A New Eye on Deep-Sea Fisheries

A VEHICLE CALLED HABCAM OFFERS SEAFLOOR PHOTOMOSAICS

by Lonny Lippsett

Imagine that officials charged with setting deer-hunting limits had to assess the herd's abundance by flying over forests at night. That's a little like what the National Marine Fisheries Services (NMFS) is up against to set fishing quotas for deep-sea scallops.

To get new views into the deep, Woods Hole Oceanographic Institution (WHOI) scientists built HabCam, a stereo-optic camera and lighting system mounted on a metal frame. It is towed by a ship 6 to 8 feet above the seafloor, snapping six images per second. Covering 100 nautical miles per day, it creates vivid ribbonlike photomosaics showing where, what, and how much life lies on the seafloor.

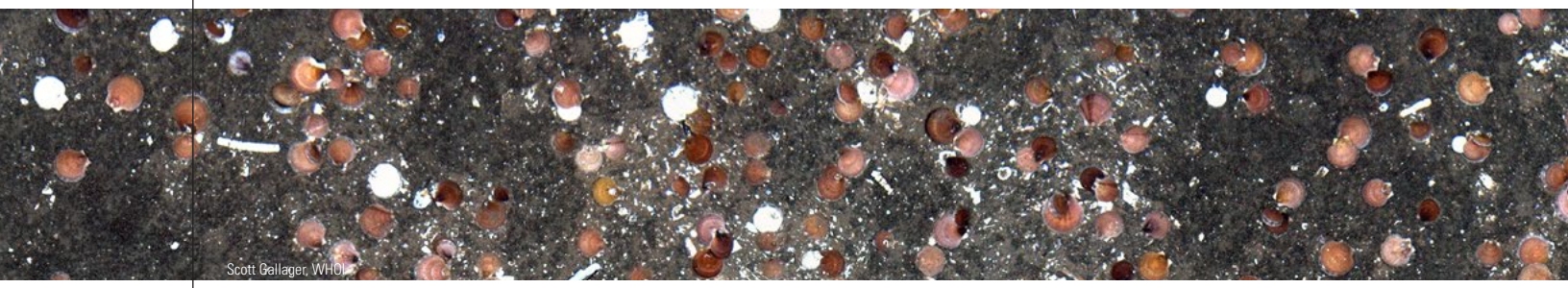
Unlike dredge sampling, HabCam doesn't disturb seafloor ecosystems. The 3-D images provide millimeter-scale resolution of seafloor contours, said WHOI biologist Scott Gallager. "In addition to information on scallops, HabCam also provides a huge amount of data on seafloor habitat. We are seeing that the more complex or three-dimensional the seafloor habitat is, the higher the diversity of organisms and communities it can support."

HabCam is also equipped with sensors that measure temperature, salinity, chlorophyll levels, and other ocean conditions. It has a side-scan sonar that images seafloor contours 50 meters on either side of the vehicle, about the size of a football field. These data, combined with the images, reveal a much fuller picture of all the factors that create ecosystems.

"Now we can add the fourth dimension—time—to see how seafloor ecosystems change, especially as climate change causes ocean temperatures to rise and pH to drop," Gallager said. "Using repeated surveys, we can see if communities are changing, and we can use environmental conditions to predict whether they will survive in particular locations."

HabCam was developed in partnership with commercial fishermen and NMFS scientists, Gallager said. "The intent is to provide the commercial fishing industry with the capability to see the ocean floor and the distribution and abundance of organisms on it. This will help improve management of fish and shellfish populations by empowering the industry with knowledge we haven't been able to provide before."

This research was funded by the National Oceanic and Atmospheric Administration and the Research Set Aside Program, which supports basic research through a percentage of dockside sales of scallops.

