

Beneath the Waves

Protecting Marine Wildlife



**"Join me and IFAW
in taking action for
animals."**

Leonardo DiCaprio
Actor and Activist



Beneath the Waves

How to Use This Programme

Beneath the Waves: Protecting Marine Wildlife aims to educate students about the vital importance of maintaining a healthy ocean ecosystem, protecting marine wildlife, and about the threats to this spectacular world that lies beneath the waves: hunting, over-fishing, pollution, oil spills, and global warming. Here's one possible approach to teaching this programme:

1. Introduce Topic and Develop Content Knowledge *Film at www.vimeo.com/3109930; Worksheet 1: Film Quiz*

- **Film** View the film with the class to build background and tap into students' prior knowledge about ocean ecosystems, marine wildlife, and human activities that affect the oceans. After viewing, have students take the *Film Quiz* on the next page.
- **Student Magazine pages 13-18** Use the magazine in this unit before or soon after viewing the film. Have a class discussion about what students learned from the film or the magazine.

2. Conduct Lesson Activities *Lesson Plans and Worksheets*

- **Lessons 1 and 2 and Worksheet 2: *The Right Whale*** focus on whales – the great diversity within the population – and on how they find food. The lesson and activities build on content delivered in the **Student Magazine** pages 13 – 18.
- **Lesson 3 and Worksheet 3: *TurtleTown News*** provide the information and structure for a role play activity centered on the issues and perspectives that affect environmental decisions and policy choices.
- **Lesson 4 and Worksheet 4: *Clean it up!*** focus on helping students learn how even the most remote and apparently innocent human activities can affect the ocean ecosystem. They build on content found in the Student Magazine.

3. Extend Learning *Lesson Plans*

Each lesson offers activities that extend learning about the topics and offer students concrete ways to take action for animals and the environment.

Go Online

Go to: www.ifaw.org
Click on "Our Work" and "Defending Whales"

Ocean Literacy

The ocean is not only rich with life – it also provides the perfect lens for covering material in science, math, language arts, and more. Use these materials to incorporate the following essential principles of ocean literacy into your classroom:

1. Earth has one big ocean with many features.
2. The ocean and life in the ocean shape the features of Earth.
3. The ocean is a major influence on climate.
4. The ocean makes Earth habitable.
5. The ocean supports a great diversity of life and ecosystems.
6. The ocean and humans are inextricably linked.
7. The ocean is largely unexplored.

Meeting Curriculum Aims

These materials may be adapted to meet curriculum aims in a number of subject areas including Science, English, Geography and Personal, Social and Health Education. See pages 3-4 for more details.

Companion Film

The *Beneath The Waves* companion film is an excellent introduction to the content and concepts presented in this teaching guide. Narrated by actor and environmentalist Leonardo DiCaprio, the film runs for about 15 minutes and is appropriate for general youth audiences. It can be found at www.vimeo.com/3109930

Online Resources

IFAW's Animal Action education programmes offer a wealth of free teaching resources about animals and the environment: www.ifaw.org/education

Animal Action Education

IFAW's Animal Action Education programme offers free resources focusing on animals and the environment. Curriculum-linked education materials are locally adapted for free distribution in eight languages and 20+ countries, reaching more than 5,000,000 young people worldwide each year. For more information about IFAW and the Animal Action Education programme, email animalactionweek@ifaw.org, or call 0207 587 6700.



International Fund for Animal Welfare

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Links to the Key Stage 3 National Curriculum

Studies have shown that most children have an affinity for and interest in animals, meaning that lessons with animal content are more likely to capture pupils' attention, making learning more interesting for children. Teachers can use this interest to develop knowledge and skills relevant to both the national and whole school curriculum.

National Curriculum for England

Specific links to a number of National Curriculum subjects are detailed below. Each lesson in the pack identifies broad subject learning outcomes which can be made more specific using the lists on this chart.

The 'whole school curriculum'

Children's interest in animals as well as associated conservation, welfare and environmental issues will offer all schools an opportunity to demonstrate that they deliver that balanced and broadly based curriculum that 'prepares pupils at the school for the opportunities, responsibilities and experiences of life'.

Teachers who have used IFAW's educational resources judge these lessons as excellent for delivering a range of core skills and competences essential for work based learning, social and emotional development and for community engagement and participation.

English

Pupils should be taught to:

Spoken English

- use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas
- become competent in the arts of speaking and listening, making formal presentations, demonstrating to others and participating in debate.
- **speak confidently and effectively, including through:**
 - giving short speeches and presentations, expressing their own ideas and keeping to the point
 - participating in formal debates and structured discussions, summarising and/or building on what has been said

Reading

- develop an appreciation and love of reading including a wide range of non-fiction in order to gain an understanding of increasingly challenging texts through making inferences and referring to evidence in the text.

Writing

- **Write accurately, fluently, effectively and at length for pleasure and information through:**
 - notes and polished scripts for talks and presentations
 - a range of other narrative and non narrative texts, including arguments, and personal and formal letters
 - Summarising and organising material, and supporting ideas and arguments with any necessary factual detail

Grammar and Vocabulary

- Pupils should be taught to consolidate and build on their vocabulary and use this in their writing and speech to achieve particular effects

Links to the Key Stage 3 National Curriculum

Science – Biology

Pupils should be taught about:

Interactions and interdependencies; Relationships in an ecosystem

- the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops
- the importance of plant reproduction through insect pollination in human food security
- how organisms affect, and are affected by, their environment, including the accumulation of toxic materials

Genetics and evolution; Inheritance, chromosomes, DNA and genes

- the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection
- changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction
- the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.

Citizenship

The national curriculum for citizenship aims to ensure that all pupils:

- develop an interest in, and commitment to, participation in volunteering as well as other forms of responsible activity, that they will take with them into adulthood
- are equipped with the skills to think critically and debate political questions

Pupils should be taught about:

- human rights and international law (key stage 4)

Geography

Pupils should be taught to:

Human and physical geography

- understand how human and physical processes interact to influence, and change landscapes, environments and the climate; and how human activity relies on effective functioning of natural systems

Geographical skills and fieldwork:

- use fieldwork in contrasting locations to collect, analyse and draw conclusions from geographical data, using multiple sources of increasingly complex information.

Non-Statutory Personal, Social, Health and Economic Education

The non statutory nature of PSHE offers teachers and students the opportunity to creatively explore the three core themes of the subject through the lens of animal welfare and conservation as well as human interaction with animals.

