



# **WHALE SAFE OCEANS:** Preventing Entanglements off the U.S. West Coast

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# Whales and Sea Turtles

While many species of whales and sea turtles are susceptible to entanglement in fishing gear, the most at risk animals are endangered populations of humpback whales, blue whales and Pacific leatherback sea turtles, all of which travel vast distances to feed in waters off the coasts of California, Oregon and Washington. Along with other threats, entanglements in fishing gear can impede the ability of endangered whale and sea turtle populations to recover to healthy levels.



Pacific

Ocean

Endangered Pacific leatherbacks migrate 6,000 miles from Indonesia to the U.S. West Coast to feed on jellyfish.



Indonesia

## Pacific Leatherback Sea Turtles

The critically endangered western Pacific population of leatherback sea turtles feeds on jellyfish off California, Oregon and Washington as part of an impressive 12,000 mile annual round trip journey between Indonesia and the U.S. West Coast. Adults can reach lengths of nine feet long and weights of up to 2,000 pounds, and eat 220-606 pounds<sup>8</sup> of jellyfish per day. Their numbers have declined by 90 percent in recent decades, and fewer than 1,200 female turtles remain in the last primary nesting population.<sup>9</sup> This special population of leatherback sea turtles currently faces extinction.



Alaska

Gulf of Alaska

## Humpback Whales

Humpback whales amaze sightseers with their acrobatic behaviors and long, complex songs that many researchers believe are part of courting.<sup>1</sup> Reaching up to 60 feet in length and weighing up to 80,000 pounds, humpbacks feed on krill—tiny, shrimp-like crustaceans—and small schooling fish including anchovies, sardines and herring.<sup>2</sup>

Three populations feed and migrate off the U.S. West Coast. The approximately 500-600<sup>3</sup> individuals of the endangered Central American population breed off Central America and feed mostly off California and Oregon, with a few found off Washington. The threatened Mexican population feeds from California to Alaska, with population estimates between 2,000 and 7,000.<sup>4</sup> Some whales from the Hawaii population also feed off Washington, but are more commonly found off British Columbia and Alaska. There is recent evidence of increases in U.S. West Coast humpback populations, however, it is unclear whether the endangered population off Central America is increasing. The Hawaii population is considered healthy.

U.S. West Coast

WA

OR

CA

Threatened and endangered populations of humpback and blue whales migrate to feeding grounds off the U.S. West Coast from Mexico and Central America.

Mexico

Central America



## Blue Whales

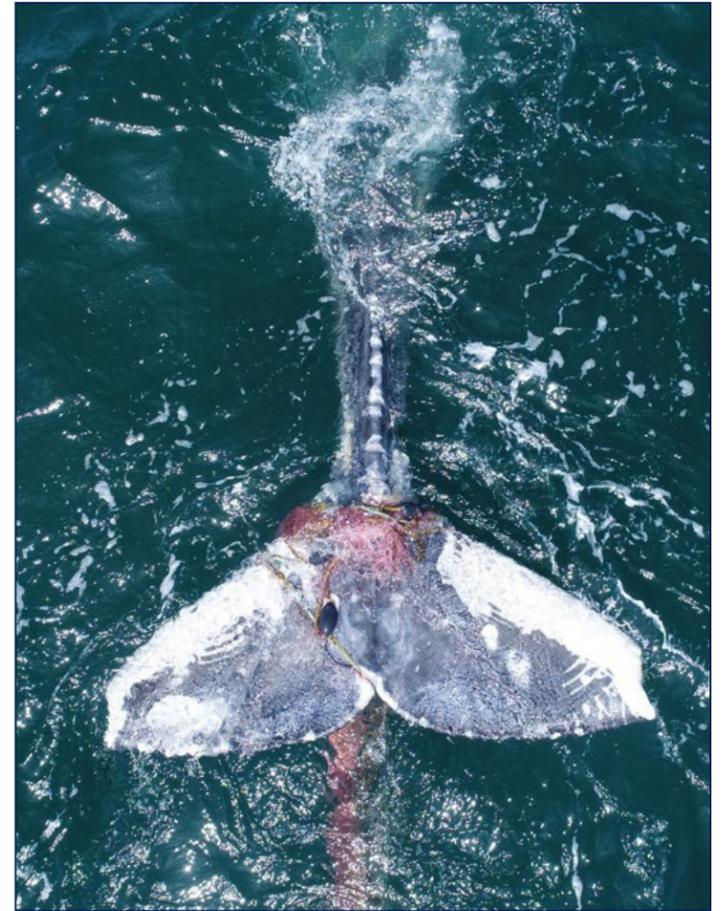
Blue whales are the largest animals to have ever lived, with a heart that can weigh more than 1,000 pounds.<sup>5</sup> The largest blue whales consume up to 12,000 pounds of krill daily.<sup>6</sup> They winter off Central America and spend summers feeding off the U.S. West Coast, the Gulf of Alaska and central North Pacific. There are an estimated 1,650 individuals in the eastern North Pacific population, which does not appear to be increasing.<sup>7</sup> Blue whales are listed as endangered under the U.S. Endangered Species Act.

