

Silhouettes of reef sharks feeding against the surface of the water in Micronesia.



THIS PAGE: PHOTOGRAPHY BY KRISTINA VACKOVA / SHUTTERSTOCK. OPPOSITE PAGE: PHOTOGRAPHY BY LUCY HOWEY.

THE BIG BITE

SHARKS HAVE LONG BEEN THE SEA'S SCARIEST CREATURES, BUT NOW THEY FIND THEIR VERY EXISTENCE THREATENED AS SCIENTISTS WORK TO SAVE THESE MISUNDERSTOOD MONSTERS. BY JAMES STURZ

It's 8:26 AM when the *R/V Shinnecock* pulls in its first trawl—a juvenile horseshoe crab and baby tautog. Bluefish are flitting at the surface of Shinnecock Bay, and the eight-person crew from Stony Brook University's School of Marine and Atmospheric Sciences (SoMAS) is out this morning to catalog the bay's water quality and life. There's devotion among the scientists and volunteers on this 35-foot platform research craft. They started this project in 2012 with a clear vision—to take care of what's happening in the Long Island university's aquatic backyard and to see how to protect and improve it.

A second and third trawl reveal striped sea robins, anchovies, shrimp, comb jellies, and a half-dozen varieties of crab. Other days, they'll be joined by stingrays, fluke, and grouper. But these are small fish in a vast pond. They're only half of the story.

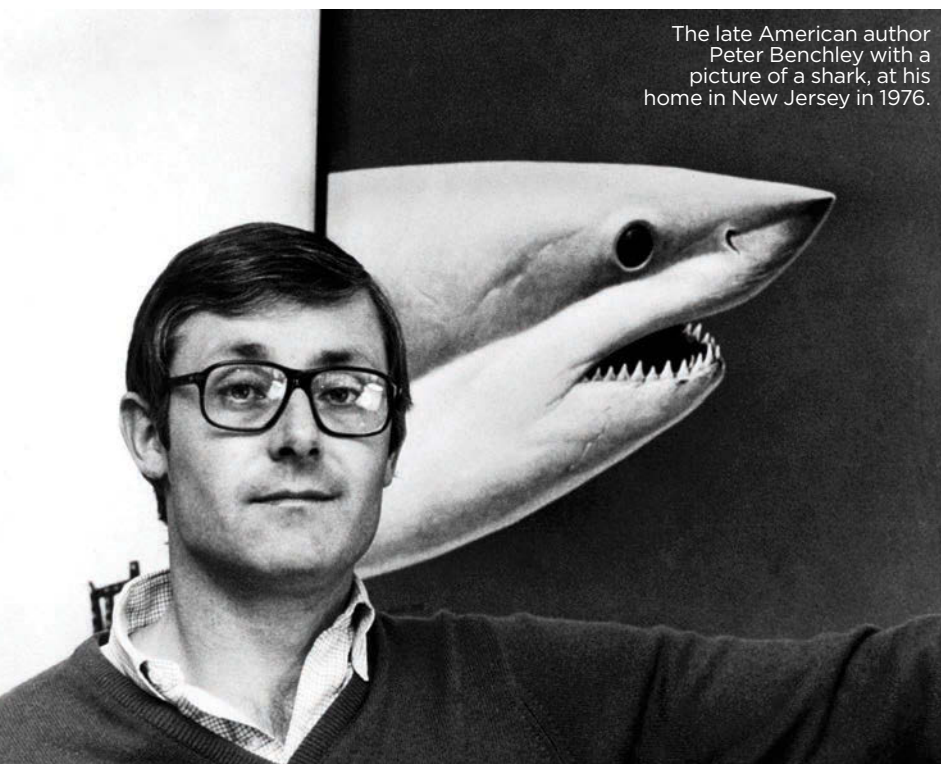
The other half is sharks.

Forty years ago, Peter Benchley's *Jaws* transformed Long Island into shark central. Inspired by the real-life story of shark hunter Frank Mundus, who claims to have harpooned a 4,550-pound great white off Montauk Point in 1964, the novel was set in the fictional town of Amity, allegedly somewhere between Bridgehampton and East Hampton. By the time Steven Spielberg's adaptation followed a year later, the book had already sold 5.5 million copies and spurred a worldwide fascination with hunting sharks. Spielberg's film changed cinema, introducing film's first blockbuster and creating a feeding frenzy of fear and concern. But by the time Benchley died in 2006 and Mundus passed away two years later, both had taken up a new fight: Each had become a staunch conservationist.

