



Twisted Orca

Jr. Marine Naturalist of New England Program

Whales of New England Curriculum Grades 4-8



Have you ever seen a Whale?

Whales live in every ocean in the world!

Many people who live in New England have never seen a whale. However, we are very lucky to be surrounded by many different species of whales and other fascinating marine animals!

Whales such as Humpbacks, Minkes, Fin Whales and North Atlantic Right Whales visit the nutrient rich New England waters every year. It is also possible to spot other whales such as Orcas (Killer Whales), Pilot Whales, Sperm Whales (the type of whale that Herman Melville wrote about in the novel Moby Dick), and even Blue Whales- the largest animals in the world!

We will learn more about more about the whales that visit New England, whales from other places in the world, and other fascinating creatures that live in the ocean.

There is a magical world out there. Let's explore!





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Part 1: Whales, Whales, Whales





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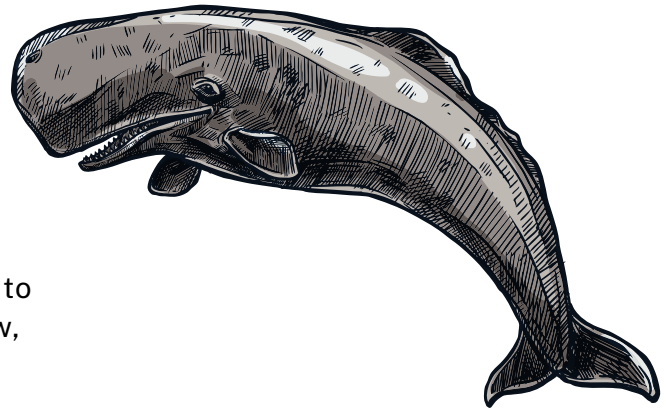
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1:1 What Are Whales?

Whales are Mammals!

Because they live in the ocean, many people think whales are fish. However, whales are mammals just like us! Like humans:

- Whales are warm blooded. (They have a thick layer of fat called 'blubber' to help keep them warm)!
- They breathe air through their lungs.
- Whales give birth to live young and produce milk to feed their babies.
- They have hair! Whales are born with a few hairs (similar to whiskers). While most whales lose this hair as they grow, some whales will keep a few hairs forever.



Whales are Cetaceans!

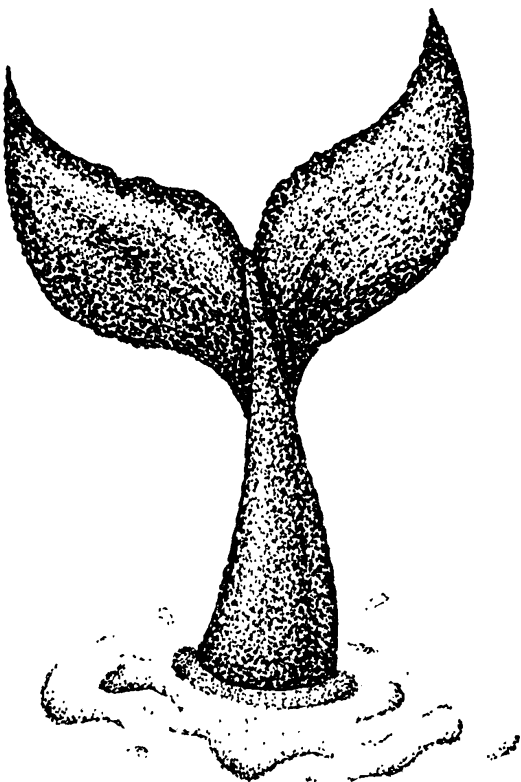
Whales belong to a category of animals called cetaceans (pronounced suh-tay-shins).

Cetaceans (order Cetacea) are mammals that live in the water.

Whales, dolphins, and porpoises are all cetaceans.

Cetaceans are made up of two sub orders:

Toothed Whales and Baleen Whales





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1:1 What Are Whales?

Toothed Whales

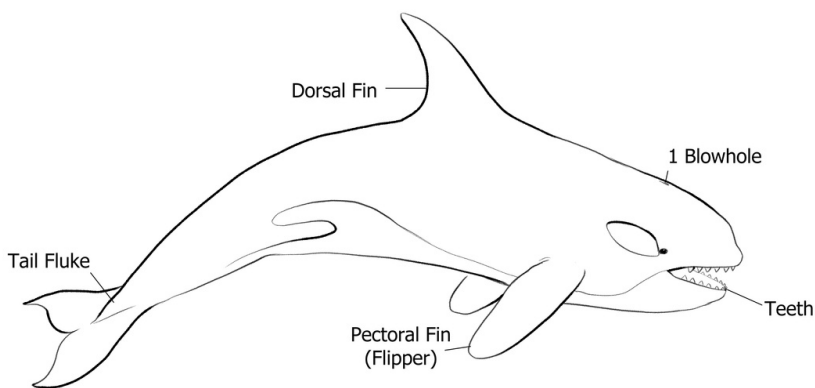
Toothed whales have teeth that they use to catch food (such as fish, squid, or even other marine mammals).

Dolphins and porpoises are considered small toothed whales.

You may have heard about the Narwhal. These arctic whales are sometimes called the 'unicorns of the sea' because of their unusual tusks. The tusk of a Narwhal is actually a spiral shaped canine tooth! Not all Narwhals have tusks. Most males do, and about 15% of females do.



Fun Fact: Orcas (Killer Whales) are the largest members of the Dolphin Family. Dolphins are scientifically classified as toothed whales. When someone says Killer Whales are dolphins and not whales, you can tell them that they are both!