## The Problem: Entanglement in Fishing Gear

*The International Whaling Commission identifies entanglements in fishing gear as the main human-caused threat to large whales, estimating that worldwide 300,000 whales, dolphins and porpoises die from entanglements each year.<sup>10</sup>*

*Since 2014, the number of whales and sea turtles becoming entangled in fishing gear off the U.S. West Coast has increased dramatically, with the highest number of reports off Central California.*

Prior to 2010 there was an average of eight reports of whale entanglements per year. In recent years, these numbers have spiked, to a high of 56 confirmed whale entanglements in 2016, due to warming ocean waters

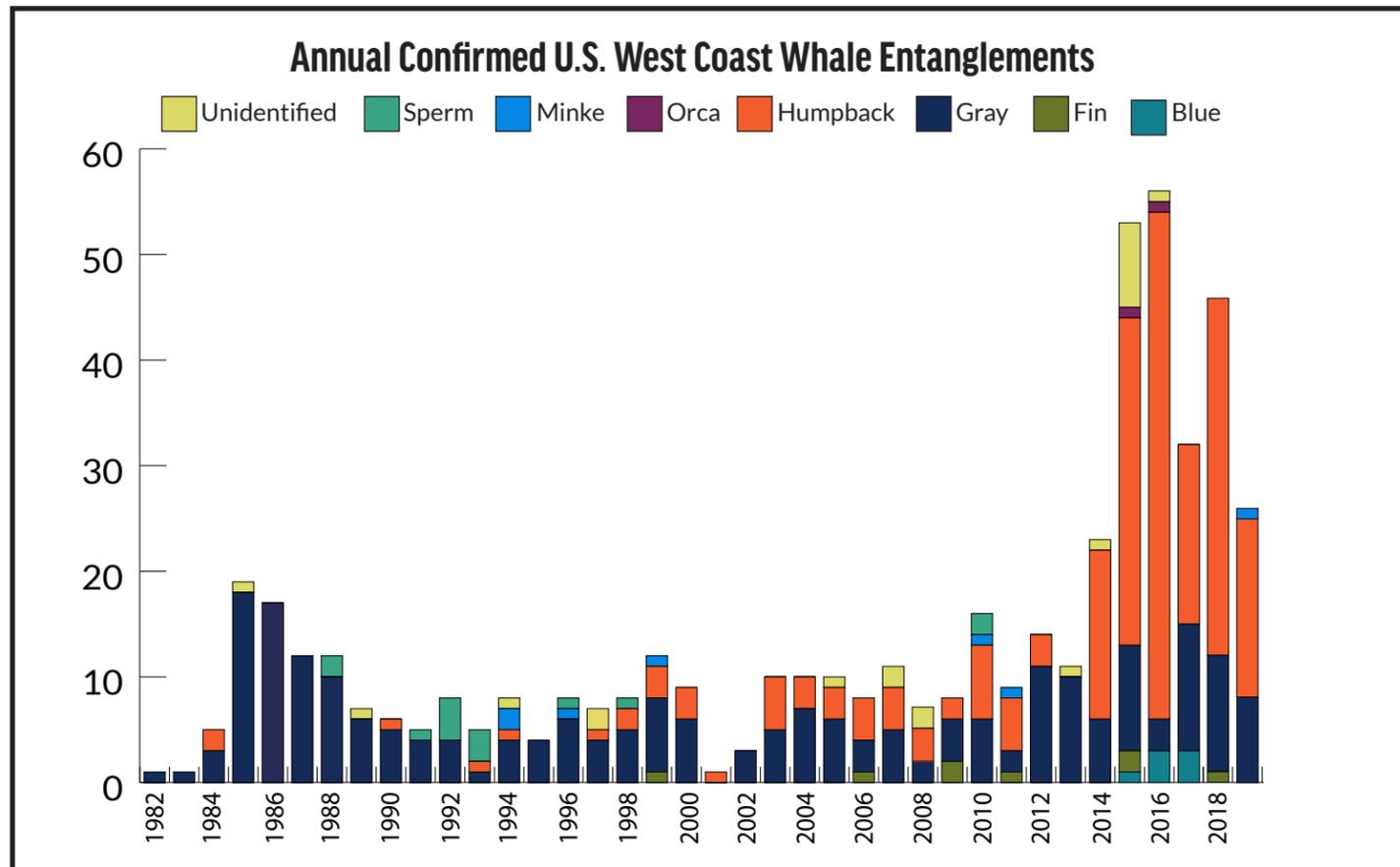


*Photo: Gray whale entangled in fishing gear, NOAA Federal Permit Number 18786-04*



*Photo: Pacific leatherback sea turtle entangled and killed in crab fishing gear; NOAA Federal Permit Number 18786-03*

concentrating forage species close to shore in areas that overlap with fishing grounds.