

WHY DO MARINE MAMMALS STRAND ON LAND AND HOW CAN HUMANS HELP?

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Have you ever heard about, or maybe even seen, a whale or a dolphin that was helplessly lying on the beach or stuck in very shallow water? These are called “stranding events” or “strandings,” and have been documented since the fourth century. Back then, strandings involving cetaceans (whales, dolphins, and porpoises) were welcome events because they provided a rich source of food and other resources for the people nearby. But today, we tend to see strandings as events in which animals need human help. There are several types of strandings, each with their own possible causes. In this article, we explain what stranding events are, what might cause them, and how you can help if you ever find a stranded animal.

CETACEANS

(Pronounced: SE-TAY-SHUNS) A group of aquatic mammals including whales, dolphins, and porpoises.

STRANDING

An event in which a cetacean becomes beached/stuck on land.

Figure 1

(A) World map with water depth indicated by color: darker blue represents deeper water. Circles show locations with high frequency of mass stranding events: Cape Cod, USA (green), Tasmania, Australia (yellow), and Farewell Spit, New Zealand (pink). (B) Cape Cod, USA and (C) Farewell Spit, New Zealand are stranding hotspots with shallow bays mudflats and a “spit” of land to the north (Photo credit: NASA).

WHAT ARE STRANDINGS?

Cetaceans are a group of aquatic animals including whales, dolphins, and porpoises. For hundreds of years, humans have witnessed times when these animals have become stuck ashore, which are called **strandings**. Many years ago, strandings were often considered gifts from the gods, as they provided food and other resources such as bones (used for making tools and jewelry) and oil (used for cooking and burning in lamps). Most stranding events involve single animals, but in some places, mass strandings—involving up to hundreds of animals—can happen [1, 2]. Mass stranding events often occur regularly in the same spots (called stranding hotspots), including Cape Cod in the USA, Tasmania in Australia, and Farewell Spit in New Zealand (Figure 1A). It is unknown why strandings occur frequently in some spots; however, it is possible that shallow bays and spits of land in these locations (Figures 1B, C) cause the animals to become disorientated; then, as the tide goes out, they can become stranded [1].