Common Toothed Whales

**Sperm Whales
Pilot Whales
Narwhals
Beluga Whales
Orcas
Dolphin Species
Porpoises**



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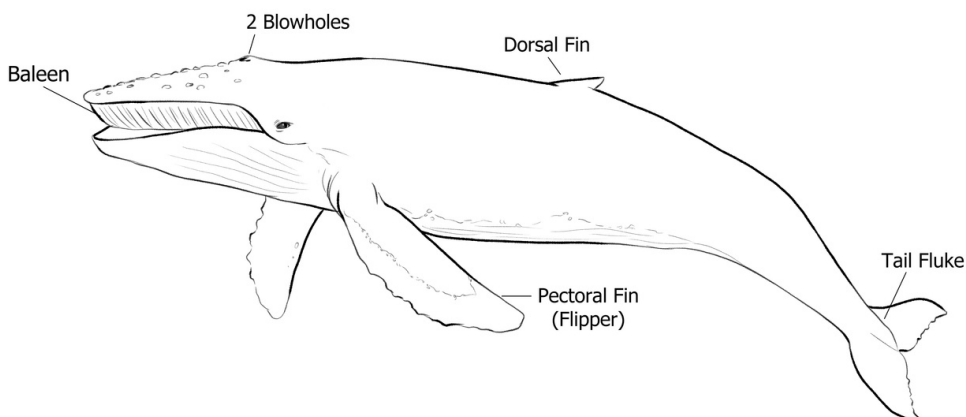
1:1 What Are Whales?

Baleen Whales

Baleen Whales do not have 'teeth'. They have plates in their mouths that look similar to broom or toothbrush bristles.

Baleen whales use these comb-like plates to trap their food. The baleen keeps small fish and ocean animals inside the whale's mouth, but lets the seawater filter back out. This is like when you pour spaghetti into a strainer at home. The spaghetti stays in, but the water drains out.

Baleen whales eat a diet of small fish, plankton, and tiny shrimp like creatures called krill. The biggest baleen whales can eat over 8,000 pounds of food every day!



Common Baleen Whales

Humpback Whales
Fin Whales
Blue Whales
Minke Whales
Gray Whales
Bowhead Whales
Right Whales



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1:1 What Are Whales?

Did You Know???

- A male whale is called a bull. A female whale is called a cow. A baby whale is called a calf!
- Whales breathe through blowholes located on top of their heads. Toothed whales have 1 blowhole and baleen whales have 2 blowholes!
- The plates inside a baleen whale's mouth are made out of keratin, the same thing our fingernails are made of!
- The Blue Whale is the largest animal that has ever lived. It is even bigger than the biggest dinosaur was!
- When whales sleep, half of their brain remains awake and reminds the whale to breathe!
- Whales talk by making sounds such as whistles, clicks, and groans. They also use their body language and physical behaviors to communicate with other whales!
- Like bats, some whales use sonar or 'echolocation' to see under the water. When whales make a sound, that sound bounces off of an object and returns to them. Whales can use these echoes to form a picture of an object and know how close it is. This helps them to hunt and navigate in total darkness!





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1:2 Why Are Whales Important?

Whales are some of the most amazing and majestic animals in the world! Did you know they are also good for the world as well?

Whales are an important part of the food chain!

Whales can eat thousands of pounds of food in one day! Without whales as part of the food chain, the creatures that they eat would multiply. Over time, this would change the ecosystem (an ecosystem is all living and nonliving things in one area). Other plants and animals depend on ecosystems to survive. Any changes in the ocean's ecosystem could cause other sea creatures to go extinct!

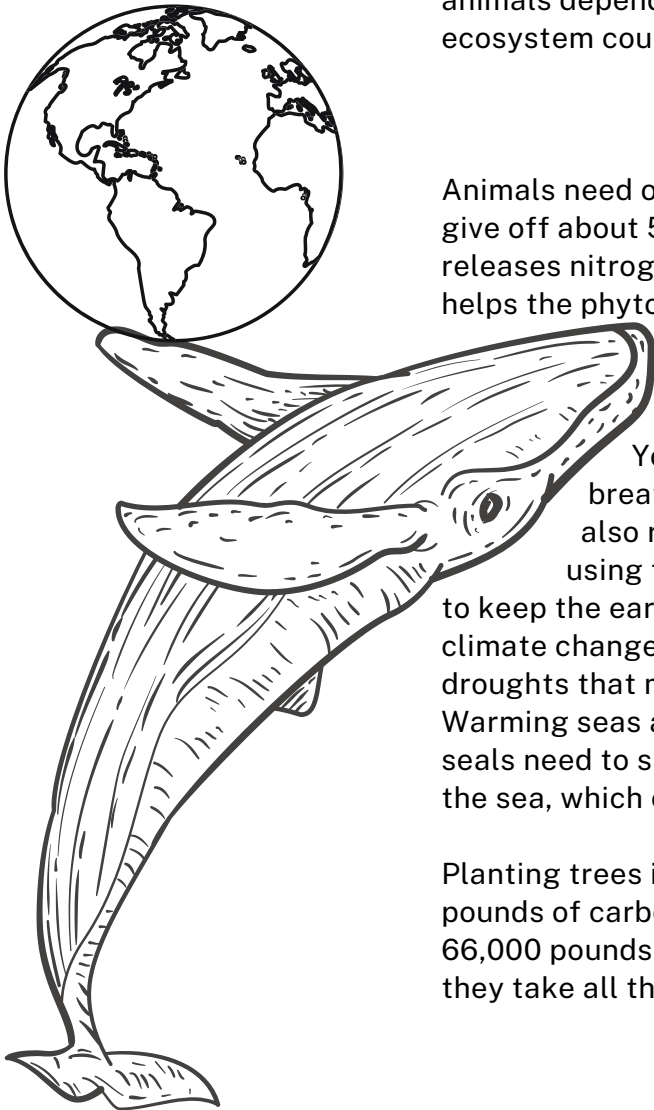
Whale poop helps phytoplankton grow!

Animals need oxygen to breathe! Tiny ocean plants called phytoplankton give off about 50% of the oxygen that we breathe! When a whale poops, it releases nitrogen and important minerals like iron into the water. This helps the phytoplankton grow- so more oxygen is produced.

Whales absorb carbon!