<sup>11</sup> Increased whale entanglements and recent sea turtle entanglements raise serious concerns regarding the effects to endangered humpback whale, blue whale and Pacific leatherback sea turtle populations. Along with other sources of mortality like ship strikes, deaths from entanglements could prevent the recovery of these endangered and threatened whale and sea turtle populations.



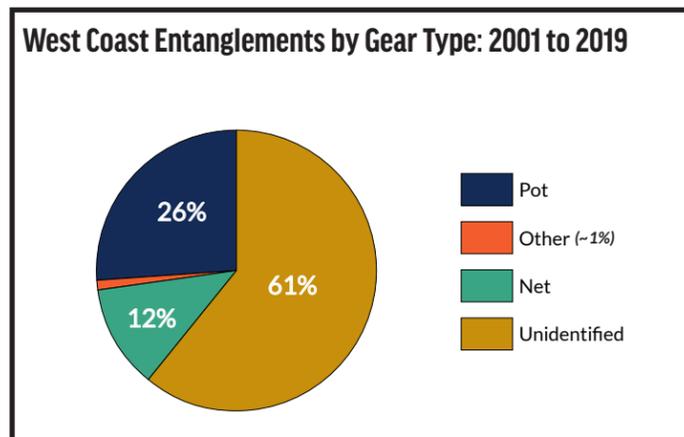
As shown above, whale entanglements increased dramatically in recent years, peaking at 56 confirmed entanglements in 2016. Source: Saez, L., Lawson, D., and M. DeAngelis. 2020. Large whale entanglements off the U.S. West Coast, from 1982-2017. NOAA Tech. Memo. NMFS-OPR-63, 48 p. and Saez, L., Updated 2018-19 Appendix, Personal Communication, May 13, 2020.

The National Marine Fisheries Service began recording entanglements in 1982. Since then there have been 505 confirmed whale entanglements along the U.S. West Coast.<sup>12</sup> Confirmed reports require photographs, sighting by a federally trained responder or multiple eyewitness sources providing similar observations with detailed descriptions. However, the number of reported entangled whales has been estimated to be only 10% of the actual number of whales entangled.<sup>13</sup>