The PSHE Association identifies the following core themes for PSHE Education

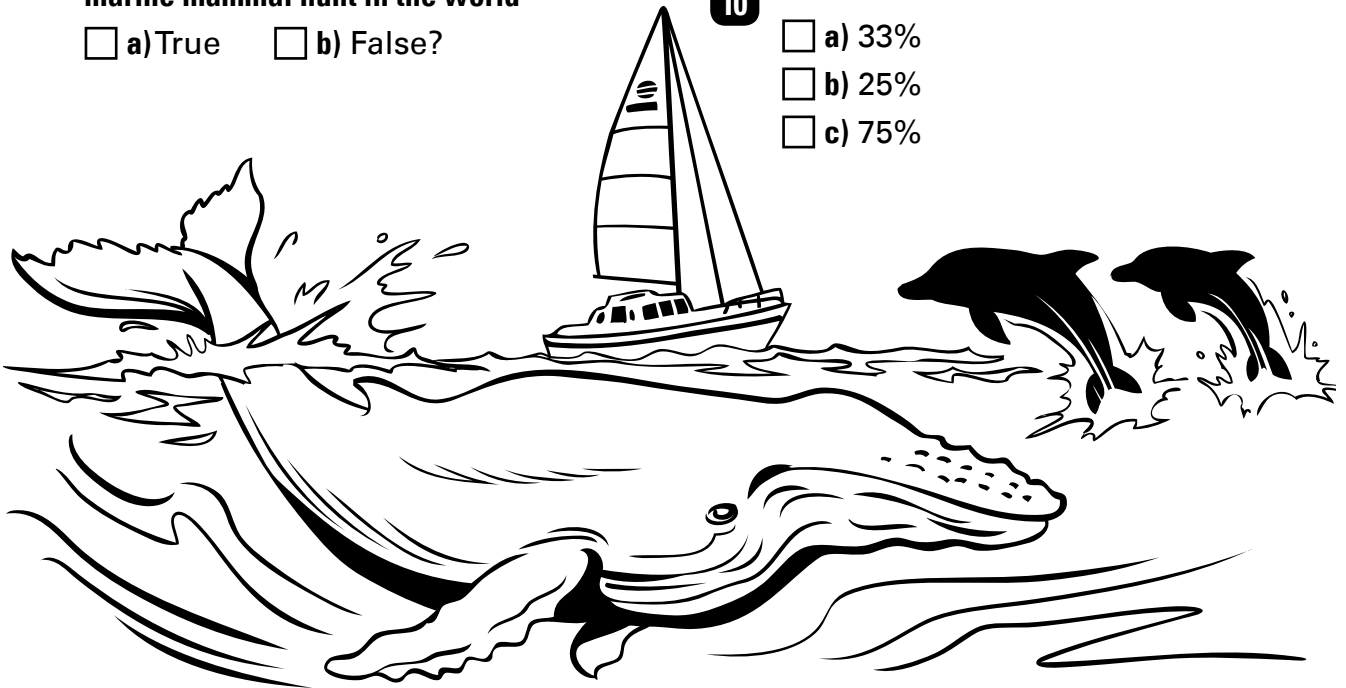
- Health and Wellbeing
- Relationships
- Living in the Wider World

These materials can also be useful for schools working towards the **Rights Respecting Schools Award**, encouraging children to participate in classroom activities and have their opinions heard and, through learning about the rights of others, learn about their own responsibilities to themselves and the wider global community.

What do you remember about the film you have just seen?

Tick the correct answers below

- 1 The earth was formed
☐ a) 4.5 billion years ago
☐ b) 4.5 million years ago
☐ c) 4 million years ago
- 2 Some countries still hunt and kill whales
☐ a) True ☐ b) False
- 3 More than 100 million sharks are killed every year
☐ a) True ☐ b) False
- 4 The world's largest creature is
☐ a) the African elephant
☐ b) the blue whale
☐ c) the basking shark
- 5 Africa is responsible for the biggest marine mammal hunt in the world
☐ a) True ☐ b) False?
- 6 IFAW's research vessel is called:
☐ a) *Song of the Sea*
☐ b) *Song of the Dolphin*
☐ c) *Song of the Whale*
- 7 Dolphins and porpoises can find food using echolocation.
☐ a) True ☐ b) False
- 8 The North Atlantic right whale is not one of the world's most endangered animals
☐ a) True ☐ b) False
- 9 Plastic lasts in the oceans for
☐ a) one week
☐ b) hundreds of years
☐ c) ten years
- 10 How much of the earth is covered in water?
☐ a) 33%
☐ b) 25%
☐ c) 75%



Answers: 1 a; 2 True; 3 True; 4 b; 5 False; 6 c; 7 True; 8 False; 9 b; 10 c.



Lessons 1 and 2

How Whales Measure Up • How Whales Find Food

Learning Outcomes: Students will apply research skills and role-play to learning about the physical structure of whale species and echolocation. This activity meets curriculum aims in maths and science.

How Whales Measure Up

Whales come in all shapes and sizes, from the relatively small pygmy whale to the great blue whale. In this activity, students will learn about the many different species of whales, and how their sizes compare.

What you need

- **Worksheet 2:** *The Right Whale*
- 100 feet (30 m) of string or rope
- tape measure
- index cards
- tape
- markers

What to do

- Begin by distributing **Worksheet 2: The Right Whale**. Ask students if they can identify any parts of the right whale. If so, which ones?
- Divide students into small groups. Challenge each group to research one of the right whale body parts on the reproducible, using the websites listed under 'Go Online' or your library.
- Have groups share what they found. Together, complete the reproducible.

- Next, compare the right whale to other whale species. Invite groups to research the average lengths of: the pygmy whale (6m, 120 feet); the gray whale (12m, 40ft); the humpback whale (15m/50 feet); the right whale (17m/55 feet); fin whale (25m/85 feet) and the blue whale (30 m/100 feet). Have groups write the lengths and names of their species on index cards.
- Next, gather in a large space, such as the hallway, gym, or schoolyard. Stretch the string or rope flat on the ground.
- Have groups take turns measuring the lengths of their whales using the tape measure. Tape the index cards to the appropriate spots on the rope.
- You might want to add index cards for other ocean animals so that students may make further comparisons.
- As an extension, invite groups to do further research on their species, finding more about each species' diet, habitat, and body structure. Ask groups to present this additional information on a poster.

How Whales Find Food

Whales use a complex system of sounds called echolocation to locate and hunt their prey. This activity teaches students about echolocation and the delicate relationship whales have with their underwater environment.