You may have heard about our 'Carbon Footprint'. We breathe in oxygen and breathe out carbon dioxide. Carbon is also released by our daily activities- such as driving in cars and using fuel to heat our homes. Carbon helps trap heat from the sun to keep the earth warm, but too much carbon can lead to unhealthy climate change. This can cause an increase in dangerous storms, cause droughts that make it harder to grow crops, and lead to more wildfires. Warming seas are melting sea ice that animals like polar bears and many seals need to survive. Too much carbon is also changing the make up of the sea, which can cause plants and animals to go extinct.

Planting trees is a good way to reduce carbon. A tree can absorb 48 pounds of carbon a year. But did you know that one whale can absorb 66,000 pounds of carbon? When they die and sink to the ocean bottom they take all that carbon out of the air for hundreds of years!





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1.3 Meet the Whales of New England!

Whales can be anywhere under the surface of the water! Sometimes we can see spray coming out of a whale's blow hole. Sometimes we can see a tail slapping on the water, or even a massive whale jumping out of the sea! If you look closely, you may notice bubbles and light green foamy patches floating on the water surface. This may be a sign of a whale feeding below!

A whale may be on a deep dive for food and not be visible at all. We must always be careful if there is any chance that a whale may be in the area.

One of the best places in the whole world to see whales is Stellwagen Bank National Marine Sanctuary.

Stellwagen Bank is located off of Cape Cod, Massachusetts. From spring through fall, many species of whales, dolphins, and other marine animals come to feed on the plentiful krill (tiny shrimp like animals) and small fish.



Humpbacks feeding in Stellwagen Bank



Spray from a whale's blow hole



Fun Fact: Whales breathe air through a blowhole on top of their head. When whales come to the surface for air, warm air comes out of the blowhole and creates a spray mist that can be seen for miles.



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Humpback Whales

Humpback Whales (named for the hump on their backs) are one of the largest of the baleen whales. They are easily recognized by the white coloring on their long pectoral fins (flippers). These fins help whales move and stay stable in the water.

Humpbacks are commonly seen feeding in New England Waters between the months of March and November. They can eat up to 3,000 pounds of food a day! To get this much food, groups of Humpback Whales have been known to 'bubble-net feed' together. To do this, they dive below schools of fish and blow bubbles out of their noses to push the small fish and krill into a tight imaginary net. Then they emerge with their mouths wide open to gulp them up!

Humpbacks are known to be very active whales and can often be seen breaching (jumping out of the water), tail slapping and putting on quite a show! These behaviors may be to communicate with other whales, warn off predators, or attract a mate. Humpbacks are very social, and also communicate through sounds (such as grunts and moans). Male Humpbacks are even said to "sing". These songs of repeated sounds can be heard up to 20 miles away.

Every year, Humpbacks travel long distances from their breeding grounds to cooler feeding grounds. Humpbacks only eat during the months they are in the feeding grounds. They live off their fat while migrating (traveling) and mating. They can have calves every 2-3 years and these baby whales stay close to their moms for the first year.

Every Humpback has distinctive markings on their tails. Researchers use these markings to identify and study whales by name. A famous Humpback often seen in New England is named Salt. She was first seen in 1976 and has had at least 13 calves.

By identifying and following specific whales, scientists can learn a lot about whale behavior.



Humpback's white pectoral fin



Humpback Whale "Salt"

Humpback Whale Facts

Lifespan: 80 to 90 Years

Weight: Up to 80,000 Pounds

Length: Up to 60 Feet

Locations: New England, Mid-Atlantic, Alaska, Pacific Islands, Southeast, West Coast



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Minke Whales

While Minke (pronounced Mink-ee) Whales are one of the smallest of the baleen whales, they can still grow as long as a school bus! Females often grow a little larger than males.

Minke Whales are sometimes nicknamed 'Stinky Minkes' due to their breathe which can smell like dead fish!

There are different kinds of Minke Whales, including the Common Minke (Northern Minke), the Antarctic Minke (Southern Minke), and the Dwarf Minke (a sub-species of the Common Minke).

Common Minkes tend to spend winters months in warmer waters where they breed, and move to cooler waters (such as New England) in the summer to feed.

Minke Whales are known for their beautiful markings, and common Minkes can be identified by white bands on their flippers (these are sometimes referred to as Minke Mittens).

Minke Whales are very curious, and can often found in shallow waters. This can be dangerous to them, as they may come too close to boats. While they can dive for up to 25 minutes, they can often be seen at the surface spyhopping (poking their heads out of the water) or even breaching (leaping out of the water).



Note the 2 Blowholes



Juvenile Minke off the coast of Maine



Minke Whale Facts

Lifespan: About 50 Years

Weight: Up to 20,000 Pounds

Length: Up to 35 Feet

Location: New England, Mid-Atlantic, Alaska, Pacific Islands, Southeast, West Coast



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Fin Whales

Fin Whales (also known as Finback Whales) are very large baleen whales. They are the second largest animal to have ever lived in the world (including dinosaurs)! Newborn Fin Whales can be 18 feet long and weigh more than a car!

Although they take second place in size, Fin Whales take first place in speed! Their sleek, streamlined bodies enable these large creatures to swim faster than any other whale species!

They have V-shaped heads with very distinctive markings. Their lower right jaw is white and their lower left jaw is black.

Researchers have been able to follow specific whales by noting their unique markings and the shape of their dorsal fin. Because of this, they can identify whales that return to New England to feed every year.

Fin whales can eat about 2 tons (over 4,400 pounds) of small fish, squid, and krill a day during feeding season! They can often be seen feeding in the same areas as Humpback Whales.

Like Humpbacks, Fin Whales fast during the winter season when they migrate to warmer climates.

Fin Whales can often be found swimming alone or in pairs, but sometimes can be in groups of up to seven whales. Baby whales stay close to their mothers for the first year.