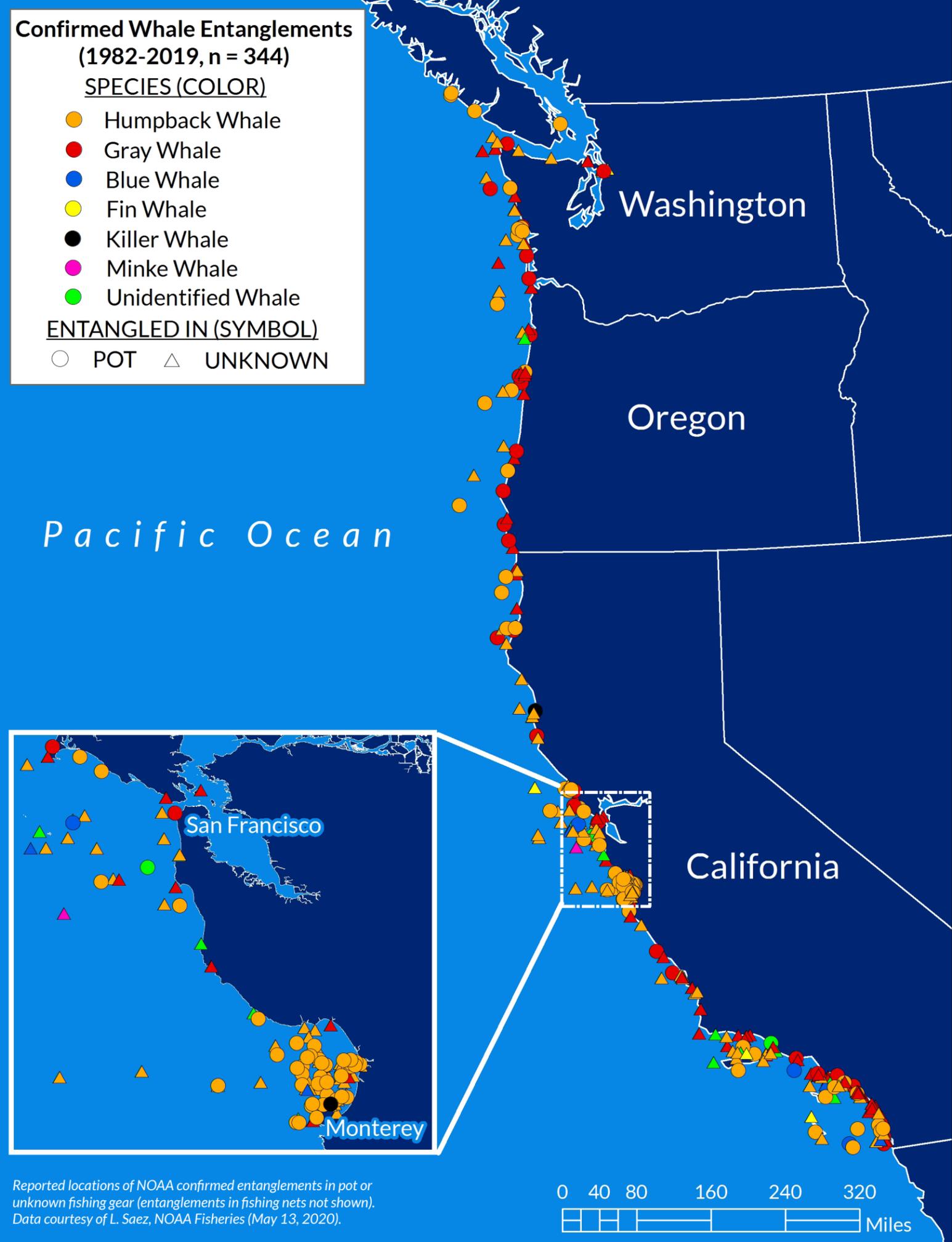
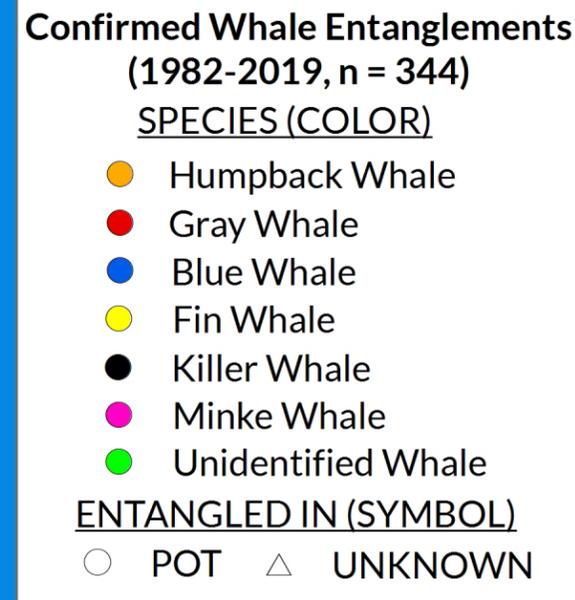
Prior to 2000, most entanglements were attributed to nets like set gillnets targeting California halibut and white seabass, and drift gillnets targeting swordfish. This has declined as the use of these gears has declined, however, gillnet related entanglements continue to occur.

