

Humpback Whales Herd Salmon with Their Fins, New Photos Reveal

By Tim Vernimmen October 15, 2019 National Geographic



A humpback whale surfaces while feeding on herring in Norway. A population of humpback whales in Alaska has been observed corralling fish with their flippers. *Photograph by Paul Nicklen, Nat Geo image collection*

The discovery, filmed in southeastern Alaska, confirms a behavior long hypothesized but never scientifically confirmed.

Humpback whales are well known for their sophisticated hunting strategies, such as blowing bubbles to form wide nets, then swimming in a clockwise motion to swiftly encircle their prey. This ingenuity, coupled with the marine mammals' advanced social behavior and communication, led scientists to suspect they were missing something.

It turns out they were right.

Each April, a salmon hatchery in southeastern Alaska releases young fish into the sea, part of an effort to replenish overfished populations. A few humpbacks have learned to show up every year to partake of this human-made buffet. To capture the whales' dietary habits from various perspectives, researchers took photo and video from aerial drones and floating platforms around the hatchery.

In doing so, they recorded a behavior never before confirmed by scientists.

After blowing a bubble net, two whales used their flippers to create a second barrier inside the bubbles, moving the appendages up and down to direct the fish toward their gaping mouths, according to a new study, published today in the journal *Royal Society Open Science*.

Anecdotal evidence of this so-called "pectoral herding" exists, but in those cases, it was too hard to tell what was really going on, says study leader Madison Kosma, a master's student in fisheries at the University of Alaska Fairbanks.

"Now, thanks to the unique situation at the hatchery, and thanks to new technologies such as drones, we were actually able to document it," says Kosma, whose team witnessed pectoral herding dozens of times over the three-year study.

"The only way you could get closer is if you're a fish in their mouth," she adds.



A humpback whale collects young salmon with its fins in southeastern Alaska.
Photograph by Madison Kosma

It's unknown whether humpbacks elsewhere use this technique, or what prompts the animals to use it. But what's clear is humpback whales are even more adaptable than thought, and could rely on a suite of feeding strategies to cope with the rapidly changing planet.

Working for Their Dinner

For the study, Kosma and colleagues set up experiments in various bays along the eastern shore of Baranof Island, timed to coincide with the release of young salmon from Hidden Falls Hatchery.

The team identified individual whales by characteristics such as coloration and dorsal fin shape, and then videotaped and photographed as many of the whale feeding events as possible. In some cases, the scientists stood on walkways attached to hatchery pens and extended an 11-foot pole with a camera attached over the water to record the action. Back at the lab, the team analyzed the footage and assembled frame-by-frame feeding sequences, as well as 3-D modeled the foraging.



The results showed that the whales herded salmon with their flippers for three reasons: To trap the fish; to move water, which then directs the fish; and to scare the fish to the surface by flashing their fins' light-colored underside, a behavior only observed in sunny weather.

Kosma jokingly refers to the last strategy as a referee field goal position, because one video shows a whale swimming up toward the salmon with its fins stretched out in a V above its head.

“From a hydrodynamical perspective, holding your fins like that would be a waste of energy,” she says, “so they must have a good reason for doing this, like catching more fish.”

As for why the whales use pectoral herding, Kosma suspects it's because the inexperienced fish require more work to catch.

Since lunging at prey with their mouths wide open is quite tiring for the whales, they need to make sure their prey are dense enough to make it worthwhile. However, when threatened, juvenile salmon don't school together the way other prey species like herring do—so corralling the salmon with their flippers may be needed to move them closer together.



An aerial image shows a humpback gathering fish with its flippers. The behavior was observed dozens of times during the three-year study.

Photograph by Madison Kosma

Trapped

Frank Fish, a biologist at West Chester University in Pennsylvania who has studied the biomechanics of whale fins, agrees “this research definitely shows that the flippers can concentrate prey.”

Humpback whales have very long flippers relative to other whales, in part to help them maneuver and accelerate in shallow water, and it make sense the animals “use flippers for other functions, such as corralling prey, touching, or communication,” says Fish, who was not involved in the study.

“The main lesson I take away from this study is that humpbacks are capable of innovation and learning new foraging strategies that may help them to feed more effectively on specific prey species,” says Christie McMillan, a whale expert at the Marine Education & Research Society in British Columbia, Canada.

She knows this firsthand: McMillan recently described a newly observed behavior she calls trap feeding, in which some humpback whales near Vancouver Island hold their mouths open at the surface where birds are feeding—an apparent attempt to fool fish into seeking refuge in their mouth.

“But it is unclear how long it takes whales to learn these new strategies,” McMillan notes, “and therefore whether they will be sufficient to allow them to respond effectively to climate change and the depletion of their prey.”

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