New technology aids in ocean research

Clever ways to collect data

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To understand what climate change is doing to the Pacific Ocean, scientists need data.

Lots of it.

Traditionally, data has been expensive to secure because it involves large equipment and ocean voyages. But the miniaturization of technology and some clever new machines mean scientists are now getting lots of data — sometimes delivered via phone to the comfort of an office chair.

A good example can be found on the deck of the Forerunner, a small Clatsop Community College research vessel that sails out of Astoria.

A deckhand lowers a detector the size of a suitcase into the crystal blue waters of the Pacific. National Oceanic and Atmospheric Administration fisheries biologist Curtis Roegner is using it to look for a scanner on the sea floor.

"There. Found it," he said. "OK, so here it's recognizing that I've found one of our scanners and here's its code number. It's out there and we could talk to it. And now we could tell it to release from the bottom, pop-it-up and retrieve it."

The scanner's job is to sit on the ocean floor and detect crab that Roegner has tagged with tiny transmitters. Because the transmitters are relatively inexpensive, he's been able to install an array of scanners that give him an idea of where all the crab are and what they do.

Instead of scuttling around in circles, crab will walk a mile or more in one direction.

Roegner's research is funded by the U.S. Army Corps of Engineers. That's because it's dropping tons of sand from dredging the shipping channel of the Columbia River into the research area. Roegner is using his scanners, tags and cameras to see how all that sand is affecting the crab.

"It looks like a tsunami wave of sediment and water mixing. And that overwhelms them," he said. "They get enveloped by it."

Despite the onslaught, Roegner said the crab survive.

"They're tough. And they don't get buried. They scuttle above the sediment," he said.

Roegner has been researching in this area for the past 17 years and getting the data to tell such stories is getting easier and cheaper.

"We're putting (GoPro cameras) in all of the stuff and throwing them overboard and looking at the behavior of creatures that we never could see before. So, the technological advances and to be able to use existing technology and apply it to a new aspect of your research, that's really exciting I think," he said.

For the recent trip, the team has a shiny new piece of equipment called the Slocum glider.

It's being used by Jack Barth, a professor of oceanography at Oregon State University. Barth has doubled up on this trip with Roegner to save money.

Barth explained that instead of flying through the air, the glider flies through the water.

"It's an underwater robot. It's completely autonomous," he said. "We can fly it from the sea surface to right near the sea floor, up and down, back and forth, and we can measure the entire sub-surface structure."

Sensors on the glider can record temperature, salinity, dissolved oxygen, water velocity, even how much sediment is in the water.

And it's all done without an engine.

The Slocum glider has a battery to run all the electronics and drive a piston that compresses air with one stroke. That makes the glider heavier than water, so it sinks. And its wings turn that sinking motion into forward motion. When it gets close to the bottom, that same piston expands the air again, making the glider buoyant.

It can travel about 10 miles a day and stay out for weeks at a time.

When the glider reaches the surface, its tail sticks out of the water so an embedded satellite phone antenna can call Oregon State's lab and send all the data ashore.

Roegner said it's impressive.

"It's being fitted with an acoustic receiver that can actually hear my tags. This trip, we're not going to be able to do it, because we're not in the right position. But eventually, I totally want to be able to track the crabs with something like that," he said.

A deckhand lowers scientific equipment into the Pacific to check the health of scanners sitting on the ocean floor.
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