Beginning in 2015, California prioritized addressing entanglements in commercial Dungeness crab gear, which have increased in recent years. In more than

half of all confirmed entanglements the gear type cannot be determined, giving rise to the need for improved gear marking requirements to increase accountability and inform solutions.



Source: Saez, L., Lawson, D., and M. DeAngelis. 2020. Large whale entanglements off the U.S. West Coast, from 1982-2017. NOAA Tech. Memo. NMFS-OPR-63, 48 p. and Saez, L., Updated 2018-19 Appendix, Personal Communication, May 13, 2020.



Reported locations of NOAA confirmed entanglements in pot or unknown fishing gear (entanglements in fishing nets not shown). Data courtesy of L. Saez, NOAA Fisheries (May 13, 2020).

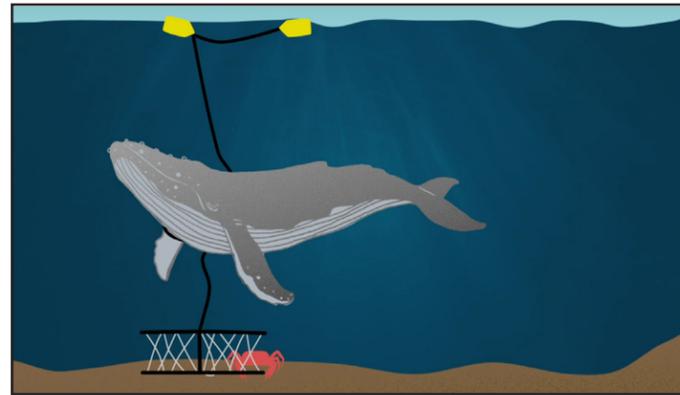
# How Entanglements Occur

Fishing gears that use traps or pots, like conventional fishing gear to catch Dungeness crabs, use a line that connects a heavy metal trap resting on the seafloor to a buoy floating at the surface. Along with other stationary fishing methods such as set gillnets and bottom longlines that are anchored in place, these conventional crab fishing gear designs are referred to as fixed fishing gears as opposed to mobile fishing gears like trawl nets that are towed behind a vessel.

Dungeness crab pots are typically set from 30 to 600 feet deep, and the line connecting the trap to the buoy floating at the ocean's surface can be even longer. Whales and sea turtles swimming by or feeding in the area can get tangled in this line. The lines can wrap around a whale's mouth, fluke or pectoral fins, or the flippers and neck of a sea turtle.

## ***The Fate of Entangled Whales and Sea Turtles***

According to the Fisheries Service, about 75 percent of all reported whale entanglements are fatal.<sup>14</sup> These deaths are particularly gruesome because entangled whales can take an average of six months to die. Whales can drag the heavy fishing gear for months, which hinders their ability to feed,



*In conventional crab fishing gear, a line connects a metal pot on the seafloor to one or more buoys floating on the surface. Whales and turtles can then become entangled in this line.*

resulting in malnourishment and starvation. Often animals die from infection, severed appendages, a lack of nutrition, drowning, or a combination of these impacts. Sea turtles suffer similar fates and may get anchored to the gear and drown.

Trained whale disentanglement teams perform heroic and dangerous missions to free entangled whales and sea turtles. These efforts can result in successful disentanglements and provide important forensic information to better understand the causes of entanglements. However, preventing entanglements in the first place is paramount.