Now Stony Brook is leading the way in that conservation, protecting sharks



Dr. Demian Chapman holding a silky shark in the Bahamas.



The late American author Peter Benchley with a picture of a shark, at his home in New Jersey in 1976.



Shark fins laid out to dry on a street corner in Hong Kong. Shark fin soup has long been a luxury enjoyed by China's wealthy, but environmentalists say shark populations around the world have been decimated by its consumption.

with a mix of advocacy and hard science, in the face of estimates that approximately 100 million of these ocean predators are being killed each year. Chief among the team is Demian Chapman, who travels the globe with peculiar luggage: a bright orange hard-side suitcase crammed full of endangered shark fins. When I meet him at Stony Brook University's main campus, the 40-year-old professor has just returned from the Bahamas, Belize, and Fiji, and is preparing to administer a graduate-student exam before taking off again for South Africa and Hong Kong. A new batch of fins to add to his stockpile is drying in a plastic bin outside, and he sheepishly admits, "I've got to go wash my hands. You get used to the smell, but you can never be totally oblivious to it."

Half of the world's shark fins pass through the ports of Hong Kong, making their way to mainland China and elsewhere, many to be bleached and shredded for shark-fin soup. It's a long-standing practice, but a complicated one, and in 2009, Chapman and his colleagues developed a DNA-testing technique to trace the fins back to their region of origin. He then expanded the testing to other species to better understand the complex nature of the global trade.

"*Jaws* was definitely bad for sharks," Chapman tells me in his office. "Tournaments like the ones in Montauk already existed, but then killing them became the new hot thing. The sharks were villains, and they put the fishermen on the map."

After the initial craze waned, though, developments overseas spurred on

the hunt. "By the 1980s, the Chinese economy grew, and that had nothing to do with *Jaws*," Chapman continues. "There was a new middle class with plenty of disposable income, and the luxury product they wanted was soup, which can cost \$100 a bowl in restaurants." Complicating matters, the United States Fisheries then pushed American fishermen toward catching sharks, both to answer the new demand and to protect other fish species that had become depleted.

Between 2000 and 2004, CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and its 180 member countries added great whites, whale sharks, and basking sharks to its list of animals that had to be protected worldwide. But stopping them in customs remained a problem because it was difficult to tell the 400-plus shark species apart.

"Finning"—cutting fins from the sharks and then leaving the mutilated creatures to die—was the preferred harvesting approach, because it left fishing boats' freezers open for more valuable catches, like tuna. In some cases, fishermen would even slice the fins from females, removing embryos and taking their tiny fins as well.

But while finning of sharks has become less common—whether by individual nations' regulations, or an increased market for the sharks' meat, cartilage, jaws, and oils—it hasn't decreased the numbers being killed. "Sharks don't reproduce fast enough for aquaculture," Chapman says. "So they're getting depleted."

Efforts to add additional shark species to the endangered species list were



A sand tiger shark, a local species that sometimes appears in Shinnecock Bay. Sand tiger sharks are harmless to people.



Dr. Ellen Pikitch with a beluga sturgeon in Kazakhstan.