What you need

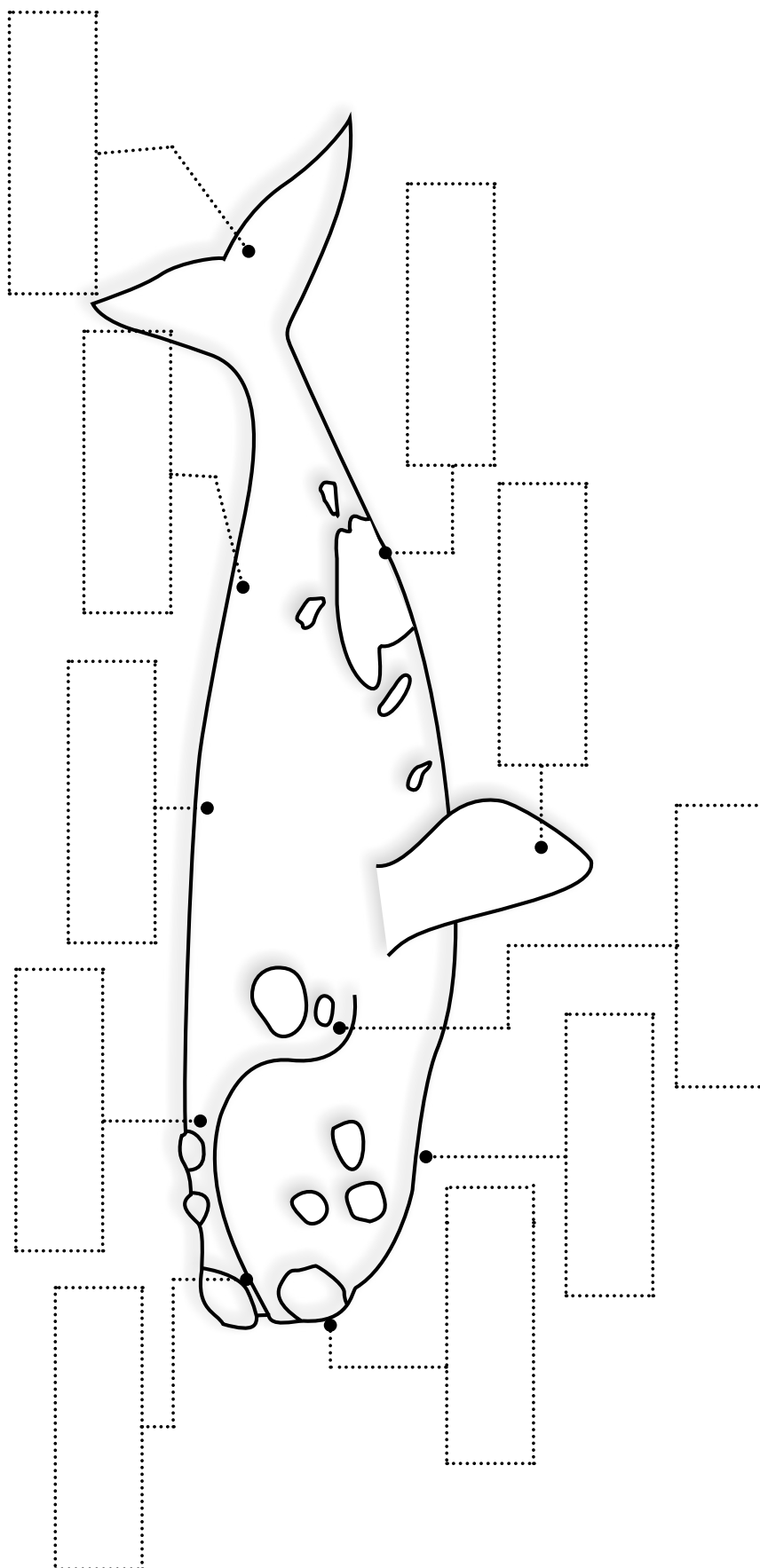
Four blindfolds

What to do

- Begin by talking about the ways whales find food. Whales continually emit a sequence of tones and sounds. They listen for the tones to echo off the ocean floor, surface, rocks, and other sea life. The echoes tell whales about their environment and what's nearby.
- Next, demonstrate echolocation by inviting students to gather in a circle, representing the ocean. Have two volunteers stand in the middle and blindfold them. They are the whale and the shrimp. Ask four others also to join the middle; they will play the ocean floor, a rock, some seaweed, and a boat.
- Ask the whale to call out 'whale,' using his or her deepest voice possible. The shrimp must respond by calling out 'shrimp' in his or her quietest voice. The others in the middle should also respond to the whale, using medium tones. The challenge is for the whale to find and tag the shrimp. Have students take turns playing the different roles.
- As a class, discuss the activity. What was it like for the students who played whales to find the shrimp? How is it similar to the process whales use to find their prey? How is it different?

Because right whales are slow and swim close to shore, they are at risk of injury or even death from being struck by ships. To help prevent this, IFAW helped develop special acoustic monitoring buoys that can detect right whales and warn nearby ships of their presence.





Get whale savvy: After researching these important right whale body parts, cut and paste them in the correct boxes. Then test your friends!

Get white carry-over! Reacquaintance sheet important! Right white body! Put eyes out and place them in the correct boxes: when test your answers.				
Black to dark gray skin	White patches on belly	Eye	Large, wide flippers	2 Blowholes
No dorsal fin	Median Notch	Large head covered with tan bumps (callosities)	205–270 pairs of black baleen in mouth	No throat grooves



Lessons 3

Drama in Turtletown

Learning Outcomes: Students will read a news article to extract facts and opinion and use the information to role-play points of view about a controversy. This activity meets curriculum aims in science, English, geography and PSHE.