*Photo: Humpback whale entangled in fishing gear; NOAA Federal Permit Number 18786-03*



*Humpback whale breaching. © Tony Kallman/Shutterstock*

# Solutions: Time and Area Closures

*Oceana campaigns to make the oceans a safer place for whales and sea turtles by advocating for science-based management solutions that reduce the overlap of feeding whales and turtles with conventional crab traps.*

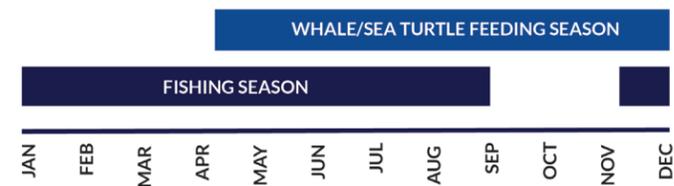
*This is accomplished through time and area closures, and by using innovative pop-up fishing gear to reduce the number of wildlife entanglements in crab traps while ensuring that fishermen can continue to make a living and provide fresh seafood.*

Ultimately, reducing the overlap of wildlife and conventional crab gear through time and area fishery closures is the best way to reduce entanglements. The Dungeness crab fishery is the largest fishery that utilizes trap gear along the U.S. West Coast. Washington, Oregon and California each have slightly different start and end dates for the fishery, but generally it operates as early as November until as late as September. In total, around 400,000 commercial traps are allowed to fish each year, and approximately 10% of these traps are lost every year.<sup>15</sup>

As the fishery begins in late fall, humpback whales, blue whales, and leatherback sea turtles typically



leave the U.S. West Coast to their seasonal breeding grounds. In April to June, these species return to the West Coast to feed and remain in the area until late fall.



While entanglements occur along the entire West Coast, the central coast of California has the greatest known concentrations of humpback whales, Pacific leatherback sea turtles and reported entanglements.

Photos: Leatherback sea turtle, NOAA; Entangled whale tail, NOAA Federal Permit number 18786-03



# How Data Can Inform Temporary Fishing Closures

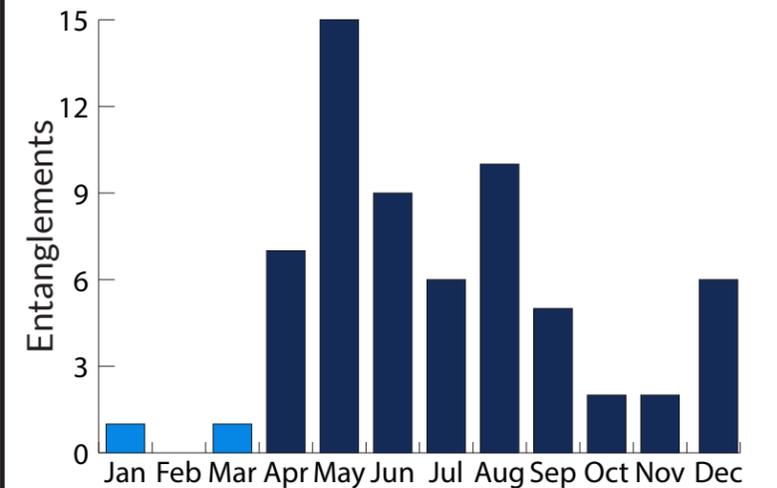
When whales and sea turtles are present in larger numbers, fishery managers can temporarily close areas to conventional crab fishing for a specific length of time to decrease the risk of entanglement. These areas can then be re-opened to fishing once whales and sea turtles leave the area. These time and area closures can be informed by a number of approaches.

Regular surveys of fishing areas using boats or airplanes can assess the overlap of fishing gear and wildlife. Dungeness crab gear visible from the air can be plotted using GPS to highlight places and depths where pots were most abundant.

In 2016, Oceana partnered with NOAA scientists and LightHawk—a nonprofit organization that coordinates flights to collect data in support of conservation efforts—to conduct the first aerial survey to quantify number and locations of crab pots.<sup>16</sup> The California Department of Fish and Wildlife now conducts its own aerial surveys.