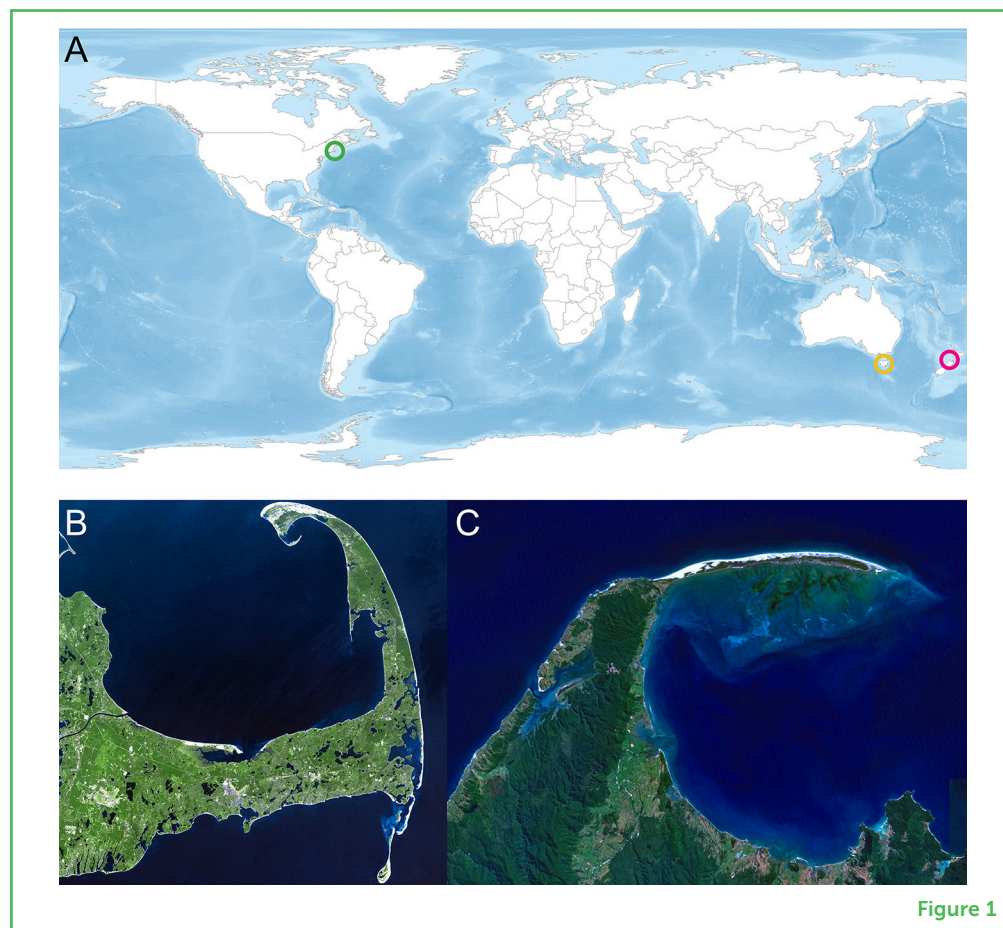


Figure 1

Strandings can occur for various reasons: as mentioned for stranding hotspots, geographical features may be involved, such as the shape of bays; but extreme tides and extreme or unusual weather might also be involved. Certain biological factors could also play a role in strandings, such as poor animal health or old age. Sadly, human factors can also

cause strandings. Cetaceans may become ill from pollution, and they can also be injured by ships or can become entangled in debris such as ropes and old fishing gear [1–3]. Strandings are generally categorized into four types:

Single Stranding (Figure 2A): In a single stranding, one animal (or a mother-calf pair) is stranded. This is the most common type of stranding. These stranded animals often have underlying health issues, such as illness, complications while giving birth, or they might have poor nutrition or be starving. However, single strandings may also be related to human activities, like harassment by people (such as frequent close contact by humans swimming with and/or following the animals closely on jet skis or boats) or entanglement in fishing gear.

Figure 2

(A) Single stranded cetacean (pygmy killer whale) that died after stranding on a New Zealand beach (Photo credit: Rebecca M. Boys). (B) Mass stranding event of long-finned pilot whales in New Zealand. Some individuals were refloated, but many others died (Photo credit: Rebecca M. Boys). (C) Minke whale calf that became trapped in a loch when it swam up the Thames River, London, UK. Sadly, the animal was not well and needed to be euthanized to end its suffering (Photo credit: The Independent). (D) A long-finned pilot whale is prepared for refloating using inflatable pontoons in New Zealand (Photo credit: Rebecca M. Boys).