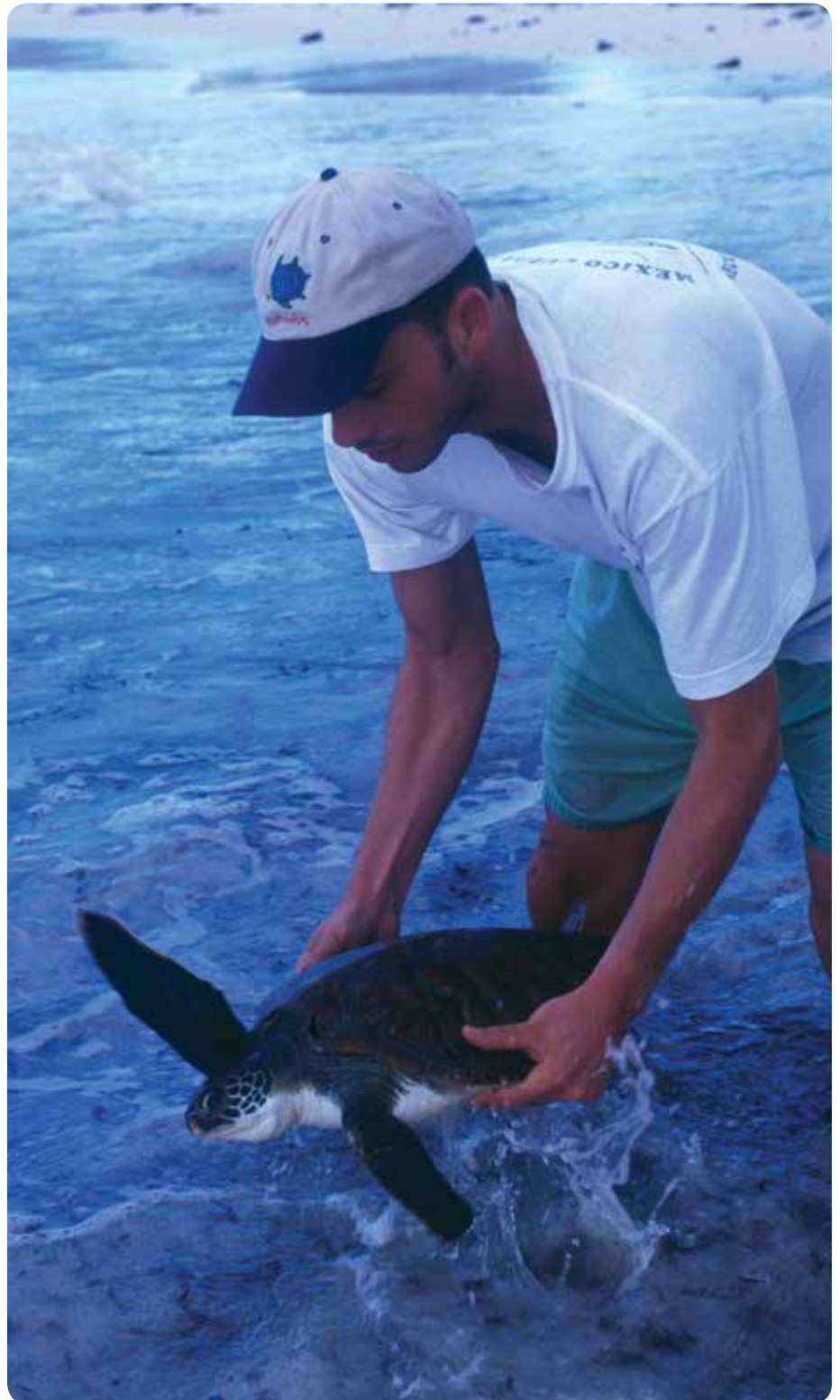
Turtles are just one marine animal facing human and environmental threats. This activity asks students to think about the issues and perspectives involved in crises affecting marine life.

What you need

- **Worksheet 3:** *Turtletown News*

What to do

- Distribute the **Worksheet 3:** *Turtletown News*. Invite students to read the fictional article silently.
- As a class, discuss the issues raised within the article. What are the different arguments for or against continuing development in Turtletown? What are the interests of the scientist in the article? What about the mayor?
- Challenge students to role-play what they think might happen at the Turtletown public meeting on October 25th. Assign different roles, including: Dr. Powell; the mayor; a property developer; the manager of the local supermarket (Turtletown's largest user and supplier of plastic bags), and various citizens.
- Give students a few minutes to think about their roles and the perspectives these individuals might have. The supermarket manager, for instance, might deny that his plastic bags are behind the turtle crisis. A local teenager might be upset because she volunteers to protect nesting sites. Encourage students to jot down a few notes on their imagined opinions.
- Conduct the role play. Afterwards, discuss students' own opinions. Are there easy answers? Why or why not?
- As an extension, encourage students to research an environmental issue in your community. Ask them to form opinions about that issue and then write to the editor of your local newspaper to share their views.



TURTLETOWN News



An endangered turtle swimming the Turtletown coast

DEVELOPING TOWN KILLS TURTLES

Uncontrolled development along the Turtletown coast is killing the region's nesting population of sea turtles.

The number of turtle nests in our area has dropped from 1,000 to just 200 in just two years, says Dr. Mark Powell, a marine biologist at Turtletown University. "This is caused largely by the bright lights from the new buildings along the coast. The lights make the turtles disoriented when they come ashore to try to lay their eggs, so they go back to sea again or don't build adequate nests to protect the eggs."

He says that there have also been cases of workers and machinery from the new development straying into the nesting areas and accidentally destroying nests.

"Although the turtles are on the endangered list and protected by international law, very little is being done by the government to stop illegal beach development and protect the turtles' nesting area," says Dr. Powell.

Turtletown Mayor, Robyn Clark, refutes Dr. Powell's claims. "The turtles are one of the reasons tourists come here and we need more hotels to accommodate these visitors. It's not in our interest to hurt the turtles. The hotels also mean more jobs for our local people. Environmentalists should not forget this," she said.

Plastic waste also kills

But Dr. Powell also says that turtles are not just threatened by the development of the area alone. Around 30 dead turtles have washed ashore in the last three months. Autopsies on the animals conducted at Turtletown University have identified the plastic bags from the local supermarket found in their stomachs as the cause of death.

"Jellyfish is a main source of turtle food; they mistake the plastic bags for jellyfish when they see them floating in the water and eat them," explains Dr. Powell. "It is imperative that local people take responsibility for protecting these wonderful creatures and take care when disposing of their rubbish."



Can our area's turtles be saved?

A public meeting will be held at Town Hall on October 25th to discuss the turtle and Turtletown development issue.



Lessons 4

Everything Winds Up in the Sea

Learning Outcomes: Students use real-life skills to collect and tabulate plastic waste in a defined area. This activity is relevant to the maths and science curriculum.

Even if you live in a landlocked state, your habits still have an effect on ocean life. This activity teaches young people about human impact and what they can do to help out.

