



## PLAYING TAG UNDERWATER

### Glimpses into the lives of ocean animals

Ocean animals can be tough to study. Living in the dark, deep, and expansive ocean often keeps them hidden from humans. To learn about marine animals and their behaviors, scientists tag them with small devices. These attachments are similar to the Fitbits or smart watches that some people wear to track their exercise or sleep stages or measure their heart rate. Tags offer scientists a more detailed picture of what's happening in the ocean.

### Fishy Research Buddies

At a depth of 200 to 1,000 meters (656 to 3,280 feet), the twilight zone is mostly out of reach of sunlight. Scientists interested in its mysteries have recruited partners who can easily dive to those depths: swordfish. Researchers attach one tag high on a swordfish's dorsal fin and another to its back. This isn't easy. "You have to hold [the animal] alongside the boat and try to fix the tags while it tries to whack you or bash a hole in the boat with that razor-sharp sword," Peter

Gaube told *Knowable Magazine*. He's an oceanographer at the University of Washington in Seattle.

Whenever the fish breaks through the ocean surface, the antenna on one tag will transmit its location to satellites. The second tag records conditions like depth, light, and temperature on the swordfish's daily travels from the surface to the deep sea and back.

As swordfish swim to places where they regularly find food, researchers can learn about the distribution and abundance of fish at those depths. Government officials and conservationists could use this information to help set rules to prevent overfishing by humans.



A researcher tags a swordfish.

A beluga whale has satellite tracking devices attached to its back.



An orca is tagged off the state of Washington. (Photo by Deborah Giles, NMFS permit number 16163.)



### Dinnertime Distractions

The endangered orcas of the Pacific Northwest live in an area with a lot of boat traffic. Researchers at the Northwest Fisheries Science Center, based in Seattle, Washington, use suction-cup tags to study how boats affect the whales. With a long, lightweight pole, they stick the tag to an orca's back. Scientists program the tag to stay on for several hours to a day, recording sounds—including echolocation clicks—and the orca's movements. The echolocation data revealed when orcas were hunting. The movement data provided a location. The researchers matched this with boat movement in the area.

## WHAT GOES INTO A TAG?

**Designing tags for ocean animals is tricky.** The electronics must work even when the tag is drenched in saltwater and squeezed by the high pressure of the deep sea. The tag needs to stay on even when an animal makes a sudden move, like when a dolphin leaps out of the water.

An effective tag needs to have all the necessary equipment but be lightweight and unnoticeable. It shouldn't slow an animal down or otherwise change its natural behavior.

Scientists are increasingly interested in "animal-friendly" tags. These tags are less like invasive ear piercings and more like the rings or wristwatches that people wear.



Sea otters spend a lot of time floating on their backs, but they're tagged, too!



The satellite tags placed on orcas are designed to fall off after a while. (Photo by Brad Hanson, NWFS NMFS permit number 781-1824/16163.)

The data showed that when nearby boats move quickly, orcas have more difficulty catching their favorite food, salmon. Female orcas often stop trying to hunt altogether, perhaps to stay close to their calves. "Having vessels moving around fast can be one extra thing for the whales to have to keep track of while they're trying to chase fish and come up for air," says Marla Holt. She's a wildlife biologist at Northwest Fisheries Science Center in Seattle, Washington. The findings are informing changes in the law to ensure boaters give the endangered orcas the space they need.

### Squid Backpacks and Jelly Hats

Tags wouldn't stick to squishy, soft-bodied ocean animals. Aran Mooney is a marine biologist at the Woods Hole Oceanographic Institution in



A female hawksbill turtle with a satellite sensor heads to the water off the north coast of Australia.

Massachusetts. He designed a special tag that works with such animals. Researchers can sew it onto a squid using biodegradable thread that dissolves after a while, releasing the tag. "It's a really light backpack," says Mooney. "It gives us a picture of what the squid's doing, but also the local environment."

This information includes the squid's speed, direction, and depth, as well as conditions like light and temperature. Mooney hopes to learn more about how squid behave in different ocean temperatures and whether they'll manage to thrive as the climate changes.

Scientists at the Monterey Bay Aquarium Research Institute on the central coast of California applied a similar tag to learn more about jellies. After catching jellies in a bucket, they dried their top with a towel and glued a tag in their center. Before releasing a jelly, they tethered the tag to a float



A diver tags a barrel jelly. It can be done!

with a fishing line to help them find the animal the next day. The information recorded on the tag revealed that jellies spend a lot more time actively swimming than simply drifting along.

### Looking Ahead

Tags let us learn more about the daily lives of ocean creatures. They also tell us about the threats they may face due to human activity—and ways we can help. What ocean animal would you like to learn more about? What might you have to consider to design a tag for that creature?

**Nora Nickum** leads ocean conservation policy work for the Seattle Aquarium. Her new middle-grade book, *Superpod: Saving the Endangered Orcas of the Pacific Northwest*, includes a dramatic true tale of scientists searching for a whale tag full of valuable data that was lost at sea.