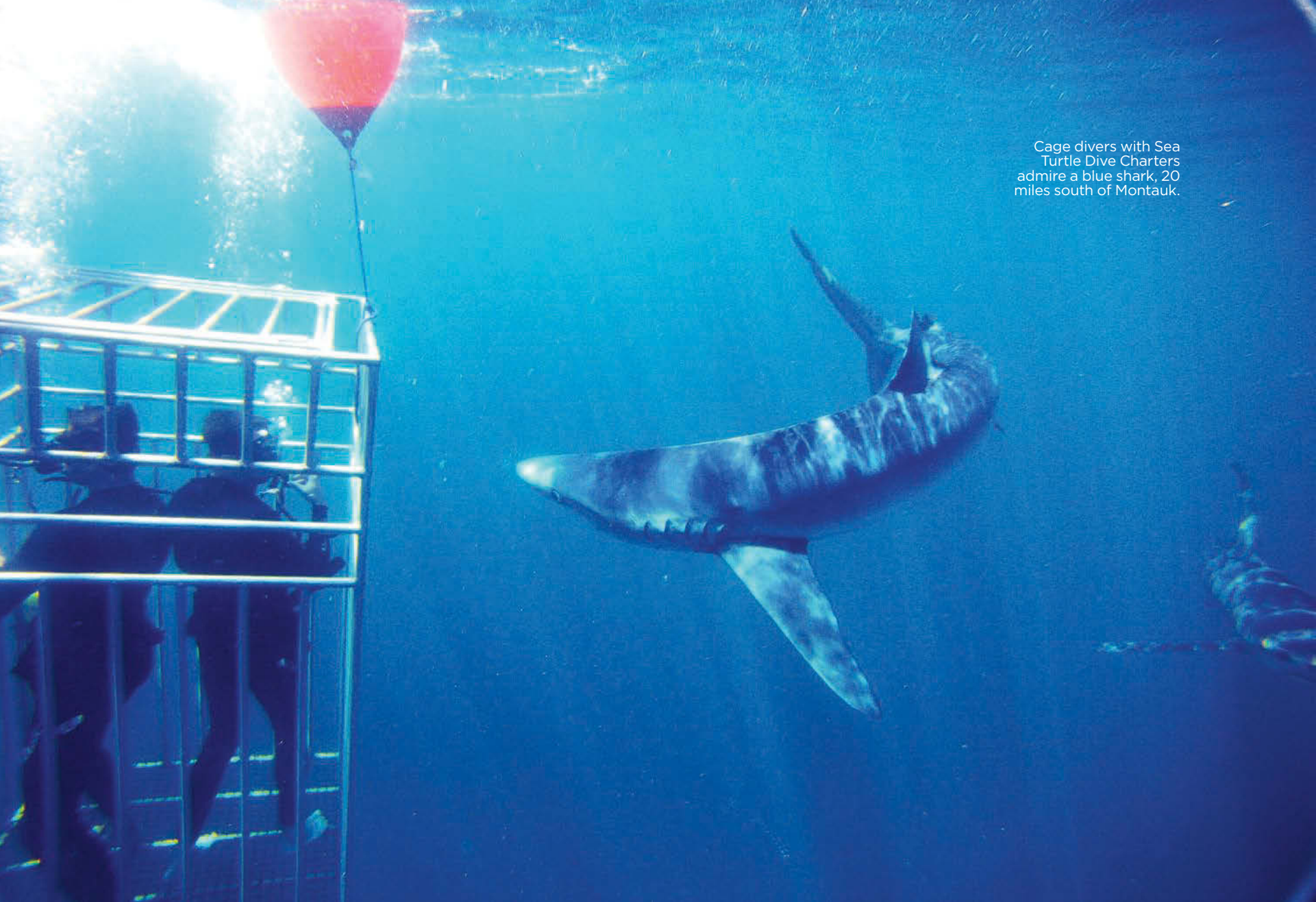
similarly hindered because the task of telling the fins apart seemed insurmountable. But in 2012, Chapman and his wife, Debra Abercrombie, developed a fin guide, based on simple visible physical differences. “We taught ourselves how to identify them, traveling the world and looking at sharks, and making sure there weren’t variations among the species in different areas,” Chapman explains. Funding came from the US government and the Pew Charitable Trust, and the pair displayed the fins and their guide (*available at sharkfinid.com*) to delegates at the CITES conference in Bangkok in 2013. Three hammerhead species, porbeagles, and oceanic whitetips were added to the list along with all manta rays. Those regulations take effect worldwide this September 14.

But back to Chapman’s bag. He’s wheeled it through airports around the globe, showing it to customs officers at ports. “I spend a lot of time doing paperwork,” Chapman admits, “but you can get through customs pretty easily with a good story, and I’ve got one.” Chapman explains that in one hour he can train a customs officer to spot illegally sourced fins and that the training is inspiring people to want to do their part. “They see how easy it is to make a big difference with a global problem,” he says.