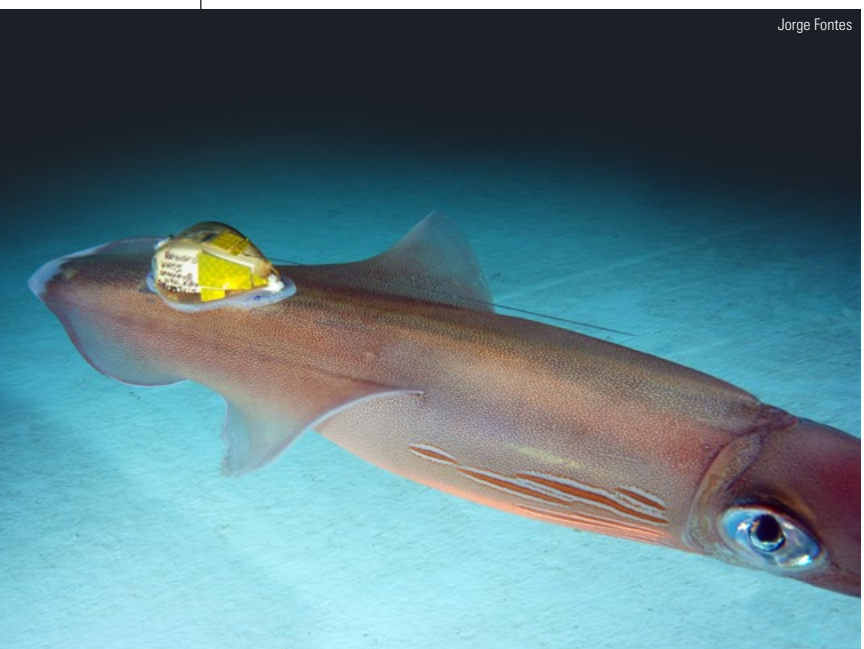


Scott Gallager, WHOI

Tagging a Squishy Squid

IT'S HARD TO TRACK A SOFT-BODIED MARINE ORGANISM

by Erin Koenig

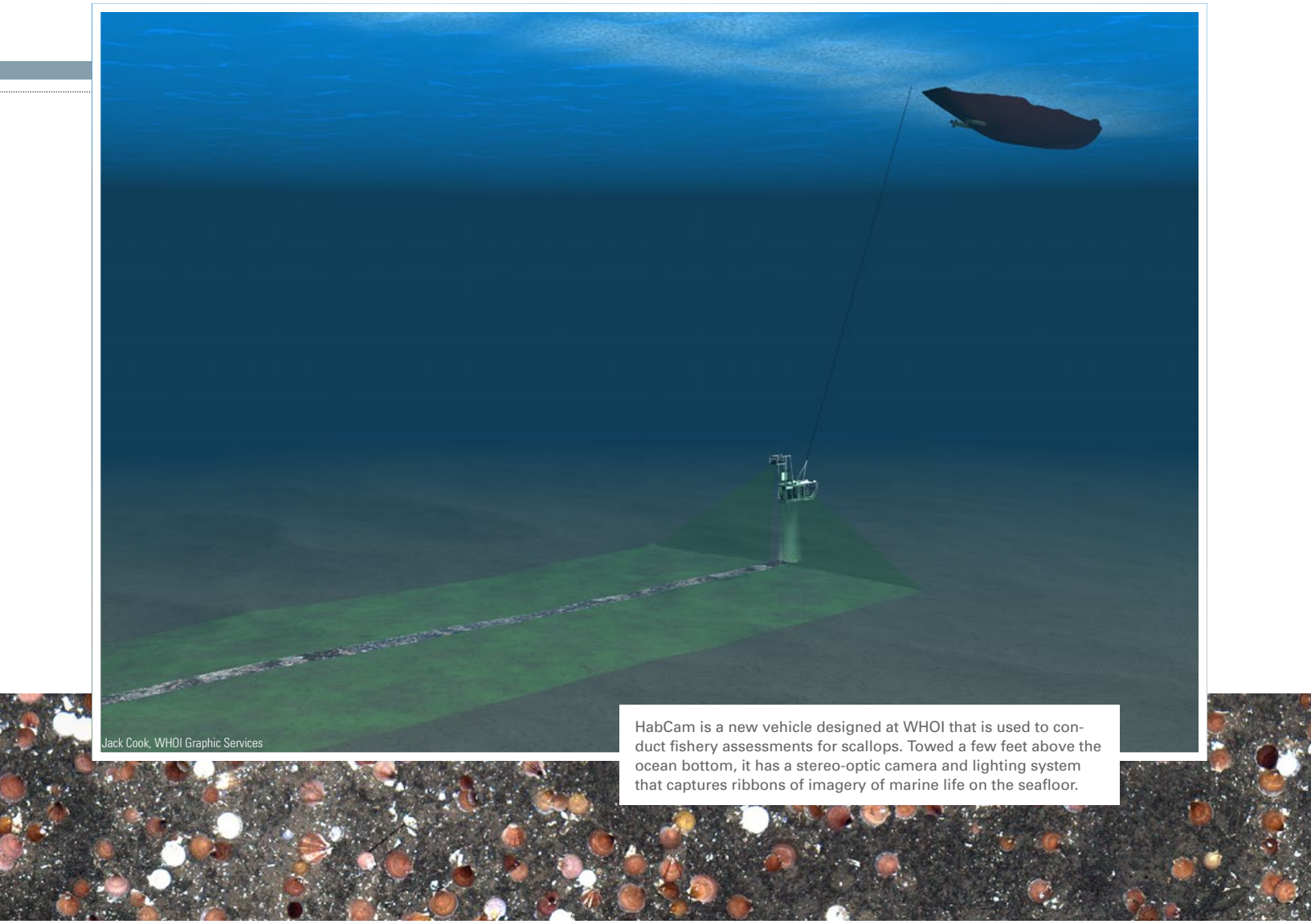


Jorge Fontes

For more than a decade, researchers have been tagging large marine mammals such as dolphins and whales to reveal their behavior. But tagging small, soft animals such as jellyfish and squid has posed a big, hard challenge.

WHOI biologist Aran Mooney and collaborators at Stanford University and the University of Michigan have developed a new kind of data-logging tag, specifically designed for small and delicate invertebrates. The ITAG (the "I" stands for "invertebrate") is small—1 by 4.25 by 2.5 inches. It has a hydrodynamic shape to minimize its impact on the animals and attaches to jellyfish with suction cups and a veterinary-grade tissue adhesive. For squid, researchers stitch it onto the animals' backs using biodegradable sutures.

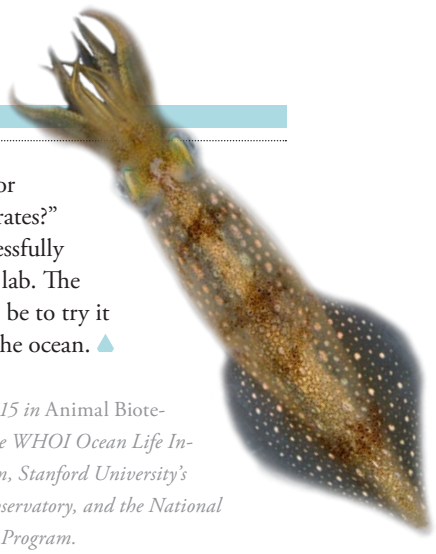
There are iPads and iPhones, and now ITAGs, electronic devices specially designed to temporarily attach to delicate, soft-bodied marine life. In this case, the "I" stands for "invertebrate."



Jack Cook, WHOI Graphic Services

HabCam is a new vehicle designed at WHOI that is used to conduct fishery assessments for scallops. Towed a few feet above the ocean bottom, it has a stereo-optic camera and lighting system that captures ribbons of imagery of marine life on the seafloor.

Tom Kleindinst, WHOI Graphic Services



Squid and jellyfish play crucial roles in marine food webs, and squid is a vital commercial fishery. Yet little is known about their natural behaviors or physiology. As climate change warms the ocean and changes its chemistry, it is becoming increasingly important to understand how these animals will be affected, Mooney said.

Sensitive sensors on the ITAG can record animals' swimming patterns and breathing rates, along with environmental conditions such as light and seawater temperature. The tags eventually detach from the animals' bodies, float to the surface, and transmit data via a radio antenna back to computers in scientists' labs.

"We wanted a tag that would be able to tell us what the animals are doing at different depths," Mooney said. "When squid go down to a couple hundred meters, are they foraging at night or are they resting and getting away from top predators? Are they hovering or swimming faster or slower? What are their respiration rates?"

So far, the ITAG has been successfully tested on squid and jellyfish in the lab. The next step for the research team will be to try it out on free-swimming animals in the ocean.

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