In addition, data from whale watching operations that maintain daily whale sightings can be used as an indicator for when whales arrive and depart, and systematic surveys by boats can be used to quantify the locations of both traps and wildlife. Movements of whales and sea turtles can also be tracked using tags attached to individual animals.

**Humpback Whale Entanglement Reports by Month (1982-2019) in Commercial Dungeness Crab Gear**



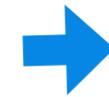
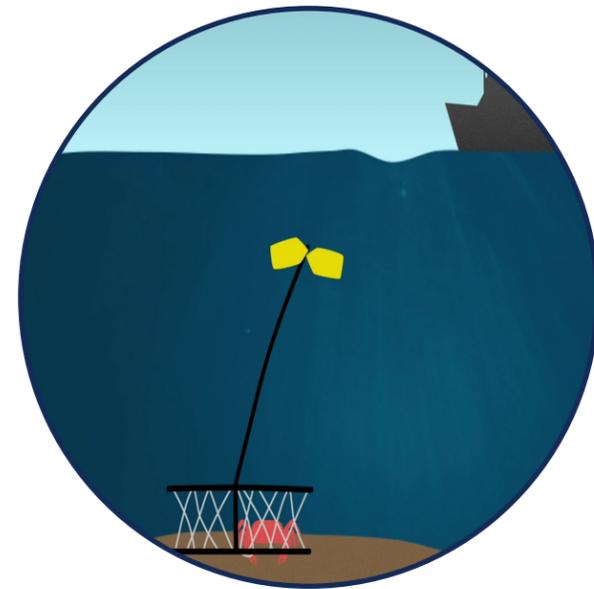
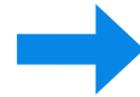
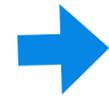
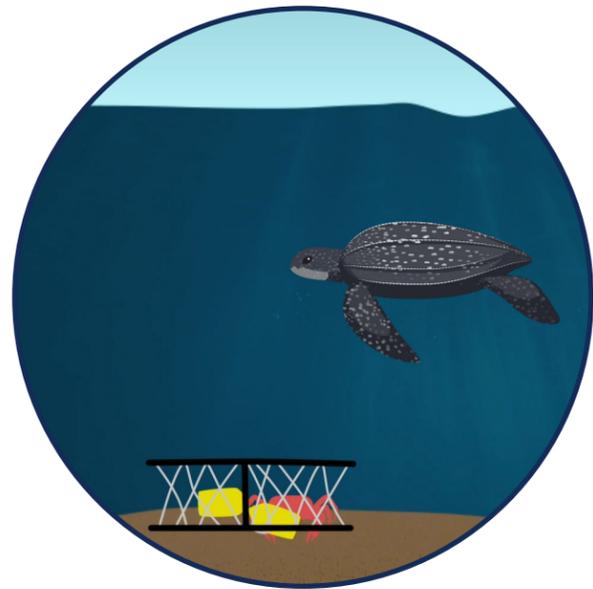
Whale entanglements are generally lowest between January and March, when whales are not present or feeding off the U.S. West Coast. Source: Saez, L., Lawson, D., and M. DeAngelis. 2020. Large whale entanglements off the U.S. West Coast, from 1982-2017. NOAA Tech. Memo. NMFS-OPR-63, 48 p. and Saez, L., Updated 2018-19 Appendix, Personal Communication, May 13, 2020.

New technologies enable real-time, automated data using electronic monitoring. For example, *Global Fishing Watch* is an online platform that could be used to automatically identify the location of fishing traps by tracking the movements of fishing vessels. The combination of whale and sea turtle sightings, oceanographic and forage fish data, and fishing effort can then be overlaid to determine specific times and areas of elevated entanglement risk.



Photo: Humpback whale entangled in fishing gear; NOAA federal permit number 18786-04.

# Solutions: Using Innovative, Pop-up Fishing Gear to Avoid Entanglements While Continuing to Fish



Pop-up fishing systems stay connected to traps on the seafloor, allowing animals to swim by without risk of entanglement.

These pop-up systems remain on the seafloor until an acoustic signal is sent from an arriving fishing vessel.