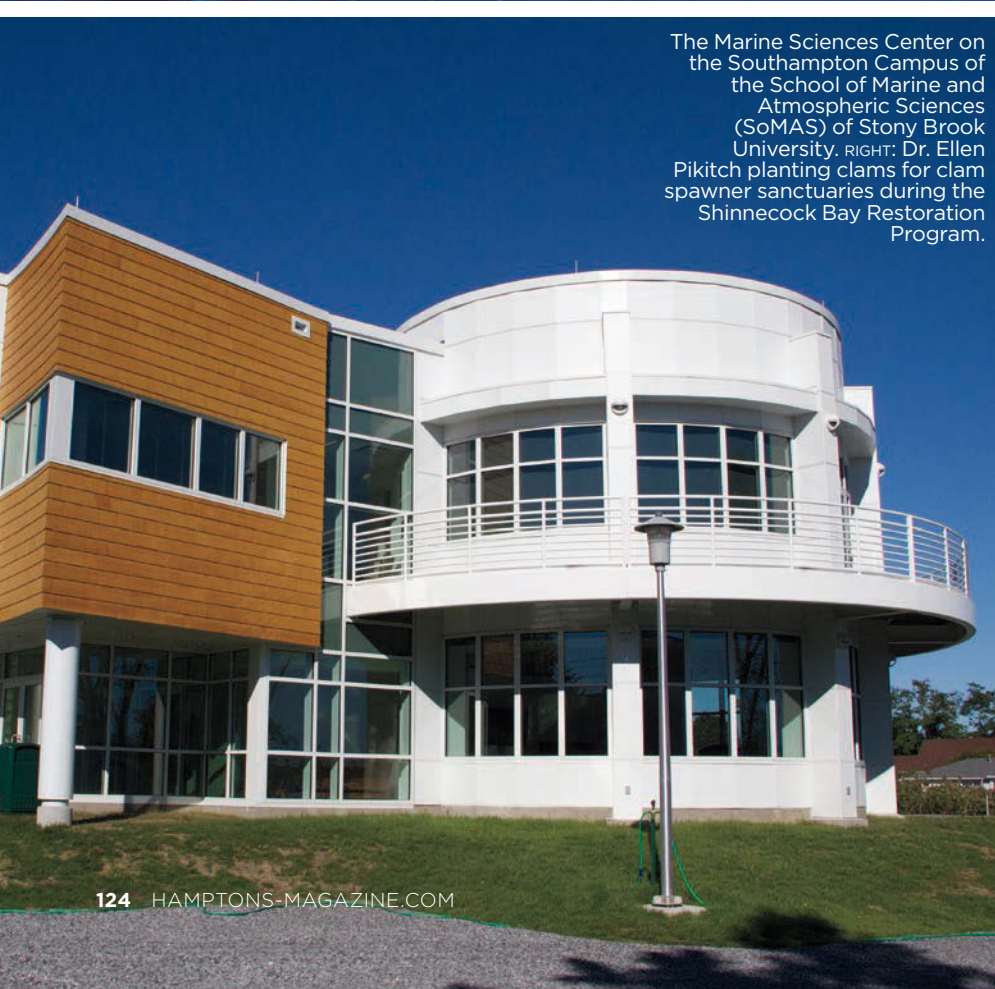
Chapman—whose grandfather had a shark tattoo on his arm—became interested in sharks as a child in New Plymouth, New Zealand, but it changed when he met Ellen Pikitch, a Bensonhurst, New York, native who grew up mesmerized by fish on summer outings to Coney Island. Pikitch

“JAWS WAS DEFINITELY BAD FOR SHARKS. TOURNAMENTS LIKE THE ONES IN MONTAUK ALREADY EXISTED, BUT THEN KILLING [SHARKS] BECAME THE NEW HOT THING.” —**DEMIAN CHAPMAN**

was the founding director of the Wildlife Conservation Society’s global marine conservation program, headquartered at the New York Aquarium and then at the Bronx Zoo. She met Chapman while doing fieldwork in the Bahamas and later hired him to run the Institute for Ocean Conservation Science’s shark research program in 2007. In 2008 she moved the institute to Stony Brook University’s main campus, where she and Chapman are SoMAS professors as well.



Cage divers with Sea Turtle Dive Charters admire a blue shark, 20 miles south of Montauk.



The Marine Sciences Center on the Southampton Campus of the School of Marine and Atmospheric Sciences (SoMAS) of Stony Brook University. RIGHT: Dr. Ellen Pikitch planting clams for clam spawner sanctuaries during the Shinnecock Bay Restoration Program.