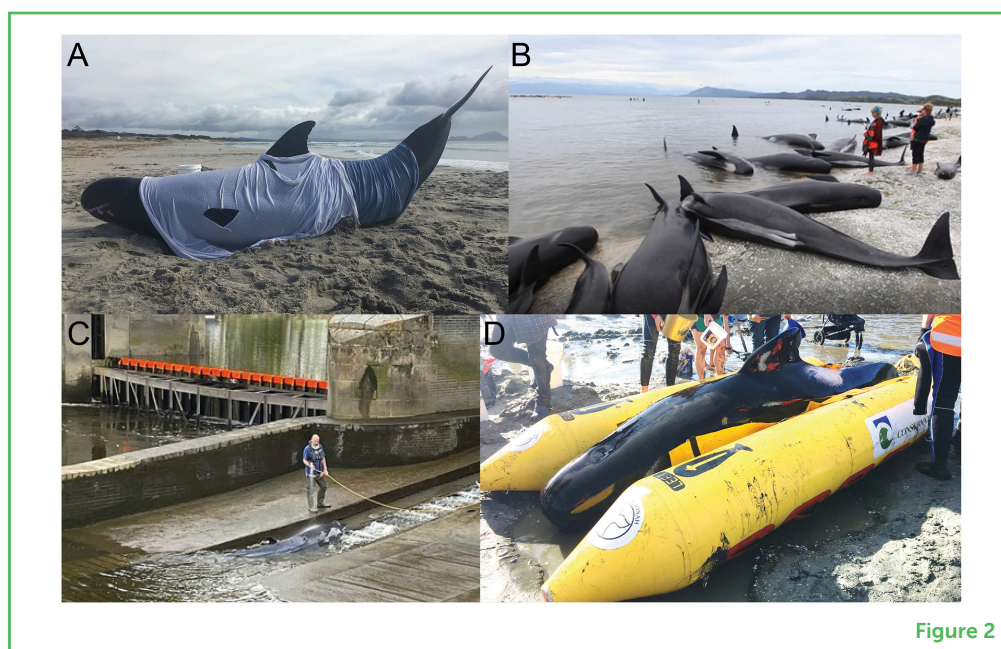


Figure 2

Mass Stranding (Figure 2B): In a mass stranding, two or more individuals strand in the same area at the same time. Many of the animals in mass strandings appear outwardly healthy. However, animals can be harmed by the stranding event itself or may be injured by scavengers like seabirds. Mass strandings often involve species known to have strong social bonds, such as pilot whales *Globicephala* spp.

Unusual Mortality Event: In unusual mortality events, many animals, often in large numbers, strand over a wide geographic area and long time frame. These animals are often already dead when they are found. Unusual mortality events are generally linked to disease outbreaks, but large-scale catastrophes such as oil spills have also caused them. Other human activities, such as the use of high frequency sonar, have also been linked to unusual mortality stranding events, particularly of beaked whales.

Out-of-Habitat Situation (Figure 2C): Out-of-habitat strandings occur when an animal is found in an area that would be considered unusual for the species, such as the minke whale (*Balaenoptera acutorostrata*) calf reported in the Thames River in London, or the beluga whale (*Delphinapterus leucas*) seen in the Seine River in France. These are considered stranding events even though the animals may not be “stuck” on the shore. In some cases, these animals may be healthy and are just lost, but they may become ill or injured due to the inappropriate habitat.

THE IMPACT OF STRANDING

In some cases, stranded animals may be ill or injured, while in others they may appear healthy. However, the stranding event itself can cause significant damage to an animal because the animal is out of its natural water environment [4]. Cetaceans have evolved to live in water, so they cannot support their own body weight on land. Therefore, when they are stranded, their organs can be crushed. The inner heating/cooling system of their bodies, known as the **thermoregulatory system**, is also adapted to being in water, which means cetaceans can quickly overheat on land. The skin of cetaceans is also designed to be in water, and it becomes dry and easily damaged when not submerged. In sunny conditions, stranded cetaceans can get painful sunburns, with skin blistering.

THERMOREGULATORY SYSTEM

The biological system that regulates the body temperature of a human or an animal.

HOW DO EXPERTS HELP STRANDED ANIMALS?

Today’s responses to strandings often focus on trying to save animals by refloating them at sea (Figure 2D). However, depending on the situation, refloating an animal might just be extending its suffering instead of saving its life. In some cases, animals may have significant injuries (both inside and outside the body), illness and/or have become severely weakened due to stranding [2, 4]. These animals are unlikely to survive even if they are refloated. In these cases, experts can use **euthanasia** to end an animal’s suffering, or they can keep it comfortable until its natural death occurs [3, 5]. These options can be the best choice from an animal-welfare perspective. Therefore, before an animal can be refloated, it should undergo a thorough medical examination by cetacean stranding experts and/or veterinarians. These professionals should make sure, to the best of their ability, that the animal will not suffer and that it is likely to survive, if refloated [2, 4].

EUTHANASIA

The process of humanely ending an animal’s life to stop its suffering.

