

INNOVATORS

ON THE HORIZON

Some very clever people are bringing us modern concepts that are changing our world, and our boating lives, one cool idea at a time

BY CHRIS LANDERS



SEA FARE TO SCIENCE FAIR

DIANA DOYLE, A LONGTIME BOATER and co-author, most recently, of the new *AnchorGuide for the Intercoastal Waterway*, has been an avid birdwatcher since she was seven. For years she participated in the Audubon Society's century-old Christmas Bird Count, or CBC, but now she wants to expand the land-based bird count to the water. For that, she needs a little help. "There are a lot of boaters on the water," Doyle says. "If we can harness all those eyes, and get them to report what they see, they can contribute to the database at Cornell University's eBird.com." Doyle's SeaBC, as she's dubbed it (www.facebook.com/Birding.Aboard), is part of a growing trend called citizen science, where ordinary folks can contrib-

ute to a larger body of knowledge. There are programs from whales to weather watching, allowing amateurs to do real science. By virtue of their locations, boaters can be among the most valuable contributors. "The ocean is the last birding frontier," Doyle says. "We don't even know all the species out there." Since the SeaBC launched last year, reports have come in from Chile's Golfo de Penas to the Weddell Sea.

NOAA has long been a forerunner of citizen science at sea. Their Voluntary Observing Ships program, which calls on commercial mariners to send in weather reports from remote locations, traces its lineage back to the mid-19th century. Even with modern meteorological satellites, that information remains vital to weather-forecasting efforts. Almost 1,000 ships send in their barometer and temperature readings to the program, which involves minimal training for the crew.

"On-land forecasters have hundreds, if not thousands, of observations they can use," says Tim Rulon, of NOAA's National Weather Service, "but as soon as you go out on the water, there is one or two, or none."

Websites like SciStarter (www.scistarter.com) collect various citizen-science projects, from looking for shad in the Pacific Northwest and sharks in South Carolina, to keeping an eye on reefs, rivers, and watersheds. NOAA also has a smartphone app for reporting marine debris, and invasive species.

Diana Doyle is hoping the SeaBC will catch on, partly for the information, but also to get people interested in what they see as they go out boating. Bird sightings, by land and by sea, can be reported to eBird.com year round, not just at Christmas. "Somebody emailed me the other day and said 'I'm going to be on a cruise, Does that count?'" Her answer? "Absolutely."

CLAM DIGGING

RAZOR CLAMS DIG INTO THE SEAFLOOR at a rate of about 1 cm per second before anchoring themselves in place. Their anchoring force – the measure of how well they hold fast compared to the energy they expend in getting there – is 10 times better than the best boat anchors, according to the Massachusetts Institute of Technology (MIT), where they studied the razor clam's abilities. The clam does it by making quick up-and-down movements and opening and closing its shell, turning the sand around it into quicksand that it can burrow through quickly.

Trying to create a lightweight anchor that held fast, but could be unset easily, MIT came up with the



RoboClam, which uses the razor clam's digging method to burrow down, before expanding to set itself. The robot's digging method could be used to search for oil or underwater mines, and the RoboClam could be the basis for a whole new way of commercial anchoring and mooring.

Razor clams produce proportional anchoring force 10x larger than a conventional anchor