



From first noticing that this humpback whale had become entangled in a crab pot line, it took rescuers four days to free it. The line was cinched so tight the whale was at risk of losing its right pectoral fin. Photo by Peggy Stap/Marine Mammal Center

Crab Command and Control

A California team uses science to predict the risk of whale entanglements and shut down the Dungeness crab industry when necessary in “near real time.”

by L. Clark Tate

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This story is over 2 years old.

As the warm water Blob transformed the ecosystem in the northeast Pacific, the number of whales tangled in fishing lines along the US west coast soared from a baseline of 10 per year to 30 in 2014 and 71 in 2016. A good percentage were entangled in gear owned by California-based Dungeness crab fishers. Frustrated by the growing number of casualties, the Center for Biological Diversity filed a lawsuit against^[PDF] Charlton Bonham, director of the California Department of Fish and Wildlife (CDFW). The 2017 suit pushed for clear, objective, and science-based triggers to shut down the crab fishery when whales are at risk.

In response, the California Dungeness Crab Fishing Gear Working Group, a surprisingly powerful consortium of fishermen, conservation groups (including the Center for Biological Diversity prior to the lawsuit), scientists, and staff from the CDFW created their risk assessment and mitigation program. The program helps the working group identify and respond to swiftly changing ecological conditions.

“Whales getting entangled in fishing gear is a huge crisis,” says John Mellor, a commercial fisherman and a member of the working group since its inception. “It has to be dealt with, and dealt with in real time.”

Once or twice a month during Dungeness crab fishing season, which normally runs from November 15 to July 15, scientists in the working group conduct a series of mini research projects looking at four risk factors for entanglements: how many whales and sea turtles are around, where whales are likely to forage, the number and locations of recorded entanglements, and information about fishermen, including their landing data, license numbers, and the locations of their traps.

The working group makes recommendations in what Karin Forney*, a research biologist with the National Oceanic and Atmospheric Administration, calls “near real time.”

“We are using whatever information we have now to make a decision about what the fishery will do in about three weeks,” says Forney.

Forney tracks humpback populations for the working group using data collected through aerial surveys and by Monterey Bay Whale Watch. The aerial surveys cover prime foraging grounds between Point Conception and Gualala, a high-risk entanglement zone. When weather and funding permit, she covers the entire fishery.

Jarrod Santora, an applied mathematician at the University of California, Santa Cruz, is the working group’s ocean condition and whale foraging guru. He looks at the distributions of humpback favorites like krill and anchovy and checks data from an oceanographic model to determine where humpbacks are most likely feeding.

Ecosystem models are important tools for the working group’s risk assessments. This type of work, for instance, showed that the Blob compressed the territory for humpbacks’ prey near shore, forcing the whales to feed closer to crab lines and leading to the surge in entanglements.

But what gives the working group teeth, and what sets it apart from many other ecosystem monitoring projects, is a 2018 law that codifies its role in advising management actions for the Dungeness crab fishery.

In 2019, and again this year, the working group issued two recommendations that, when seconded by the CDFW, led Bonham to restrict when and where crabbers could fish.

As of May 15, draft rules were poised to give the working group's data more power and to reduce Bonham's role, making the risk assessment program the primary mechanism to reduce whale entanglements. The rules also seek to make decisions more formulaic and precise.

On November 15, 2019, the risk assessment data led to a Dungeness season delay in the Central Management Area (CMA), south of Mendocino County, because whales were in the area. Initially, the working group, which includes fishermen, tried to get the season open in time for the Thanksgiving Dungeness rush, but persistent whale presence pushed it back to December 15. This denied crab fishers a very profitable month.

The second recommendation came on April 9, 2020, as whales were seen moving north into Monterey Bay. The CDFW followed with a decision on May 15 to shut down fishing in the CMA.

The early closure caused rumblings from crab fishers who were already struggling under the strain of COVID-19. The working group, says Santora, doesn't take such economic impacts lightly. "Yes, we want more whales. And we want to protect the livelihoods provided by fisheries," he says. "This is a true social, economic, ecosystem-level problem."

Forney says this kind of scientific, dynamic, ecosystem-based fisheries management will be more important in the future.

It's hard to say what success looks like. Since the working group piloted the risk assessment program in 2017, whale entanglements have dropped from their peak during the Blob years. They are, however, still well above pre-2014 levels. There is no way of knowing if they would be higher still without the working group.

On May 16, just a day after the imposed shutdown, a humpback whale was spotted dragging multiple sets of Dungeness crab fishing gear through the CMA. Rescuers were able to remove the lines saving what is, so far, the only confirmed whale entangled in Dungeness lines in the region this year.

*Correction: The spelling of Karin Forney's name has been corrected.

Clark Tate is an environmental science and outdoor adventure journalist. She's endlessly curious about the natural world and how humans fit into it. Tate worked in river habitat restoration for six years before jumping into journalism and covering a marine ecology and conservation beat for Hilltromper.com. She holds a master's degree in environmental science from the University of Virginia and surfs, sails, climbs, and bikes in her free time.