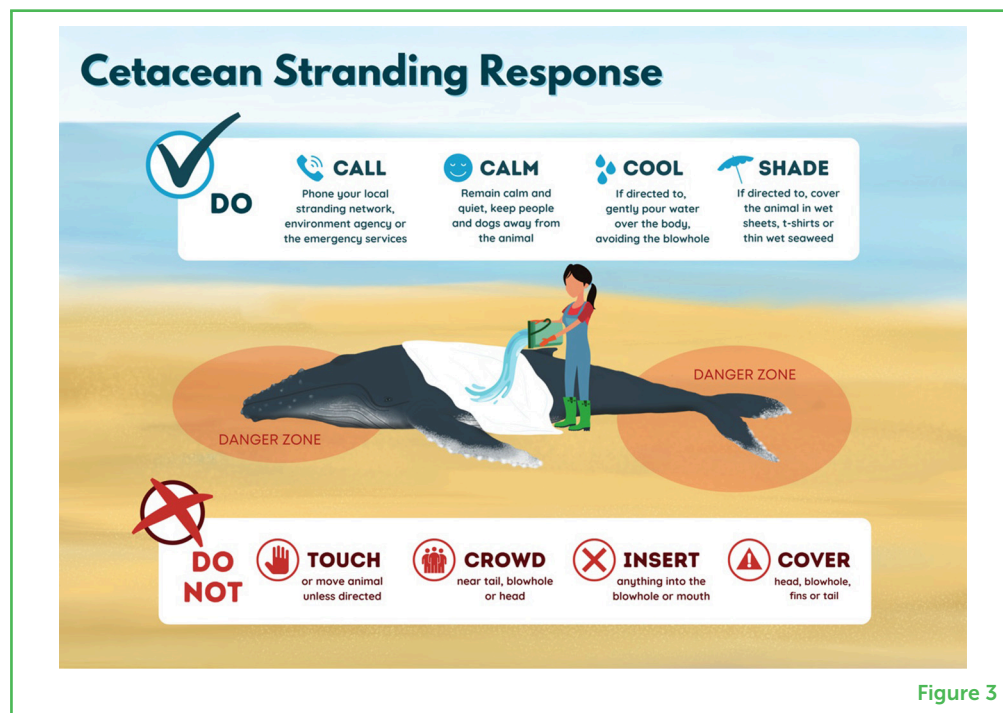
WHAT IF YOU FIND A STRANDED CETACEAN?

To best protect an animal’s welfare and increase its chance of survival, there are several first-aid procedures that should be followed in

stranding response [1, 2, 4] (Figure 3). However, even with good intentions, untrained people can worsen an animal's situation through stress and injury, and may also put themselves and others at risk of injury or disease [1–5]. Here are some simple “do’s and do not’s” to follow if you find a stranded cetacean.

Figure 3

Do’s and do not’s for cetacean stranding events (Image credit: Katharina J. Peters and Rebecca M. Boys).



DO

- **CALL:** Phone your local stranding network, environmental agency, or emergency services. Tell them the location and number of animals, and try to give a description of any visible injuries. Take photographs if possible and send these to the experts. [Click here](#) to find information on your local stranding network.
- **CALM:** Remain calm and quiet, keep people and dogs away from the animal(s). Procedures should be done quietly, gently, and slowly, and only at the direction of the stranding experts.
- **COOL:** While waiting for experts, you can begin to keep a stranded animal cool by gently pouring water over its body. It is very important **NOT** to pour water into the **blowhole**, as this is how cetaceans breathe.
- **SHADE:** While waiting for experts, you can cover the animal in wet, thin sheets or something similar. You could also use a thin covering of wet seaweed. **NO** cover should be placed over the head or blowhole, the **dorsal fin** (on the back), or the tail. Try to avoid covering the **pectoral fins** (on each side of body) if possible.
- **COMFORTABLE:** If the stranded cetacean is small and lying on its side, and if the stranding experts direct you to do so, you can gently roll the animal onto its belly. In most species, you must

BLOWHOLE

The hole(s) at the top of the head through which cetaceans breathe air.

DORSAL FIN

Fin on the back of cetaceans' bodies.

PECTORAL FINS

Broad, flattened limbs on the side of cetaceans' bodies (their “arms”).

ensure the pectoral fins (on each side of body) are tucked close against the body before beginning this rolling. Once the animal is upright, carefully dig shallow trenches/holes in the sand under the pectoral fins, so that the fins can hang in a natural position. Be aware that sand may build up over these holes as you pour water on the animal.

DO NOT

1. **TOUCH** the animal unless it is necessary. Stranded cetaceans may have diseases, so it is important to keep yourself and others safe by not touching the animal.
2. **MOVE**, push, pull/drag, or roll an animal to get it back into the sea. It must be assessed by a stranding expert or veterinarian before it can be refloated. Moving an animal incorrectly can cause injury or even death.
3. **PULL** or push on any fins. Fins are very delicate and moving them inappropriately can cause severe damage.
4. **COVER** the head, blowhole, fins, or tail.
5. **STAND** close to the tail. The animal may suddenly thrash and could easily injure you.
6. **CROWD** close to the blowhole or head. The animal breathes from the blowhole, so if you are close you may inhale air containing any disease-causing organisms the animal may be carrying.
7. **INSERT** anything into the blowhole or mouth, and do not try to feed the animal or make it drink.

