

Rutgers gets in the swim with glider study

Launches robotic device to investigate pollution

BY KEVIN COUGHLIN
STAFF WRITER

If you're fishing near Sandy Hook and reel in something that looks like a yellow tarp, don't panic.

Chances are you have hooked a sea glider. And Rutgers University would really like it back.

Sea gliders are technical marvels that swim without propellers and record data about ocean conditions as they dive and rise at a crab's pace.

Researchers say these robotic devices may help them understand climate and global warming, as well as guide fishermen to fish feeding grounds.

Military and homeland defense agencies are exploring gliders' potential for patrolling ports. Scientists have pondered using them to plumb the depths of Europa, an icy moon of Jupiter.

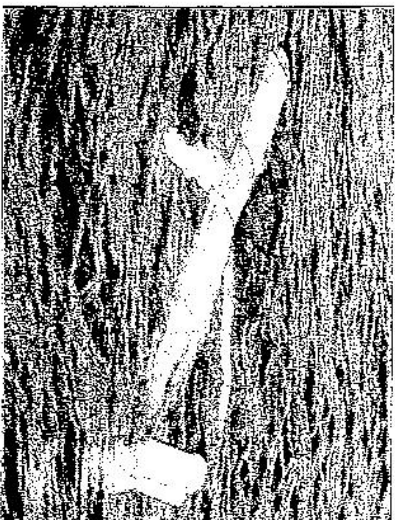
Rutgers launched a sea glider last Monday for a university-led project studying how Hudson River pollution af-

fects New Jersey coastal waters.

Last June, the school lost two \$85,000, 6-foot-long aluminum gliders — one off Sandy Hook just beyond New York Harbor and another that was damaged during retrieval and sank in rough seas off Atlantic City.

"It was a bad week," says Elizabeth Creed, an engineer with the Coastal Ocean Observing Laboratory at the Rutgers Institute of Marine and Coastal Sciences in New Brunswick.

She says she thinks the glider off the coast of Atlantic City.



Rutgers University is using a Stocum Glider to study pollution off the New Jersey coast.

PHOTO BY KEVIN COUGHLIN

GLIDER

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Sandy Hook got siammed by a ship. Or maybe it's a trophy on some fisherman's wall. Either way, such mishaps underscore a virtue of these plodding vessels, which have inspired amorous advances from sea turtles and fooled remoras (shark-suckers) into hitching rides.

When a sea glider vanishes, no humans go down with the ship.

"They fly in conditions where you would not put out a boat — nor easters, hurricanes Ivan and Jean. They can go 24/7 for 30 days. You can't put a boat crew out there for that long. They will kill each other," Creed says.

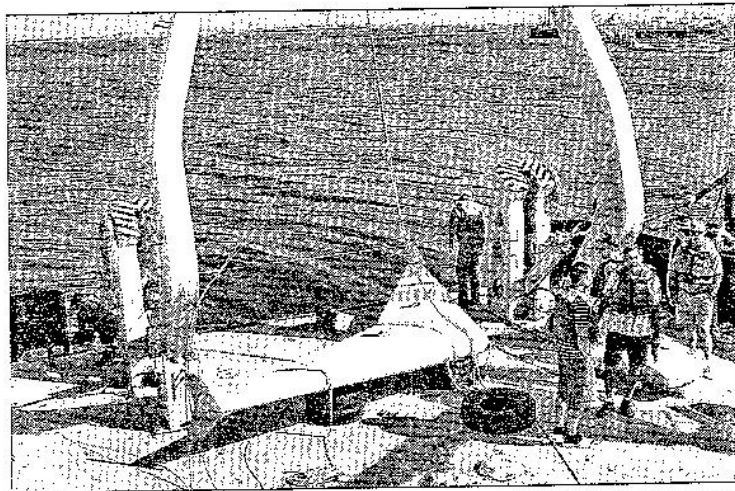
Named for the first man to sail solo around the world, these "Slocum Gliders" dive and surface like submarines, taking in water as ballast and expelling it as directed by onboard computers that can be remote-controlled. At the surface, a bladder inflates with air and lifts a tail antenna to relay the glider's location, which is pinpointed by satellites of the global positioning system. The information is transmitted to Rutgers via the Iridium satellite phone network.

Powering these operations are 240 alkaline "C" cell flashlight batteries, says Douglas Webb, whose Webb Research pioneered the Slocum Gliders in the 1980s.

A newer Webb model "flies" by exploiting differences in sea temperature to alter buoyancy.

The Rutgers gliders can dive about as deep as a football field is long, gathering data about sea temperature and salinity. Optical sensors also measure what is floating in the water — plant life, sediments and so forth — by sending pulses of light and analyzing how much is reflected. At speeds of less than a knot, these hundred-pound vessels cover about 16 miles per day.

Glider designed by the University of Washington have descended 3,300 feet, spanned nearly 2,000 miles of Pacific Ocean and spent more than 193 straight days fluttering across the Labrador Sea. Rutgers shouldn't feel too bad about losing gliders; University of Wash-



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The Stingray, an experimental Navy glider, may be used for surveillance.

ington oceanographer Bruce Howe says his school has lost 10 during the past decade. (Besides, they are insured.)

The Navy envisions glider fleets as "coordinated sentries," using sensitive listening gear to keep watch around aircraft carriers or scout for enemy mine operations, says Tom Swean of the Office of Naval Research. Princeton University engineers are perfecting software to control such fleets, he says.

Soon the Navy will test a fast-gliding "flying wing," resembling an undersea B-2 bomber. Can it carry weapons? "That sort of stuff is kind of sensitive," Swean says.

Canada has rigged gliders with equipment for making and sending audio recordings — "wav" files, appropriately — of small boats that drug runners or terrorists might use to elude radar. Tests are planned later this year, says Cary Risley, a defense scientist for Defense Research and Development Canada in Nova Scotia.

Clayton Jones of Webb Research says NASA also has discussed sending sea gliders on future missions to Europa.

For two more weeks, a Rutgers glider will crisscross a "highway" of Hudson River water about 25 miles off of Lavallette on the Jersey coast. It's part of a five-year, \$4.2 million project called LaTTE (short for LaGrangian Transport and Transformation Experiment) that includes researchers from Columbia University and the University of Massachusetts-Boston.

Earlier this month, the team

used shore-based radar, satellite imagery and water-sampling methods to track a harmless red dye injected near Sandy Hook. The idea was to trace how toxic metals and sewage from the river enter the marine food chain.

Rough seas delayed the launch, and a communications glitch further hampered the glider's efforts to guide two research boats tracking the plume for their experiments. The glider will keep monitoring salinity, water temperature and plant life.

"It's such an elegant design . . . (The glider is) just an amazing tool," says Alexandra Isem, program director of oceanic technologies for the National Science Foundation, which is funding LaTTE.

Other Rutgers gliders plying the Gulf of Mexico have analyzed water for signs of harmful algae that causes red tides. Right now, Rutgers gliders are taking temperature and salinity readings near the Bahamas for the Navy. The university is seeking money for sensors to measure dissolved oxygen, an indicator of the ocean's health.

Creed says a glider in the gulf had an odd excuse for poor performance: A remora mistook it for a shark and glommed onto a fin, expecting free meals. Another balky glider revealed a similar surprise.

"We went to pick it up," says Jones of Webb Research, "and a turtle was sitting on top of it."

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