Fin Whale Facts

Lifespan: 80 to 90 Years

Weight: Up to 160,000 Pounds

Length: About 75-85 Feet

Locations: New England, Mid-Atlantic, Pacific Islands, West Coast



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North Atlantic Right Whales

Scientists can tell the age of a North Atlantic Right Whale after it dies by examining the wax in it's ears! While they have been known to live to around 70 years old, many are dying much younger.

North Atlantic Right Whales are one of the most endangered species of whales on earth. This means they are in extreme danger of going extinct and disappearing forever. Researchers believe there are less than 350 of them alive today.

North Atlantic Right Whales migrate from the Southeast to the New England area in early spring. They can sometimes even be seen from land off off the Cape Cod Shore. These baleen whales are recognized by rough white patches on their dark bodies called 'callosities'.

They do not have dorsal fins on their backs like many other whales. As they often swim very slowly and close to the surface, they can at times look like logs. It is very easy for them to get hit by ships that don't see them.

Another huge danger that North Atlantic Right Whales face is getting tangled in fishing nets and gear. With so few of these whales remaining, many groups are looking into solutions such as 'ropeless' fishing gear.

It used to be considered normal for a Right Whale to give birth to one calf every three years. However, scientists have found more North Atlantic Right Whales giving birth to one calf every 6 to 10 years! Some researchers believe the reason for this change could be related to the stress of getting tangled in nets and ropes.

North Atlantic Right Whales are protected as an Endangered Species by the government. There are laws about how close people can get to them, and how fast boats can go in areas where they may be. However, much more must be done to prevent these beautiful whales from going extinct.



North Atlantic Right Whale Facts

Lifespan: Up to 70 Years

Weight: Up to 140,000 Pounds

Length: Up to 52 Feet

Locations: New England, Mid-Atlantic, Southeast



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1:4 Other Whales in the Sea



Orca's (known as Killer Whales) are often considered the ocean's top predator. While found in every ocean in the world, they are not common in New England waters. However, there have been some sightings. In fact, a lone killer whale named Old Thom can sometimes be spotted off Cape Cod and Maine.



Pilot Whales are small toothed whales that grow to about 20 feet long. While not as common as other whales in the New England area, they are usually seen every year. They tend to travel in large pods (group of whales) and commonly hunt during the night for squid and fish.



Sperm Whales are the largest of the toothed whales. They can be found in every ocean around the world. Because they tend to stay in deep waters, it is rare to see one close to shore. Sperm Whales have the largest brains of any animal. They are capable of diving underwater for up to 60 minutes!



The Blue Whale is the largest animal that ever lived! They can grow over 100 feet long and weigh over 330,000 pounds! These baleen whales can be found in every ocean except the Arctic Ocean. Blue Whales are typically found in deep waters and on rare occasions they have been spotted off the New England coast.



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1:5 Dolphins and Porpoises

Dolphins and porpoises are scientifically classified as toothed whales. Several species can be found swimming and feeding off the New England Coast - including Harbor Porpoises, Atlantic White-Sided Dolphins, Atlantic Spotted Dolphins, and Common Dolphins.

Is it a Dolphin or a Porpoise? Take a Look!

- **Head:** Dolphins tend to have longer beaks (jaws) while porpoises have short beaks and more rounded heads.
- Dolphins tend to be more active at the surface, social, and talkative.
- Dolphins have pointed, cone shaped teeth. Porpoises' teeth are shaped like spades.
- Porpoises are usually found traveling alone or in smaller groups.
- Porpoises have triangle shaped dorsal fins. A dolphin's dorsal fin is more curved.
- Both Dolphins and Porpoises are known to be extremely smart.
- Both Dolphins and Porpoises make whistle and clicking sounds to communicate.



Common Dolphin



Atlantic White Sided Dolphin



Atlantic Spotted Dolphins



Harbor Porpoise



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Part 2: Marine Mammals





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2.1 More Marine Mammals

Whales, dolphins and porpoises are classified as cetaceans.

Seals, sea lions and walruses are classified as pinnipeds.

Pinnipeds spend much of their lives in water, but also spend time on land.

While they may be different, both cetaceans and pinnipeds are marine mammals.



Walrus



Sea lion

Is it a Seal or a Sea lion? Take a Look!

Many people think seals and sea lions are the same animal. While they are very similar, there are some differences:

- Sea lions have external ear flaps. Seals do not.
- Sea lions have long flippers. They can rotate their back flippers to help them 'walk' on land. Seals have shorter flippers, and 'flop' or 'inch' on land like a caterpillar.
- Seals tend to be quieter than sea lions, who communicate with loud barking noises.
- Seals spend more time in the water.



Seal



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2.1 More Marine Mammals

In the United States, Sea lions are commonly found in the Pacific Ocean from California to Alaska. Walruses prefer cold arctic and subarctic waters. Seals, on the other hand, are found in waters on both the east and west coast of North America.

Several species of seals make New England their home for all or part of the year.



Harbor Seals can be found in New England throughout the year. They are usually gray to brown with mottled spots.



Gray Seals can be found in New England throughout the year. They are usually gray with mottled spots, and have larger heads than Harbor Seals.



Harp Seals are ice seals and can be seen in New England in the winter and spring. Baby Harp Seals are born with white fur.



Hooded Seals are ice seals and can be seen in New England in the winter and spring. They have wide heads with short muzzles.



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2.2 Marine Mammal Viewing From Land

Did you know that you can see whales from land?

The least invasive way to see whales is right from land!

On the West Coast of the United States there is a Whale Trail set up that lists over 100 sites from Canada to Southern California where people can watch whales right from the rocks or beaches! (See whaletrail.org for more information).

On the East Coast, two of the best places to see whales from land are Race Point and Herring Cove in Provincetown, Massachusetts. Humpback Whales, Fin Whales, Minke Whales, and the highly endangered North Atlantic Right Whales may be seen close to the beach in the spring. During the summer months, the whales can be too far off shore to see, but it is still possible to catch a glimpse of an occasional whale near the shoreline. Always be on the lookout!

It is also possible to see dolphins, porpoises, and even pilot whales.