Pikitch's groundbreaking career includes leading the scientific efforts for beluga sturgeon to be listed on the US Endangered Species Act (at one time, Americans consumed 80 percent of its caviar each year). This resulted in the banning of all US imports of the fish in 2005, saving a fish heading toward extinction. She also helped lead a 2009 study of forage fish—prey species like sardines, herring, anchovies, and bunker—which according to statistics shows that direct fishing for these species constituted one-third of the world's marine catch, and that by removing them from the ocean, we were endangering the larger fish we rely on for human food. The research has led to changes in fishery policy worldwide.

Closer to home, Pikitch coleads the Shinnecock Bay Restoration Program, which is funded by a \$3 million, five-year grant from the Laurie Landeau Foundation (matched by Stony Brook's Simons Foundation) to study and restore Shinnecock Bay, which has been undergoing increasingly harmful algal blooms. In addition to the trawls, the work includes stocking 20 half-acre underwater sanctuaries with 50,000 hard-shell clams, establishing oyster beds (both bivalve species filter water, with a single oyster filtering up to 50 gallons per day), and planting eelgrass, which serves as a habitat for scallops and young fish. Southampton residents can even participate in the oyster program, in a joint effort between SoMAS and Southold's Cornell Cooperative Extension.

"Smaller systems like Shinnecock Bay let us show that protecting marine areas really works," Pikitch tells me when we meet in New York—she's just back from Beijing, where she was consulting on fish and food safety. "On Long Island, the Southampton trustees were very accessible, very serious, they understood the problems, and they had the power to close off areas to create clam sanctuaries without our having to deal with dueling agencies, so we did it in record time. Successes like that enhance the chance of implementing them elsewhere."

Chapman and his students, Mark Bond and Jasmine Valentin, operate a "chum cam" in Belize to see how marine reserves benefit sharks. These data are used to help support development of other protected areas for sharks, including the Bahamas, where all shark trade was banned in 2011 and shark-related tourism now contributes \$78 million annually to the economy (with each shark producing up to \$3 million in ongoing revenue in its lifetime).

The fins that Chapman lugs around the globe come from Belize along with ones donated by Montauk shark fishermen. "A lot of people are against the tournaments," Chapman says, "but if you're going to have them, our goal is to get as much data as possible. Anything that monetizes the sharks as living creatures is good for them. That's the best way to move conservation forward: It's like what's been done in safari parks in Africa."

"SMALLER SYSTEMS LIKE SHINNECOCK BAY LET US SHOW THAT PROTECTING MARINE AREAS REALLY WORKS." —**DR. ELLEN PIKITCH**

In Montauk, alternatives have emerged thanks to things like cage diving with Sea Turtle Dive Charters (seaturtlecharters.com). This summer, Abercrombie will accompany local fishermen to tag shortfin mako sharks with satellites off of Long Island, growing their influence in the region and working to preserve the delicate but essential ecosystem.

Back on the *R/V Shinnecock*, Konstantine Rountos, a freshly minted SoMAS PhD, is examining a pair of mating green crabs. This fall, he'll start a postdoc at SoMAS after designing first-of-their-kind experiments on the effects of red tide on the early development of fish. Sara Cernadas-Martin from Spain is alongside him, taking samples of the crabs' flesh before releasing them back into the bay.

As a commercial trawler passes us, Andy Brosnan, the *Shinnecock's* captain, says, "This is a summer community, so people don't know what's here in winter. But there are harbor and harp seals, and snowy owls that fly down from the Arctic because they only feed in light. I saw one in the Quantuck parking lot, chewing on ice."

Black cormorants greet us on the dock as we step ashore at Stony Brook's Marine Sciences Center in Southampton, an \$8 million, 15,000-square-foot facility that opened in September 2013. A 2,400-square-foot outdoor wet lab for studies that need natural light sits outside, while an indoor seawater lab holds 17 tanks for experiments, plus 10 more for studying algal blooms. Powered by a 100-gallon-per minute pump, the entire array can bring water in from the bay, or use a closed, filtered flow that can be further adjusted by tweaking the calcium levels, salinity, and temperatures to satisfy any scientist's parameters. The first experiments began this summer.

A second floor features classroom labs and a conference room with enviable views of summer homes, resident swans, and the water. There's work to be done in Shinnecock Bay and in oceans around the world, but it's impossible to stand in these halls and not feel that Stony Brook's fleet of scientists is making a difference. **H**