What you need

- **Worksheet 4:** *Clean It Up!*
- Gloves

What to do

- Begin by sharing with students the plastic facts at right. Also share that 80 percent of all ocean debris comes from the land – swept by wind or washed by rain off streets into drains, down streams and rivers, and out to sea. That means that no matter where you live, it's important to keep your community clean.
- As a class, select a nearby park, beach, or block to conduct your own clean-up. You might even decide to clean your own schoolyard.
- Before your clean-up, share the **Worksheet 4:** *Clean It Up!* Explain that students should record every item they collect, as well as its approximate weight. You may want to estimate the weight of some of the items in your classroom as practice.
- On the day of the clean-up, divide students into small groups. Appoint one member of each group to collect and record data. The rest should focus on picking up rubbish. Remind students not to pick up sharp objects or anything too heavy or dangerous.
- Do wear gloves, take drinking water with you, set a time limit, and bring along additional adults if possible. Remember to recycle as much rubbish as you can. Also encourage students to be respectful of the natural environment, such as plants and trees.

Did You Know?

1. Plastic accounts for 90 per cent of debris in the oceans.
2. A plastic bag can take between 400 to 1,000 years to break down in the environment.
3. Many marine animals mistake plastic for food and swallow it, with painful and often fatal consequences.
4. Plastic 'pellets' (the early form of plastic prior to use in manufacturing products) can contain toxins such as PCBs.
5. Plastic exists as tiny particles in every part of the oceans. In some areas there is six times more plastic than plankton.
6. Scientists believe that each year hundreds of thousands of seabirds and tens of thousands of marine mammals die after swallowing or being entangled in marine debris.
7. The mass manufacture of plastic products began over 50 years ago. Virtually every piece of the plastic produced since then is still in existence.
8. Scientists estimate 5 per cent of all the world's plastic has entered the oceans.
9. More than 260 species of marine animals suffer from swallowing plastic.

Top Left: Old tires, plastic bags, litter – what else lies on the ocean floor?

Right: Rubbish and debris cover the coastal area of Nouadhibou, Mauritania. Rusted tanker ships are visible in the background.



Did you know that almost 80 percent of debris found in the ocean comes from the land?
Help reduce that percentage by cleaning up an area of your community.

PLASTIC		
Item Collected	Number Found	Approx. Weight

NON-PLASTIC		
Item Collected	Number Found	Approx. Weight

Total bags collected: _____ What was the most unusual item you found? _____

Family Take – Home Pledge



© IFAW/Stewart Cook

Dear Families,

At school, your students have been learning about the wonders of marine wildlife and how human activities are impacting the ocean and the animals that live there. Scientists estimate that each year hundreds of thousands of seabirds and tens of thousands of marine mammals die after swallowing or being entangled in

marine debris. Nearly 90 per cent of that debris is plastic. Plastic bags are among the most unnecessary disposable plastic products. Luckily they are also the easiest to avoid. You can help protect marine wildlife – pledge to bring your own reusable bag to shops!

PROTECT MARINE WILDLIFE PLEDGE

We, the _____ family want to help protect marine wildlife! We pledge to reduce, reuse, and recycle plastic bags.

FAMILY MEMBER 1: _____

FAMILY MEMBER 2: _____

FAMILY MEMBER 3: _____

FAMILY MEMBER 4: _____

FAMILY MEMBER 5: _____

Do your part to help marine wildlife! Take the pledge to reduce your family's use of plastic bags.

Beneath the Waves

Our ocean is one of the oldest and most important resources on this planet. Half of the water in the ocean today was inside Earth when it was formed 4.5 billion years ago. As the planet cooled, steam was released, causing the longest rainstorm ever, lasting for thousands of years.

The ocean covers 70 per cent of our planet and it conceals Earth's highest peaks and deepest valleys. The ocean is thought to be the source of life on Earth and even of most of the oxygen in the atmosphere. All the major watersheds drain to the ocean which, in turn, supplies freshwater (most rain comes from the ocean). Vital to regulating our weather and climate, the ocean absorbs, stores and moves vast amounts of heat, carbon and water. The Ocean Conveyor is the largest and most crucial of the ocean system of currents; it takes about a thousand years to go round the world. When this current failed 250 million years ago, more than 90% of life was wiped out.



The ocean is home to an incredible collection of plants and animals. The animals range from microscopic plankton to the world's largest creature – the blue whale. There are nearly as many different species of fish in the seas as there are land animals and birds combined – about 14,000.

But the smallest creatures can be the most important. Phyto-plankton are no more than the size of a pinhead, but they provide half the oxygen in the world.

Marine animals belong to three groups – drifters (*zooplankton*), bottom dwellers (*benthos*) and free swimmers (*nekton*). Drifters include jellyfish, while lobsters and starfish are among the bottom dwellers. The free swimmers range from eels and other fish to whales and dolphins.

All these animals are now at risk. Although the ocean has existed for billions of years, in the 21st century, it faces its greatest threats, including pollution, hunting, over-fishing and global warming. A recent study indicates that 40 per cent of the ocean is heavily impacted by human activities.



Did you know?

- **BIG SPLASH:** Blue whales can grow to the size of a jumbo jet and weigh some 200 tonnes (181 metric tonnes).
- **TINY FLIPPER:** The vaquita, a relative of the harbour porpoise found in Mexico's Sea of Cortez, is the smallest cetacean in the world – only 1.2 m long (4 feet).
- **HEAR WHAT:** A whale's heart can be the size of a small car but its ear is smaller than a pea.
- **BIG MOUTH:** The tongue of a humpback whale is longer than a mini van.
- **UNICORN COUSIN:** The narwhal, an unusual whale with a long spear-like tooth, is believed to be the source of the legendary unicorn.
- **DEEP DIVER:** A sperm whale can dive as deep as 3.2 km (two miles) in search of food.
- **SPEED RACER:** Fin whales are among the fastest cetaceans, reaching speeds of more than 56 km (35 miles)/hr.



A scientist works on the *Song of the Whale*.

Giants of the Sea

Whales are extraordinary creatures, highly intelligent, curious, and gentle. They are the largest animals that have ever lived – blue whales are larger than any dinosaur – and among the oldest: their mammal ancestors left dry land to live in the sea more than 50 million years ago.

Fully adapted to life underwater, whales are marine mammals known collectively, along with dolphins and porpoises, as cetaceans. Like all mammals, whales give birth to live young and breathe air. They have

lungs, but cannot breathe through their mouth; instead they breathe air in through blowholes (nostrils) on the top of their heads.

