Photo courtesy of George Proios

In the Breach

A Breach at Moriches Inlet

This aerial view shows the Moriches Inlet area during a 1980 breach event. Moriches Inlet (in foreground lined with a jetty) connects Moriches Bay (on the left) with the Atlantic Ocean (on right). Currents scouring the shoreline along the bay weakened the barrier which then breached during a storm. Rising bay waters eventually broke through the barrier and flowed into the ocean.

The breach reached a width of 2,900 feet in less than a year. It was closed artificially soon thereafter. Moriches Inlet itself was created by a breach in 1931. As would be expected, the breach allowed more salt water into the bay, which in turn had a profound effect on the bay's living resources. Predators entered the bay, too, destroying the oyster sets and undoubtedly impacting the local economy.

Each year, millions of people flock to Long Island's popular south shore beaches. Barrier islands, such as Fire Island, act as buffers that protect the mainland from storm surges and wave action. Separating the mainland from its barriers is a system of estuaries of great environmental, ecological, and economic importance to Long Island.

As has happened in the past when storms have opened a breach through the island or formed a new inlet, people take notice. The first concern is for safety and protection of people and property. However, coastal planners, managers, decision-makers and the public are also greatly interested in the impacts these changes can have on the bay's natural resources. Studies indicate that there is a strong probability that breaches or new inlets may occur in the future. These bays are home to many environmentally and economically important plants and animals. People need to know how new breaches might affect the living resources found there.

Towards this end, New York Sea Grant worked with the Marine Sciences Research Center at Stony Brook University to identify and assess the types of information required to properly evaluate the potential impacts of breaches on Great South Bay, the largest of Long Island's south shore bays. **Jay Tanski**, NYSG's coastal processes specialist, **Henry Bokuniewicz**, professor of physical oceanography at MSRC and **Cornelia Schlenk**, Assistant Director of NYSG led the effort with support from the National Park Service. Using the results of a computer model that simulated what would happen if new inlets were created at two likely locations along Fire Island, a team of scientific experts was asked to identify the biological resources most likely to be impacted. The team also assessed what steps could be taken to better define and quantify these impacts from a management perspective. The experts' initial findings were presented and reviewed at a workshop for other scientists and federal, state, and local managers and agency representatives. Final results appear in a NYSG publication, *Impacts of Barrier Island Breaches on Selected Biological Resources of Great South Bay, New York*.

The hydrodynamic model developed by **Daniel Conley** (formerly of MSRC) simulated the potential impacts that a new inlet would have if it occurred either at Barrett Beach or at Old Inlet on Fire Island. The modeled breaches had flow characteristics comparable to the Little Pike's Inlet breach that formed in 1992 at Westhampton (see

May 3, 1993: Above, an aerial view of Pike's Inlet shows a breach in the Westhampton barrier island on Long Island's south shore. The top of the photo shows the fan-like pattern of sand deposition in the bay.

October 5, 1993: The breach at Pike's Inlet was closed artificially. Photos courtesy of NYSDEC

photos). The model predicted that the new inlet would affect Great South Bay in two basic ways: by increasing the average salinity and reducing the amount of time water stays in the Bay (residence time). In essence, conditions in Great South Bay would become more like those found in Moriches and Shinnecock Bays.

To assess how these physical changes would affect the Bay's living community, **Elizabeth Cosper** of Coastal and Environmental Studies Inc., led off with what would happen to water column productivity in the Bay. The plankton and nutrients in the water make up the foundation of the Bay's ecosystem. She reports "While increasing salinity might favor smaller phytoplankton species, such as brown tide, the lower residence times and increased flushing would cause a decrease in nutrients." If a new inlet makes Great South Bay more similar to Moriches or Shinnecock Bay, Great South Bay should become a less favorable environment for nuisance algal blooms like brown tide. She predicted a possible shift to larger algae that might decrease overall phytoplankton productivity in the Bay. The shift might adversely affect the small animals in the water column but benefit shellfish on the bottom. Cosper also suggested that residence times might not necessarily be reduced evenly across the bay. Thus, brown tides would tend to keep occurring in areas with poor flushing.

"The changes associated with a new inlet indicated by the model would probably not have major impacts on the finfish in Great South Bay," says finfish expert **David Conover** of MSRC. Many of the Bay's existing fish populations are adapted to higher salinities, so a predicted increase in salinity is not likely to have a major influence on the overall species composition. "At most, we might expect a slight increase in the abundance of marine species that are more commonly found on the continental shelf: dogfish and skates, northern kingfish, black sea bass, tautog and Atlantic herring (in winter)." Conover adds that changes in the Bay's vegetation would change the habitat for certain fish species. "Since recreational fishing tends to be concentrated in inlets, an almost certain effect of a new inlet will be to redistribute fishing effort in the Bay, perhaps drawing anglers away from Fire Island and Moriches Inlets."

Eelgrass is a common submerged vegetation in the Great South Bay. How much of it grows and where is a question of light availability. According to aquatic plant expert **Stuart Findlay** of the Institute of Ecosystem Studies, "If a new breach caused the water clarity in Great South Bay to approach that of Moriches Bay, there would be an increase in the maximum depth of eelgrass beds." With clearer water, eelgrass is likely to expand its range at greater depth. Regarding intertidal, marsh vegetation Findlay reports, "The model predicted relatively small changes in the average tidal range. However, even small changes in water level elevations may affect intertidal vegetation if the new inlet persists for more than one or two years."

The team of experts was in agreement that comparative studies should be conducted between Great South Bay and the two neighboring bays, Moriches Bay and Shinnecock Bay. The neighboring bays are reflective of the higher salinities and greater oceanic mixing of waters that may be expected with a new inlet in Great South Bay.

Says Tanski, "The information provided here should help in identifying the biota most likely to be affected by new inlets and the general nature of the impacts. Just as importantly, it provides guidance on the types of information and data needed to fill in our knowledge gaps and on measures that can be taken to obtain this information. In addition to providing managers with information they can use immediately, it is hoped that suggestions and recommendations presented in this report will be of use in the development and design of research, monitoring and other data gathering programs."

—Barbara Branca, Jay Tanski
and material taken directly from
Impacts of Barrier Island Breaches on Selected Biological Resources of Great South Bay, New York.
See page 23 to order.

Changes Above, Changes Below

Team member *Robert Cerrato* of MSRC evaluated how breaches on Great South Bay could affect shellfish and other benthic (bottom-dwelling) invertebrates. Reports Cerrato, "Breaches remaining open a year or less would probably have minimal long-term impacts. However, longer lasting inlets could cause substantial changes." Species in eastern Great South Bay would probably shift more toward those of the western Bay. Populations of lady crab, razor clam, and the bivalve *Tellina agilis* would be altered as a result of a new inlet.

A new breach would have both negative and positive impacts on the hard clam, an economically important species of the Bay. Salinity and temperature changes would slow the development of their fertilized eggs and larvae so fewer clams would survive. Their predators—channeled whelks and moon snails— would probably increase, reducing clam survival even more. On the other hand, larger oceanic plankton species could improve food quality for clams and more moderate winter water temperatures could decrease their over-winter mortality.