Of course, there is no guarantee that you will see a whale at any particular time, but if you are lucky enough to catch a glimpse it will be an experience you will never forget!

Organizations such as the Center for Coastal Studies often offer guided walking tours in March and April, and many people explore on their own. Make sure that you bring binoculars and look for whale spouts, fins, and tails.

It is also common to spot seals on land as you tour. If you do, enjoy them from a distance. Always give seals and other wildlife plenty of space and never touch or disturb them.





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2.3 Marine Mammal Viewing From Sea

Seeing a whale in the wild can change your life!

It changed mine! I saw my first whale when I was a child and decided I would spend my life trying to protect them.

Seeing a beautiful creature of that size makes you realize how small humans are in comparison. It is an amazing and humbling experience.

We must remember that when we are on the sea, we are visitors to their world and we need to give them plenty of space!

Whale watching brings in 2 billion dollars a year, and has convinced many countries that it is more profitable to see whales than to hunt them. This is a great thing!

However, two of the biggest threats facing whales today are ship noise and vessel strikes. Crowding whales can have negative impacts on feeding, breeding, and their physical and mental health.

There are many organizations that provide whale watching tours. Do some research to make sure the company that you choose follows ethical whale watching standards (which includes not approaching whales too closely).

Organizations such as Whale Sense and the World Cetacean Alliance list companies that promise to uphold ethical whale watching. Also search reviews and see what past guests have said about their experiences.

Love whales but give them space!



A few Whale Watching rules to remember at sea! Report any violations you see!

- *Stay at least 100 Yards (1 football field) away from whales. Some protected whales require more space.*
- *Never chase, circle, or trap animals.*
- *Go Slow! Keep engines in neutral when whales are close.*
- *Never get close to or get between a mother and calf.*
- *Never approach a whale head on. Try to stay behind and parallel at a safe distance away.*
- *Whale watching rules apply to everyone—even on small personal boats and jet skis.*



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2.4 Stranded Marine Mammals

Sometimes marine animals strand or 'beach' themselves.

A whale or dolphin that needs the ocean to survive may be on land or in shallow water unable to return to deeper seas.

There are many reasons why a whale or dolphin may strand. For example:

- The animal may be sick, injured, or caught in nets or fishing gear.
- Pollution or eating plastics may be a factor.
- Loud underwater noise may disorient them or change their natural paths.
- Human made sonar (a process that uses sound waves to find objects underwater) may interfere with a cetacean's echolocation and ability to navigate.
- Unusual weather events or sudden changes of the tide may trap them.
- Other whales in their family unit (pod) may follow a disoriented or sick whale to the shore. This could lead to a 'mass stranding' of many whales.
- Sometimes we just don't know. Scientists are still studying reasons why whales strand.



**If you see a
Stranded Marine
Mammal in New
England contact:**

**NOAA Fisheries
24-hour Stranding
Hotline:**

**(866) 755-NOAA
(866) 755-6622**

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2.4 Stranded Marine Mammals

What to do if you see a Stranded Marine Animal

If you see a stranded sea animal (alive or dead) it is important not to touch it or get too close (even if you want to help). Stay at least 150 feet (about the length of 4 school busses away).

- Marine animals may have diseases or parasites that can get humans and pets sick.
- Getting too close can cause injury to you or the animal.
- Sometimes an animal may be injured, and trying to push it back in the water may actually be harmful.
- Pets or people who approach marine mammals can cause them more stress.
- Only specially trained experts are allowed by law to touch and move marine mammals.

The best thing that you can do is to keep your distance and call a local **Stranding Hotline**.

Let them know the exact location of the stranded animal and any details you can observe from a safe distance!

Marine rescue workers are trained to provide onsite and sometimes offsite rehabilitation and care.



It is sad when a marine animal dies, but researchers can learn a lot by examining their bodies. The information they learn may help them understand why the animal stranded and help prevent future strandings.



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2.4 Stranded Marine Mammals

Do Seals Strand?

It is perfectly normal and natural to see seals and sea lions on land!

Unlike cetaceans, pinnipeds such as seals and sea lions do not need to remain wet. You can often find them on land resting in the sun. It is not even uncommon to see a young seal pup on land alone while the mother seal hunts.

A seal is considered stranded if it is not alive, or if it is in need of medical attention.

If you see a seal that may need help, do not be afraid to call your local Stranding Hotline.

They will be happy to see if it needs help.



Remember- do not approach a seal- whether you think it is stranded or not!

Seals may carry illnesses that can transfer to you or your pets. They also may be scared and act aggressively.

Keep yourself and pets 150 feet away (4 school busses).



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Part 3: Marine Mammal Protection





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3.1 Marine Mammal Threats

Ship Strikes

One of the biggest threats to whales is being hit by a boat. Even if a whale survives a boat strike, it will most likely have bad injuries.

Busy ocean shipping lanes cause a huge risk to whales. Scientists are researching shipping lanes worldwide, and looking into the possibility of moving them slightly to avoid whale migration routes. Some shipping areas have voluntary slow down programs which are also helping.

Seasonal Management Areas (SMA's) have been set up for endangered whales such as North Atlantic Right Whales. In these areas, speeds of large boats are restricted by law.



Entanglement

Getting tangled in fishing ropes and gear is a huge threat to whales. For the whales that survive getting entangled, many have serious cuts and injuries. Some whales have to carry the heavy gear they are stuck in around with them for months or even years! This can interfere with their food intake and having calves.



Advocates are proposing 'ropeless' fishing gear to reduce whale injuries and deaths by getting caught in lines.

Underwater Noise

Whales communicate with echolocation which requires sound. People made noise from things like boat traffic and underwater drilling is causing fear, stress, and danger for marine animals. Whales may become lost, separated from their parents, disoriented, and unable to hear predators.





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3.1 Marine Mammal Threats

Climate Change

The ocean is warming up at a faster rate than ever before. When seas warm up, a whale's food may move to cooler waters and be harder to find. This may cause changes in where and when whales migrate (travel), and put them in busier, more dangerous spots. Changes in migration can also reduce the rate whales breed and reproduce. In the Arctic, melting ice is changing life for whales such as belugas, as they must travel further for food and are less sheltered from predators as the ice shrinks. Warmer waters can also increase the concentration of pollutants in the water which is harmful to all marine life.