Once the signal is received the system releases an inflatable device, which brings the buoys and line to the surface.

After the buoys reach the surface, the trap is retrieved by pulling in the line as in the traditional method.

Pop-up fishing gear stays connected to traps on the ocean floor until a release mechanism is triggered that allows a flotation device to surface so fishermen can retrieve the catch. Release mechanisms can be set to release at a certain time (“timed release”) or upon receiving an acoustic signal from a fishing vessel (“on-demand release”).<sup>18</sup> Because there is no surface buoy, virtual gear marking can notify fishery managers and other fishermen of the location of traps.

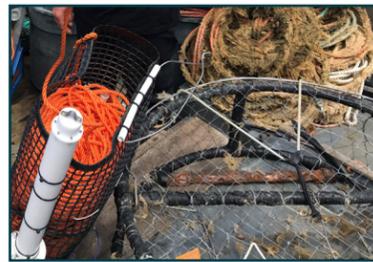
Since 2018, Oceana has worked with California Dungeness crab fishermen, gear manufacturers, fishery managers, and enforcement officers to conduct initial tests of pop-up fishing technologies. Fishermen were able to successfully deploy and retrieve crab traps with multiple pop-up systems. Participating fishermen agree that the gear has potential, and the California Dungeness Crab Fishing Gear Working Group is supporting additional research, development and testing to

ensure the gear is economical, reliable, safe, and traceable by wildlife enforcement agents.

In the near-term, pop-up gears that meet these criteria should be allowed throughout the Dungeness crab season, including in areas that are off limits to conventional crab gear due to the presence of whales and sea turtles. This will provide incentives for fishermen to use the gear and a way to fish while avoiding entanglements.

Other proposed solutions would sever fishing lines in the event of entanglements, potentially allowing a whale to free itself. These include weak links, Yale grip sleeves and line cutters that in theory would only break the line after an entanglement.<sup>19</sup> Despite these changes being easy to incorporate, none of these solutions prevent entanglements and there is no clear evidence that they allow an animal to free itself.

## Pop-Up Gear: A Sampling



This Longsoaker gear uses the “timed release” method, where the line and buoys release at a specific time.



SMELTS gear also uses “on-demand release,” but with an inflatable bag instead of a line.

These four gear types all operate using the “on-demand release” method described above. Moving clockwise from upper left, they are manufactured by: Desert Star, Ashored, EdgeTech and Fiomarine.

# Policy Recommendations

A comprehensive solution is necessary to prevent whale and sea turtle entanglements. This solution includes the implementation of time and area fishery closures when whales and sea turtles are present, coupled with the use of innovative new fishing gear and increased accountability.

**1. Establish a process to determine when and where to close specific areas in fishing grounds to conventional crab gear based on historic trends and objective, real-time data of whale, sea turtle and fishing gear presence; and then when it is safe, re-open these areas to fishing activity. This approach will require:**

- 100 percent monitoring of fishery locations where crab traps are deployed using vessel tracking devices such as solar loggers and Automatic Identification Systems (AIS). Cloud-based tools such as Global Fishing Watch can aggregate and present data to fishery managers and stakeholders to inform decision-making.
- Predictive whale and sea turtle density models and expanded tracking of sea turtle and whale movements with tags and aerial and boat surveys.



**2. Advance pop-up fishing gear to eliminate vertical fishing lines.**

- Allow pop-up gear to be used during the entire fishing season, including inside areas otherwise closed to conventional trap gear to prevent entanglements.
- Invest in development and broad-scale testing of pop-up fishing gear.
- Develop pop-up gear tracking software that shows the real-time location of fishing trap gear — like Global Fishing Watch.

**3. Require gear marking of buoys, fishing lines and tags in all fixed gear fisheries enabling identification of the fishery of origin and the gear owner while increasing accountability.**

**Solutions like these will allow continued vibrant fisheries while protecting whales and sea turtles. And in the future, these innovations could be applied to other fisheries to protect animals from becoming entangled throughout the world's oceans.**

Photo: Humpback whale mother and calf,  
©Rodrigo Friscione/Alamy Stock Photo

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