, state beaches serve as a major economic engine, creating jobs and supporting small businesses.

- New Jersey's coastlines and waterways attract an estimated \$36 billion in tourism each year.
- In 2005, tourism resulted in 472,300 jobs and 72,240,000 visitors to New Jersey.
- In 2004, tourism provided 38,431 jobs locally, \$1 billion in payroll, \$600 million to restaurants, \$500 million in real estate sales, and \$200 million in recreational spending.

Threats to New Jersey's Coastlines

The primary cause of beach closures and advisories in New Jersey is elevated bacteria populations that pose a risk to human health. A major cause of these unsafe levels is pollution and storm water runoff distributed during heavy rains. When high bacteria levels are detected, officials close down affected beaches, often with significant economic consequences.

- In 1987 and 1988, beach closings due to sewer overflows and garbage and litter wash ups caused an estimated \$2–4 billion loss to tourism in New Jersey and New York.
- In 1976, an algal bloom off the coast of New Jersey caused a large region of ocean to become oxygen starved, resulting in \$550 million in losses to New Jersey's fishing industry.

According to a recent survey from the Natural Resource Defense Council, national beach closures broke records in 2006. By region, the largest increases were found in New Jersey and New York, up 96% from 2005. In New Jersey alone, 134 bay and beach closures and advisories were reported, an increase of 70% from 2005.

Monitoring the Coasts

To ensure that New Jersey shorelines remain safe, the state administers the Cooperative Coastal Monitoring Program, a joint venture of the New Jersey Department of Environmental Protection, the New Jersey Department of Health and Senior Services and local health agencies. Since 1976, water quality sampling has been performed at 264 ocean and bay stations throughout the state, with 62 monitoring stations in recreational areas of Monmouth County. In addition, local health authorities employ a preemptive closure policy at several beaches. Beach

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areas near certain storm drains and runoff hotspots are automatically closed for 24 hours following 0.1 inches of rainfall. However, data collected over 21 years demonstrates that this strategy may result in frequent and unnecessary beach closures. Of the 97 ocean beach closures in 2006,

- only 18 resulted from elevated bacteria measured with actual water samples, and
- 79 were preemptive closures based on local rainfall.

In 2007, all 89 ocean beach closures were preemptive (four due to trash wash-ups), but whether preemptive closures had corresponding high bacteria concentrations is unknown.

Challenging Questions

Years of observational data have generated many challenging questions regarding how best to deal with increasingly frequent beach closures, and the role of rainfall as a predictor for poor water quality.

- Why do bacterial levels sometimes exceed safe standards during dry periods?
- What are the variables other than rain that impact bacteria concentrations in coastal waters?
- How can we predict bacterial proliferations in New Jersey waters in the most efficient and cost-effective way?

COOL Solutions

Recently, a pilot study conducted by Rutgers Coastal Ocean Observing Laboratory (COOL) identified two key components in addition to rainfall that explain bacterial concentrations along New Jersey's beaches: wind and ocean currents. Winds from the southwest drive a coastal process called upwelling that steers ocean currents away from the beach. When the wind switches to the northeast, surface ocean currents switch directions toward the beach, potentially driving bacteria towards the shore.

The COOL Room is a state-of-the-art facility employing satellite, high-frequency radar, and a fleet of autonomous underwater gliders to maintain a continuous observational platform along the New Jersey coast. COOL Room technologies maximize the ability to monitor environmental conditions that influence water quality along New Jersey's beaches.

- Satellites map the location of water bodies with potentially high bacteria concentrations.
- High-frequency radar monitors surface currents and the movement of water bodies.

By integrating data from all available resources, we can build a predictive system that tracks changes in coastal ocean patterns as they occur. A system that focuses on all relevant factors simultaneously—bacteria concentrations, near shore winds and currents—that is linked to ocean and atmospheric forecasts, will lead to real solutions in maintaining healthy New Jersey shores.

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