Pollution

Chemicals, plastics, and garbage are hurting the oceans and sea animals at an alarming rate. Hazardous household cleaners and lawn fertilizers can seep into the water and poison animals and their food. By reducing the amount of chemicals that we are using, we are also reducing the amount chemicals that marine animals are exposed to.



Over 100,000 marine animals die from eating plastics every year! Whales are stranding all over the world with stomachs full of plastics. Most of the trash in the ocean comes from "single use" plastics, such as plastic bottles, straws, packages, and grocery bags.

Some littering that is hurting marine animals is done on purpose! A major danger to all wildlife is balloons. When people release balloons outdoors the balloons can travel thousands of miles and reach our shores. Hundreds of thousands of balloons make it to beaches and oceans each year. Balloons are frequently eaten by sea animals who mistake them for jellyfish! Not only can they suffocate on the balloons, they can also get tangled up in the string.



Many deaths and injuries and from plastics and pollution can be avoided if we reduce what we use, choose safer alternatives, and dispose of things correctly!



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3.2 Marine Mammal Protection Act

Seeing marine animals in their natural habitat is exciting! However, we must always give wild animals plenty of space and only observe them from a distance.

People should stay at least 100 yards away from whales (about the length of a football field), and 50 yards away from dolphins, porpoises, seals, and sealions.

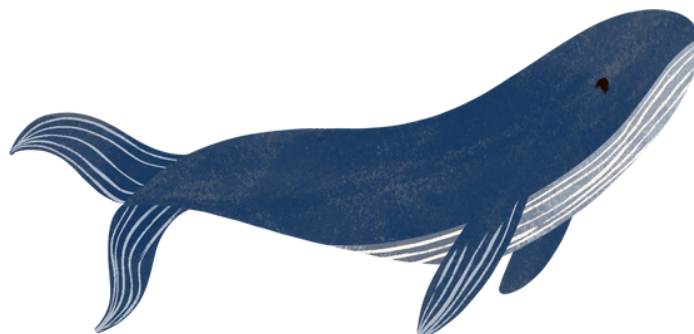
All marine mammals in the United States are protected under the Marine Mammal Protection Act. This includes all cetaceans (whales, dolphins and porpoises), pinnipeds (seals, sea lions and walruses), manatees, sea otters, and even polar bears that are found in U.S. waters.

The Marine Mammal Protection Act, passed in 1972, makes it against the law to:

- Hunt or kill marine mammals
- Take marine mammals without a permit
- Import marine mammals and marine mammal products without a permit
- Feed marine mammals
- Harass marine mammals (this includes touching, chasing, and doing anything that interrupts a marine mammal's normal behavior or disturbs their rest)

People who violate the Marine Mammal Protection Act can face heavy fines and jail time!

The Marine Mammal Protection Act does make some exceptions for animal rescue workers, scientific research, and people with special permits or permission.





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3.3 Endangered Species Act

While all marine mammals are protected under the Marine Mammal Protection Act, many are also protected under the Endangered Species Act.

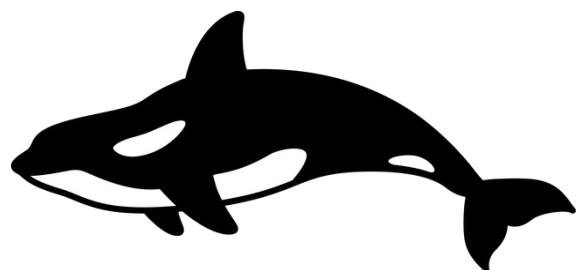
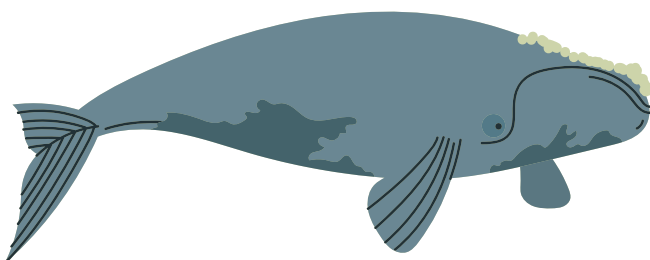
The Endangered Species Act was passed by congress in 1973 to protect and conserve animals and plants that are in danger of becoming extinct.

Like the Marine Mammal Protection Act, the Endangered Species Act prohibits people from harming, killing, importing and exporting the animals and plants on the endangered species list. The Act also provides extra protection by requiring recovery plans of action and requiring protection for the environment the species depends on to survive (called 'critical habitat areas').

Two of the most endangered marine mammals in the United States are the North Atlantic Right Whales on the east coast and Southern Resident Orcas in the Pacific Northwest.

The Southern Resident Orcas are a unique group of Killer Whales. Unlike most orcas who eat other marine mammals, the Southern Residents just eat fish (mainly Chinook Salmon). There were only 73 Southern Resident Orcas left in 2022. They are being threatened by a lack of food, ocean pollution, and noise from boats that make it hard for them to communicate and hunt. Boats must stay at least 300 yards (the length of three football fields) away from Southern Residents.

In 2022, there were less than 350 North Atlantic Right Whales left on earth. The biggest threats they face are getting hit by ships and getting tangled in fishing gear. Boats must stay at least 500 yards (the length of five football fields) away from North Atlantic Right Whales. The government also requires boats in certain areas to slow down to safer speeds during seasons where North Atlantic Right Whales may be there. These are called Seasonal Management Areas.





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Part 4: Getting Involved

SAVING THE OCEAN STARTS WITH YOU

"People ask: Why should I care about the ocean? Because the ocean is the cornerstone of earth's life support system, it shapes climate and weather. It holds most of life on earth. 97% of earth's water is there. It's the blue heart of the planet—we should take care of our heart. It's what makes life possible for us. We still have a really good chance to make things better than they are. They won't get better unless we take the action and inspire others to do the same thing. No one is without power. Everybody has the capacity to do something."