Some whales, such as orcas and sperm whales, have teeth; others, including humpback, right and blue whales, filter their food from seawater using baleen plates – huge fringed brushes that hang down inside the whale's mouth. Baleen is made of the same tough stuff as your fingernails. Baleen whales eat tiny animals called krill. The whale takes in a huge mouthful of water and krill, then presses the water through

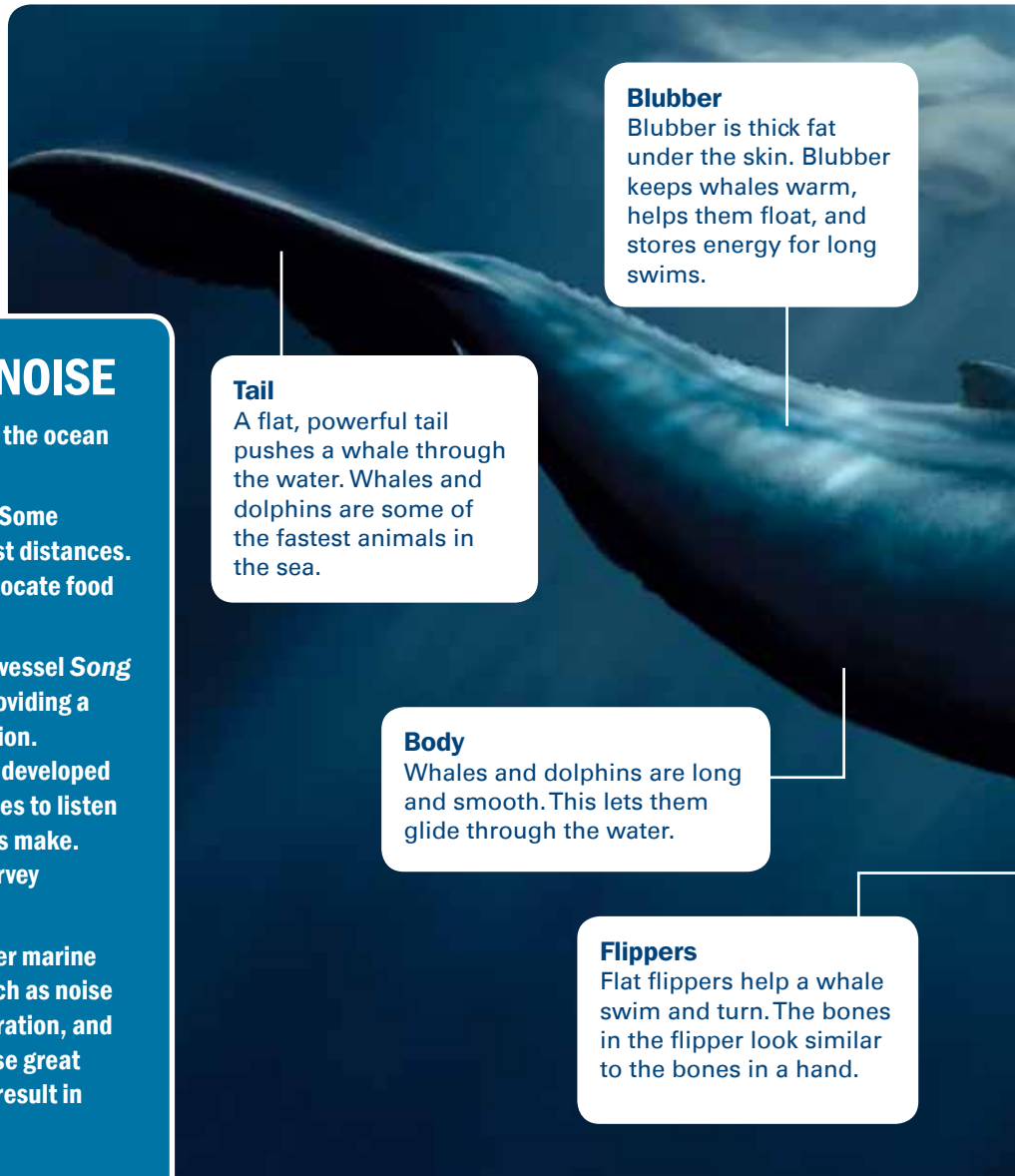
GOOD NOISE VS. BAD NOISE

Sound travels a long way underwater and the ocean can be a noisy place.

Whales use sound in very different ways. Some whales produce songs that travel over vast distances. They also use echolocation, like bats, to locate food and find their way.

For more than 20 years, IFAW's research vessel *Song of the Whale* has travelled the world providing a platform for marine research and education. The *Song of the Whale* scientists have developed expertise in using underwater microphones to listen to and record the sounds that the animals make. This helps them to track, identify, and survey different species.

One of the threats facing whales and other marine animals is noise pollution in the seas, such as noise from drilling, military activities, oil exploration, and coastal construction. This noise can cause great distress to whales and dolphins and can result in injury and even death.



Blubber

Blubber is thick fat under the skin. Blubber keeps whales warm, helps them float, and stores energy for long swims.

Tail

A flat, powerful tail pushes a whale through the water. Whales and dolphins are some of the fastest animals in the sea.

Body

Whales and dolphins are long and smooth. This lets them glide through the water.

Flippers

Flat flippers help a whale swim and turn. The bones in the flipper look similar to the bones in a hand.



its baleen with its tongue. The baleen traps the krill, and the whale swallows them whole.

Large whales have the biggest brains of any animal. Scientists believe cetaceans are very smart. Many of them live, play, and hunt in groups. Humpback whales work in teams to

catch food. Orcas hunt in packs to kill large prey.

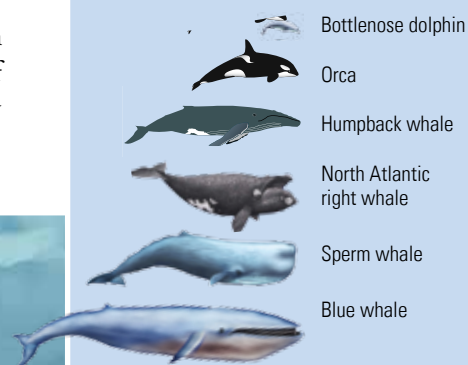
Dolphins introduce themselves with a special whistle when they meet other dolphins. Whales also use sound to find their way in their dark underwater world. They make clicks that bounce back, or echo off objects. The whales listen to the echoes in order to 'see' the objects. Using sound to 'see' is called **echolocation**.

