

Probing question: Why do whales beach themselves?

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Whales are the largest marine mammals in the world — the smallest species weigh in at several tons. When whales beach themselves, they can die simply from the crushing weight of their own bodies or from overheating due to their blubber, which is needed for insulation in cold ocean waters. What causes these often fatal incidents?

Strandings are of several types, said Susan Parks, a research associate in the Environmental Acoustics program in the Applied Research Laboratory at Penn State. Individual strandings often are caused by isolated incidents such as sickness, injury or old age. Said Parks, "Entanglement in fishing gear is one of the leading causes of mortality for marine mammals, many of which wash up on shore dead or injured." The tide carries these whales into shallow water, depositing them on the beach.

Then there are multiple-species strandings, explained Parks. "This occurs when different species of marine mammals beach themselves at the same time and place, suggesting that they all died from the same cause," she said.

Scientists have been researching possible causes of this phenomenon. One explanation involves the whale "pod" social structure. For instance, whales that travel in pods use a "strength in numbers" survival strategy, but this can backfire when the dominant whale runs aground. According to Parks, "The rest of the pod may follow a disoriented or sick whale onto shore." Another theory is that pods may venture too close to the

beach when hunting prey or evading predators and become trapped by low tides.

Weather also may play a part in beachings. Explained Parks, "In 1998, there was a major stranding on the West Coast of the United States where many different species, particularly sea lions, starved to death." This mass stranding, she added, was thought to be caused by El Nino's effects on sea-water surface temperatures. Many marine mammals depend on plankton and kelp that thrive in cool, nutrient-rich waters. In the case of sea lions, when food is scarce, the adults wean pups earlier and leave them behind while they hunt for fish in colder waters further offshore. These young seals are often the ones that become stranded.

Some theories about beaching suggest that defects in a whale's navigation system may be the cause. According to Parks, "The problem with these theories is that we don't know exactly how whales navigate." Some species travel vast distances every year and find their way back to where they started. Right whales, for example, travel more than a thousand miles from the Gulf of Maine to the coastal waters of Florida and Georgia to give birth, then swim back to northern waters. Said Parks, it is known that some whales use echolocation to identify objects in their environment but "it is unclear whether these species need to rely on it for navigation."

Some researchers have proposed that whales navigate by using passive listening to hear waves crashing against the coast or steer themselves via undersea topography or the angle of the sun. But, interjected Parks, "the distance that animals can see is often very limited in the ocean, and isn't thought to be a useful for long-distance navigation."

Another navigation theory proposed recently is that whales have a bio-magnetic sense, which allows them to sense magnetic fields in the earth's crust. "This would be similar to how homing pigeons orient themselves,"

explained Parks. Whales following magnetic field lines could beach themselves in areas where the field lines intersect with the coast. "A study in the UK by Margaret Klinowska found a correlation between local magnetic field lines and sites where whales were stranded alive," added Parks. However, more research is needed to solidify the connection.

Several multiple-species strandings have occurred following military use of mid-frequency sonar, sparking public outcry. "One reason for the level of concern about these incidents is that they involved the rarely seen beaked whales," explained Parks. "These whales were found beached five, sometimes 10 at a time. The problem with the sonar theory," she added, "is that we still don't fully understand the cause and effect mechanism of how sonar might affect whales or why it might affect beaked whales in particular."

Research into the cause of strandings is ongoing, noted Parks. Meanwhile, many coastal areas have rescue groups to find and rehabilitate these stranded mammals and to release them back into the wild. When the rehab patient weighs in at more than 40 tons, that can be a whale of a job.

Source: By Marissa McCauley, Research Penn State

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