-Sylvia Earle, World Renowned Oceanographer



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4.1 Conserving the Ocean



"Never doubt that a small group of thoughtful committed citizens can change the world: Indeed it's the only thing that ever has".

-Margaret Mead.

Ocean Conservation can start today with You!

- Avoid single use plastic
- Never release balloons outdoors
- Organize local beach clean ups
- Look for alternatives to items such as cleaners with harmful chemicals
- Conserve water by turning off faucets and hoses
- Use less! Reuse and recycle

Reduce Your Carbon Footprint

- Ride bikes, skateboards or car pool
- Turn off lights and appliances when not using them
- Keep the thermostat a little lower to save heating fuel





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4.2 Marine Life Jobs

Do you want to work with ocean life? Most people think of Marine Biologists or Oceanographers when they think of marine jobs. These scientists have fascinating jobs studying the ocean and marine animals! There are also many other careers that focus on ocean life. Think outside the box! What interests do you have that can lead to a career in marine animals? Use the list of job suggestions below for inspiration!

- Is science your favorite? You can be an Ocean Researcher. Marine Biologists, Oceanographers, and Ocean Engineers all play an important role in understanding our oceans.
- Maybe you prefer the arts! You can become a wildlife or underwater photographer or filmmaker. You can also be an artist that draws sea life, or an author writing about marine animals.
- Do you like boats? Planes? You can be a Marine Naturalist and give marine life tours, or an aerial surveyor who spots whales from planes!
- Do you like to be hands on? Maybe you would enjoy being a marine veterinarian or working with a marine animal rescue.
- Do you like to teach others? You can become a marine educator, a public advocate, or a coastal management specialist who teaches others how to conserve our shores.
- Volunteer in marine organizations and rescues. Many organizations need the help, and it will provide great experience to break into the career field of your dreams!

Don't ever limit yourself to thinking a career in marine life revolves around just one talent or skill. Make a list of your favorite hobbies and interests. Think of how you can apply that to an ocean career!





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4.3 Marine Mammal Challenge

While we covered some marine mammal species in this lesson, there are so many more amazing marine mammals to discover around the world! Don't let your learning stop here! Choose a topic below to explore deeper. Research! Ask questions! Teach others! Be an advocate for marine animals and our environment! Be an Ocean Hero- the ocean needs you!

Independent Research Topics to Explore:

- Research the marine mammals on the Endangered Species List. Choose your favorite. How many are left? What are threats to their survival? What is being done to protect the species? How can you help?
- Scientists study patterns to learn more about strandings. There has been an increase in whale strandings within the last few years. What do you think may be causing this? What led you to this hypothesis? Could there be other reasons?
- North Atlantic Right Whales are in extreme danger of becoming extinct. One of the biggest threats to them is getting tangled in fishing gear. Ropeless fishing gear is being proposed as a solution. Do some investigating. Do you think this will work? What are some of the challenges?
- Get on a first name basis with some whales! Some Humpbacks you may see in New England include Salt, Echo, and Nile! Learn about a whale and make a trip out to see if you can see them! What did you see or learn on your adventure?
- Plastics and pollutants cause a big problem for ocean life! Look around your house and neighborhood. Can you eliminate or replace anything that may be harmful? What 'green' alternatives can you find? Make a list. Check back in a month and see if there has been a change in what you use or throw away.





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4.3 Marine Mammal Challenge

Independent Research Topics to Explore:

- There are phone apps, such as '**Whale Alert**' that notify other boaters of whales that have been spotted in the area. How else can people communicate that whales are near? Do you have any new ideas or inventions you can think of?
- Finding new energy sources is important. However, there is a lot of controversy over things like offshore drilling for oil- which can cause significant underwater noise. Do you have any ideas for a solution that will be safer for marine animals?
- There have been many inspiring ocean pioneers who have made life better for marine animals, such as **Jacques-Yves Cousteau**, **Sylvia Earle**, and **Ayana Elizabeth Johnson**. Do some research on an ocean pioneer. How did their actions help marine life and the ocean?
- There are tons of sea animals that are not mammals: Sharks, sea turtles, octopuses, and more! Is there a creature that you want to learn more about? Choose one and do some independent research. What new things did you learn?

Your Ideas Matter!

Send your research, photos, and ideas to Twisted Orca @ twistedora@gmail.com

We love to feature marine conservationists and classrooms making a difference on our website!





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Part 5: Ocean Hero Pledge

I Can & Will:

- **Keep our earth healthy by recycling, reusing, and reducing!**
- **Respect marine life at all times by keeping a safe distance and obeying marine protection laws!**
- **Learn all I can about conserving marine animals and their ocean environment.**
- **Be a voice and advocate for marine animals everywhere**
- **Pick up litter (such as this) before it hurts a marine animal.**

CERTIFICATE OF ACHIEVEMENT

This certifies that

has successfully completed the Whales of New England Jr. Naturalist
Course and Marine Mammal Learning Challenge and is hereby
certified as a Jr. Marine Naturalist