Whales are found in every ocean, from the tropics to the poles and in five of the world's largest rivers. Whales know few boundaries: they can migrate

thousands of kilometres and dive to the depths of the ocean to feed.

Yet, these gentle giants face more threats than ever before: pollution, shipping traffic, a maze of fishing gear, climate change, underwater noise, and, even today, commercial whaling.

Whales Come in Many Sizes



Blowhole

A whale's nostrils are on top of its head, so it can breathe without lifting out of the water. The blowhole closes tight when the whale dives. Some whales can hold their breath for more than an hour!

Baleen

Baleen acts like a fine net that traps tiny sea animals.

Mouth

Humpback whales have huge mouths to take in enough food.

Throat

Humpback whales have folds in their throats. The folds can expand to take in big gulps of seawater.

Human Impact

The health and future of the ocean and its animal life are inextricably linked to our own. The ocean's resources are vast and plentiful but they are finite and deserving of our efforts to sustain them just as they sustain life on this planet. A recent scientific study concluded that more than 40 percent of the world's ocean are heavily affected by human activities.

Pollution

Litter is a serious problem along shorelines, coastal waters, estuaries, and beaches throughout the world. Known as marine debris, it is defined as any man-made, solid material that enters our waterways directly (e.g., by dumping) or indirectly (e.g., washed out to sea via rivers, streams, or storm drains). Ranging from plastic bags and bottles to discarded fishing line, marine debris can threaten marine organisms and humans alike.

Scientists believe that each year hundreds of thousands of seabirds and tens of thousands of marine mammals

die after swallowing or being entangled in marine debris. As much as 80 per cent of marine debris is rubbish discarded by people on land, then blown seaward by the wind or washed off in the rain, carried in rivers, drains, and sewers to the ocean.

Plastic accounts for nearly 90 per cent of all marine debris. UN experts estimate that in just one square mile of ocean there are around 46,000 pieces of plastic. One big cause of this waste is plastic bags. Each year the world uses about 1.2 trillion plastic bags on average – 300 bags for every person in the world.

One whale that died in Cairns, Australia, was found to have 6 m (19.7 feet) of plastic inside its stomach. More than 260 marine animals suffer from swallowing plastic, including loggerhead turtles and albatrosses that mistake plastic bags for the food they eat.

Over time, plastic breaks down into particles floating in the water that all creatures in the sea can swallow

– from tiny organisms such as krill to the blue whale. The worst areas of the oceans are described as 'plastic soup' by scientists because they are filled with tiny plastic pellets. Because they are so small, many animals mistakenly eat them.

Many hundreds of thousands of seabirds die each year due to oil being illegally dumped in the oceans.

Although it is often the oil spills from tanker wrecks that make the headlines, one of the worst problems is ships deliberately dumping their bilge oil.

Climate Change

Most scientists now agree that our planet is on an usual warming trend due to human activities which have resulted in increased greenhouse gases in the atmosphere.

Warmer air temperatures also lead to higher ocean temperatures. Rising air and water temperatures will alter ecosystems and destroy habitat, with dire consequences for both animals and people.

The North Atlantic right whale is one of the world's most endangered whales; only about 500 remain. The main threats right whales face are being hit by ships or getting tangled in fishing gear. Scientists on the IFAW research vessel, *Song of the Whale*, have helped to solve the problem by using acoustic buoys to listen for and locate the whales, providing information for ships to reduce the number of collisions.



IFAW's Marine Mammal Rescue and Research Team works to save stranded and injured marine mammals. The team releases rescued animals back into the ocean. Between January and July 2012, the team saved 87 stranded dolphins along the shores of Cape Cod, Massachusetts, one of the worst stranding hot spots in the world.

Marine mammals already are feeling the heat. In southern climes, IFAW scientists have documented impacts of global warming on southern right whales. Changes in water temperature lead to changes in their food web and lower birth rates, which may have long-term consequences for these animals.

In the Arctic, melting sea ice is having dire impacts on marine animals, such as seals. For 10 of the past 12 years, IFAW scientists have documented below-average ice concentrations off Canada's east coast.

Global warming is likely to blame. The ice floes are essential nurseries and breeding grounds for harp seals. Because the newborn pups cannot swim, without the ice, they cannot survive. According to Canadian estimates, in 2010 nearly 100 per cent of harp seal pups died due to lack of ice.

The melting ice also has disastrous effects on polar bears, the largest land predator in the world. Although

related to grizzly bears, polar bears are considered marine mammals because of their dependence on the ocean. They obtain almost all of their food from the ocean and even have tiny webs between their toes to help them swim.

Sadly, a recent study concluded that the loss of Arctic ice could drive polar bears to extinction within the next century and they were recently listed as 'threatened' under the U.S. Endangered Species Act.

Commercial Hunting

Commercial hunting, like whaling (see box at right), puts many marine animal species in danger. Many animal species face danger – and possible extinction – because of human activity. For example, thousands of seals are hunted each year in countries around the world.

The largest of these hunts takes place in Canada, where more than 1.6 million harp seals were killed in three years leading up to 2008.



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WHALING IS STILL A THREAT

Commercial whaling, which nearly wiped out the species in past centuries, was banned worldwide in 1986. However, some countries, such as Japan, still kill hundreds of whales each year, in the name of science. Despite the deaths of more than 15,000 whales in the last quarter century, little information has come from these controversial scientific whaling activities. Most Japanese whaling takes place in the remote waters of the Southern ocean, which surrounds Antarctica. In 1994, the Southern ocean was declared a sanctuary for whales by the International Whaling Commission.

Other countries, such as Iceland and Norway, also continue to allow commercial whaling. Whalers from these countries hunt in the North Atlantic.

In fact, IFAW research into the global whale watching industry shows that whales are worth much more to people alive than dead. Whale watching has grown into a massive international tourism industry worth millions of pounds. Each year, more than 10 million people go whale watching, with the income generated supporting coastal communities in 90 countries.

From the halls of government to the ice floes of Canada's Gulf of St. Lawrence and the Arctic, IFAW has worked for more than 40 years to protect harp seals and polar bears threatened by commercial hunting and climate change.



The seals are either beaten to death with clubs called *hakapiks* or shot. Up to half of those that are shot in water are never recovered.

Scientists warn that there is a huge risk that the seal population will be depleted up to 70 per cent over the next decade or so.

Canada's commercial hunt has been widely condemned internationally and even the majority of Canadians are opposed to it.