CONCLUSION

Stranding events are a natural occurrence, however, sometimes they can be caused by human activities. Strandings can cause significant damage to an animal, so it is important that stranded cetaceans are thoroughly examined by trained professionals to decide how best to assist them. If they are likely to survive, they can be refloated but sometimes they may need to be euthanized to end their suffering. It is important that any help is undertaken carefully by trained people. So, if you find a stranded cetacean always make sure you call your local stranding network, environment agency or emergency services before trying to help. This is essential to keep both you and the cetacean safe.

ACKNOWLEDGMENTS

RB was supported by an Association of Commonwealth Universities Doctoral Scholarship. KS was supported by a New Zealand Royal

Society Te Apārangi Rutherford Discovery Fellowship (2019–2024). This research was additionally supported by Animal Ethics Inc. Research Grant USA, GoPro Inc., Wildbase Research Trust Fund New Zealand, New Zealand Veterinary Association Marion Cunningham Memorial Fund Grant, and Animal Behavior Society Amy R. Samuels Grant USA. The funding sources had no involvement in study design, data collection, analysis or interpretation, or in the writing of the article.

REFERENCES

1. Geraci, J. R., and Lounsbury, V. 2005. *Marine Mammals Ashore: A Field Guide for Strandings*. Baltimore, MD: National Aquarium.
2. Simeone, C. A., and Moore, K. M. T. 2018. "Stranding response," in *CRC Handbook of Marine Mammal Medicine, 3rd Edn*, eds F. M. Gulland, L. A. Dierauf, and K. L. Whitman (Boca Raton, FL: CRC Press). p. 3–13.
3. Mazzariol, S., Cozzi, B., and Centelleghes, C. 2015. *Handbook for Cetaceans' Strandings*. Milan: Massimo Valdina.
4. Gales, N., Woods, R., and Vogelnest, L. 2008. "Marine mammal strandings and the role of the veterinarian," in *Medicine of Australian Mammals*, eds L. Vogelnest and R. Woods (Clayton, VIC: CSIRO Publishing). p. 39–54.
5. Boys, R. M., Beausoleil, N. J., Betty, E. L., and Stockin, K. A. 2022. When and how to say goodbye: An analysis of Standard Operating Procedures that guide end-of-life decision-making for stranded cetaceans in Australasia. *Mar. Pol.* 138:104949. doi: 10.1016/j.marpol.2021.104949

SUBMITTED: 21 March 2022; **ACCEPTED:** 09 January 2023;

PUBLISHED ONLINE: 02 February 2023.

EDITOR: [Hervé Claustre](#), Centre National de la Recherche Scientifique (CNRS), France

SCIENCE MENTORS: [Manjusha Verma](#) and [Kirsty Salmon](#)

CITATION: Boys RM, Stockin KA and Peters KJ (2023) Why Do Marine Mammals Strand on Land and How Can Humans Help? *Front. Young Minds* 11:901402. doi: 10.3389/frym.2023.901402

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YOUNG REVIEWERS



ALICE, AGE: 13

I am a 13 year old 8th grader who enjoys Science and Spanish classes at school. I spend a lot of my spare time either taking dance, martial art practice, and many other classes.



SAI, AGE: 14

I have always been interested in Science, have won Olympiad medals in Science and I am still exploring what I wish to be when I grow up. In my free time, I enjoy learning classical dance “Bharatanatyam” as well as listening to music. Some of my favorite books include Wonder, Gallery of Rascals, Island of Adventure, etc. I also enjoyed working in my school environment council and sing for the school choir. I am an avid cinephile.



SARA, AGE: 14

I am a science enthusiast and wish to be a chemist in future. I take pleasure in reading Percy Jackson books and represent my school in inter school Tennis competitions. Learning western music vocals is one of my favorite hobbies. I watch good TV series from around the world and am delighted to spend time with my friends.

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I am a German-Australian behavioral ecologist and live in Australia. I have studied many different animals species, but my main focus is marine mammals. My core research interest is to study the effect of humans on marine mammals and use this information to better manage the conservation of wild populations and their environments. My projects focus on Weddell seals in Antarctica, bottlenose dolphins in Shark Bay, Australia, and whales and dolphins in New Zealand waters. [*k.peters@massey.ac.nz](mailto:k.peters@massey.ac.nz)

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