Keri Newman

Keri Newman, Twisted Orca

Date





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Words to Know

- Baleen-** Some whales have teeth (like Belugas and Sperm Whales). Other whales (such as Right Whales and Humpbacks) have fringe like plates called **baleen** instead of teeth. The baleen acts like a sift and filters out seawater while trapping food!
- Callosity-** **Callosities** are thick, white patches of skin found on Right Whale's heads. These callosities can help researchers identify whales.
- Cetacean-** **Cetaceans** are members of marine mammal group that include whales, dolphins and porpoises. (Seals, sea lions and walruses are known as pinnipeds).
- Crustacean-** Crustaceans are a class of sea animals with hard outer shells. Crabs, lobsters, shrimp, and krill are all **crustaceans**.
- Dorsal fin-** A dorsal fin is a triangle shaped body part on the backs of many sea creatures (such as dolphins, sharks, and some whales). **Dorsal fins** help to balance fish and marine mammals so they don't roll over, and can help them control movements.
- Ecosystem-** An ecosystem is a delicate balance of an environment and all the living things that share that environment. **Ecosystems** can contain living plants and animals, and non-living objects like rocks, water, and even air!
- Endangered-** Animals that are considered **endangered** are at risk of becoming **extinct** (no longer existing anywhere on this earth)! Endangered animals are protected under the **Endangered Species Act** of 1973. Can you research how many animals are covered under the Endangered Species Act?
- Mammals-** Mammals are warm blooded animals that breathe air, have hair, and nurse their babies. **Marine mammals** are mammals that depend on the ocean to survive (even if they live on land-close to the ocean). Whales, dolphins, seals, sea otters and even polar bears are all marine mammals.
- Plankton-** Plankton are very small plants and animals that float in the water. Many **plankton** can only be seen under a microscope. **Phytoplankton** are tiny plants or plant like organisms. **Zooplankton** are small animals.



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Helpful Resources

Marine Mammal Stranding Hotlines

A great idea to program in your phones!

- NOAA National Fisheries 866-755-6-NOAA (6622)
- NOAA Dolphin & Whale 911 (Smartphone App)
- Mystic Aquarium (for CT, RI) 860-572-5955 x107
- IFAW (Southern MA & Cape Cod) 508-743-9548
- NE Aquarium (Northern MA & NH) 617-973-5247
- Maine Marine Animal (Maine) 800-532-9551

Responsible Whale Watching

- Whale Sense participants promise to uphold safe and sustainable whale watching practices. (whalesense.org)
- The World Cetacean Alliance (worldcetaceanalliance.org) promotes responsible whale watching, offers courses in whale safety, and highlights responsible whale watching companies around the world.

Marine Conservation

- The Center for Coastal Studies (coastalstudies.org) is located in Provincetown, MA. During the spring months (March and April) they offer guided beach walks to look for North Atlantic Right Whales from shore. Their website is a great resource for information on helping North Atlantic Right Whales and other marine animals.
- The New England Aquarium keeps a catalog of all identified North Atlantic Right Whales to help study them. (rwcatalog.neaq.org)
- Save The Bay (savebay.org) offers seal watches in Rhode Island and many volunteer events for families to help keep coastal areas clean.
- Check your local area for additional events and resources available!



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Part 5: Marine Activities & Fun

Whale Vision

Whales see the world differently than we do!



For one thing, many scientists believe that whales are either color blind, or at least see fewer colors than humans do. For example, it is not believed that whales can see the color blue!



We have 'binocular' vision, meaning both of our eyes see the same view. Whales, however, have one eye on either side of their head. This gives them 'monocular' vision. Each eye sees a completely different view!

Try taking 2 hand held mirrors and holding them with their backs together on your nose. Slowly move the mirrors to get separate views of your right and left side.

Can you see more or less of your surroundings? How may monocular vision help whales under the water?





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Marine Animal Activities & Fun

Whale Blubber

Whales have a thick layer of fat called blubber to keep them warm!

Try recreating this layer of insulation in the experiment below:

You will need :

- **6 spoonfulls of shortening (like Crisco)**
- **4 quart size Ziplock storage bags**
- **A large bowl of Ice**

1. Take 2 of the storage bags and place them in front of you.
2. Fill one of the storage bags with 6 heaping spoonfulls of shortening (blubber) and keep the other bag empty.
3. Turn the remaining 2 bags inside out and put them on your hands like gloves.
4. Place one gloved hand in the empty bag, and one gloved hand in the blubber bag (try to surround your gloved hand with the shortening).
5. Put both hands in the ice water. Which hand gets cold faster?

Helpful hints:

You can add more shortening as needed to really surround your gloved hand.

Zip the inner glove and outer bags together as much as possible to avoid getting water inside.

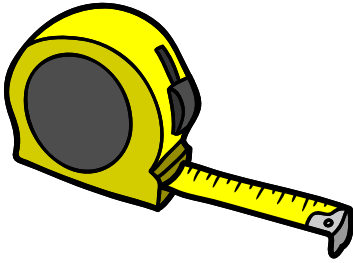




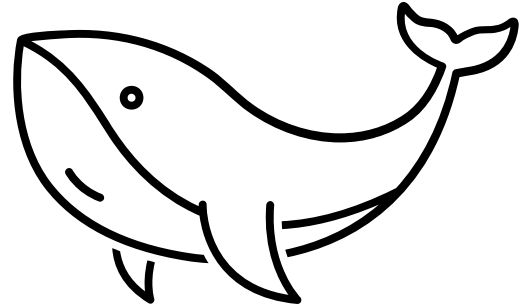
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Marine Animal Activities & Fun



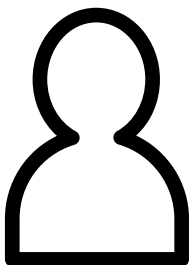
Size Comparison



Just how much bigger than you is a whale? Find out!

Using a tape measure and large roll of paper (or chalk on a big open space). Mark off your size compared to some of the whales we learned about!

You	__ Feet
Orca	30 Feet
Minke Whale	35 Feet
North Atlantic Right	55 Feet
Sperm Whale	55 Feet
Humpback Whale	60 Feet
Fin Whale	85 Feet
Blue Whale	100 Feet





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About Twisted Orca

Twisted Orca's Goal is to inspire new generations of Marine Conservationists.

Our Whales of New England presentations featuring a life size Minke Whale replica are available in Rhode Island, Connecticut and Southern Massachusetts.

Visit TwistedOrca.com for more information on live events, lesson plans, children's marine conservation books, sea themed art, and free marine conservation resources for teachers and families.



[Keri Newman](http://KeriNewman.com), founder of Twisted Orca, is a lifelong New England resident, Marine Naturalist, Conservation Author and volunteer First Responder for marine mammal strandings.