Although Canada's commercial seal hunt continues, the tide may be turning. In August 2010, a new ban on the trade in commercial seal products came into effect in the European Union. The ban prohibits importing, exporting, and sale of all commercial harp and hooded seal products in all the European Union countries. In 2011 the import and export of harp seal skins was also banned in Russia.

Even Sharks Need Saving!

Sharks range in size from the 15 cm (6 inch) cigar shark to the huge whale shark, which can grow to 20 meters (60 feet) long and is the largest fish in the sea.

Sharks are carnivores. However, they most often eat fish, including other sharks. People may fear getting bitten by a shark. But around the world there are fewer than 80 human attacks each year.

A shark has a boneless skeleton. Most sharks have a body shaped like a torpedo. This sleek shape helps the shark swim. Inside a shark's mouth are several rows of teeth, which can be pointed, flat or razor sharp. In some sharks, new teeth grow in place of older ones every week.

Whale sharks are huge but harmless to people. They eat only plankton and

A recent IFAW campaign resulted in China's largest shopping website, Taobao, banning the sale of all shark fin products, helping to protect some of the hundred million sharks killed for their fins each year.



live in warm waters near the equator, migrating huge distances from the Indian Ocean to the Caribbean.

But people are a danger to whale sharks. Because whale sharks cannot reproduce until they are 30 years old, there is a serious risk to their population if they are killed before having the chance to produce a new generation of off-spring. In India, one of the areas where whale sharks were most under threat from fishing, whale sharks are now protected by law. This makes them the first fish to have protected status in that country.

Another harmless giant under threat is the basking shark, which is the second largest fish. It grows as long as a bus and weighs as much as an elephant. Although protected in countries like the U.S. and Great Britain, basking sharks are killed in many places for their huge 2.4 metre fins and oil from their enormous livers.

More than 100 million sharks are killed each year, many of them just for their fins to make the highly priced shark's fin soup. Even the blue shark, which is the most common species, has declined by more than half in North America.

The international community has stepped into help basking sharks, whale sharks and also white sharks. Although many species of shark are protected from commercial trade by the Convention on International Trade in Endangered Species, at least 73 shark species are threatened with extinction.

Many other marine animals are endangered, including sea turtles, which have been important part of ocean ecosystems for over 100 million years. Hawksbill sea turtles live in the Atlantic, Pacific, and Indian oceans. They are often killed because of the value of their shells for tourist trinkets. The eggs are also poached from the nests on the beach.

Other marine mammals are endangered because they are killed as **by-catch** from commercial fisheries. Vaquitas are the smallest porpoise in the world and one of the top five most endangered cetaceans with only about 250 surviving. It is only found in the upper Gulf of California, Mexico.

From coral jewellery to nautilus shells, a range of unnecessary products from the sea endanger the incredible marine life beneath the waves.

Glossary

acoustic buoys: a float attached to the seabed that records noise in the ocean. Some are used to listen for and provide information on the location of whales

baleen plates: huge, fringed brushes that hang down inside a whale's mouth and provide a way for baleen whales (which have no teeth) to filter food from seawater

benthos: group term for plant and animal life that lives at the bottom of the ocean

blowhole: an opening for breathing on the top of the head of whales and dolphins

by-catch: marine animals caught unintentionally while fishing for another species

cetacea: the order of marine mammals that includes whales, dolphins, and porpoises

echolocation: A sensory system that helps whales and dolphins find food and communicate by making high-pitched sounds and then interpreting their echoes to determine the direction and distance of objects

marine debris: ocean rubbish and pollution that threaten many species

narwhal: a whale with a long spear-like tooth, which was thought to be the source of the unicorn legend

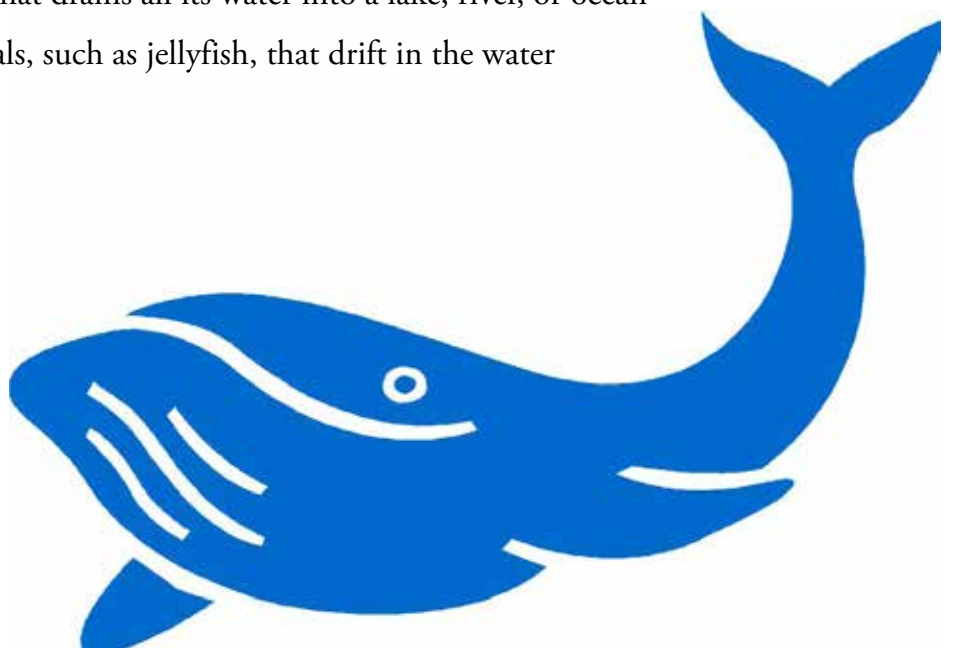
nekton: group term for free-swimming marine animals such as fish, whales, dolphins, squid, octopuses, and others

PCBs: toxic chemicals that may be found in plastic pellets polluting the ocean

phyto-plankton: the tiniest marine plants, no more than the size of a pinhead, but which as a group provide half the oxygen in the world

watershed: an area of land that drains all its water into a lake, river, or ocean

zooplankton: marine animals, such as jellyfish, that drift in the water





IFAW is an animal welfare and conservation charity that saves individual animals, animal populations and habitats all over the world. IFAW is committed to ensuring that the world beneath the waves is protected from the threats of human activities. We provide hands-on care of individual animals, find practical solutions for making oceans safer for whales, dolphins, seals, sea turtles and other marine animals and advocate for international policies that protect marine species.

Animal Action Education