

Teacher Notes

Key learning outcomes

- Learn about the diverse behaviours and traits animals use to survive in the oceans
- Connect physical features of different marine environments with characteristics of the animals living within them
- Understand the relationships between living things in the oceans
- Appreciate the impact human activities have on marine life, and our reliance on healthy ocean ecosystems for our own health and wellbeing

Key curriculum areas

- Science: Science Understanding (Biological sciences), Science as a Human Endeavour
- Mathematics: Number and algebra, Measurement and geometry
- English: Language, Literature, Literacy
- Cross Curriculum Priority – Sustainability: Systems, World views, Futures

Publication details

Ocean Animals

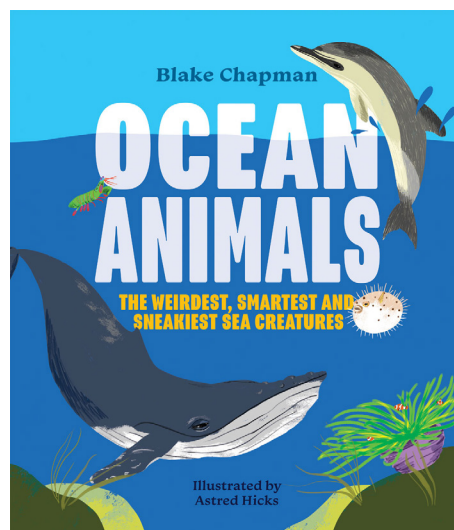
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Ocean Animals

The weirdest, smartest and sneakiest
sea creatures

Blake Chapman

Illustrated by Astred Hicks

Dive into the incredible world of ocean animals!

Ocean animals are truly awesome. They come in every size, colour and shape imaginable. They are also some of the weirdest, sneakiest and smartest animals on the planet!

This book focusses on the features and skills that make these creatures extra-incredible. You will discover animals that are masters of defence and others that use high speeds to eat or avoid being eaten. There are sea creatures that use their size as an advantage, both big and small, and others that are just really, really smart!

Whether you're a fan of fish, a connoisseur of crustaceans, mad about molluscs or just love jellyfish, *Ocean Animals* has got you covered. You may even discover some fantastical creatures you never knew existed.

Full of fun facts, 'sea-lebrity' species profiles and amazing pictures, you will also learn about issues threatening marine life and tips on how to help protect our amazing ocean environments.

Readers in Years 3 to 6

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About the author and illustrator

Blake Chapman has a PhD in marine science, with a focus on shark development and neuroscience. She has worked hands-on with a wide range of aquatic animals and has a passion for promoting conservation through education. Most of all, she loves all things wonderful, wacky and wild! Blake's first book, *Shark Attacks: Myths, Misunderstandings and Human Fear*, was published in 2017 by CSIRO Publishing. She is also the Sharks Editor-at-Large for *Australian Geographic*.

Astred Hicks is an award-winning book designer, illustrator and author. She has been designing books for over 10 years through her Sydney-based business Design Cherry.

Pre-reading activities

To prepare students for reading *Ocean Animals*, they should familiarise themselves with what might define a marine environment in contrast to other aquatic systems – such as ponds and streams – and with non-aquatic ecosystems such as forests and deserts.

Invite students to share stories of their trips to the beach, or travels over water by boat or aircraft. Discuss their observations from different perspectives, such as from a beach or what they saw as they flew over vast stretches of water. They can express themselves in speech, or visually through art, using different symbols and terms to communicate aspects of an ocean environment.

Provide documentaries or even go on an excursion to experience marine ecology, encouraging students to list or categorise familiar animals they come across.

Discussion questions

Science

1. Instruct students to describe a walk along a beach, with all of the different animals they might see as they travel, including the less fortunate ones that wash up out of the water. Ask them what makes them similar, and what makes them different. (Page 5)
2. Come up with a simplistic definition of an ocean animal, such as 'Any animal that has fins'. Challenge students to come up with problems with your definition and improve upon it. (Page 8)
3. Many marine animals pose some kind of risk to being handled or approached. Ask students why they think animals in the ocean might have evolved such characteristics that could harm humans. (Pages 13–15)

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4. Our oceans are home to some of the largest animals ever to have lived on Earth. Their size can be hard to imagine, so work with students to discuss comparisons to several large animals found in *Ocean Animals*. (Pages 27–38)
5. People historically believed the oceans were full of fantastical creatures. Ask students to contribute to a list of fantasy creatures of the ocean, and discuss how certain animals might have been mistaken for them in past centuries. (Pages 39–50)
6. Animals use a variety of methods to move quickly through the water. Starting with fish fins, discuss with students the movements and necessary body parts that different marine animals might use to move, and how that movement – whether for speed, defence or digging – helps them survive. (Pages 51–60)
7. Discuss with students how they find their way around familiar and unfamiliar territories, and how that might change when the lights go out. Discuss the echolocation used by cetaceans (whales and dolphins), and how unnatural loud underwater noises might affect them. (Pages 72–74)
8. Being careful to instruct students not to give away too much about their address, invite them to share distances they might travel in a typical day, week or year. Who has travelled the furthest? Who barely leaves their town or suburb? Introduce concepts of currents in the ocean, and discuss which kinds of animals they might expect to travel long distances. (Pages 75–91)
9. Movies are often a source of information on marine life. From *Jaws* to *Finding Nemo*, many students have heard of – if not seen – a movie about life in the ocean. Ask students to share their favourite ocean story, and discuss with them opportunities for checking their knowledge in *Ocean Animals*. (For example, page 108 has information on the clown fish that star in *Finding Nemo*)
10. Humans have had great impacts on coastal and other marine ecosystems, from overfishing to pollution. Ask students to list ways we risk upsetting the balance of marine ecosystems, and to come up with ways we might need to change behaviours to become more sustainable. (Page 133)

English

1. *Ocean Animals* provides the scientific names of a variety of animal classifications in categories in the back of the book. Invite students to try to pronounce them. Ask them why they think these words sound like they come from another language. (Page 138–139)
2. Read the caption beneath the photograph of an elephant seal on page 31. Attributing human-like behaviours and characteristics to animals is called anthropomorphism, and is a good way to create sympathy for animals. Discuss with students how anthropomorphising animals could also sometimes mean we might imagine them having feelings and thoughts they might not have.

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3. At the back of *Ocean Animals* there's a glossary of terms which students may or may not understand already (also written in bold throughout the text chapters). Ask the students to find words that are new to them, and discuss what kinds of texts they'd use these scientific words in.

Mathematics

1. Animal sizes and masses can be hard to imagine. Pick several sizes of large and small marine organisms from Chapter 3 and invite students to suggest comparisons in their environment that would make it easier to imagine these qualities.
2. *Ocean Animals* contains some numbers that are too huge to easily imagine. Discuss with students the measurements on page 9 within the sentence, "It is estimated that in the 1370 million cubic kilometres of water in the oceans, there are 50 quadrillion (or 50 million billion) tonnes of salt!"; working with them to find strategies for placing such large numbers on a number line.

Activities

Science

Creature cards

Sea creatures use a variety of methods to avoid becoming lunch! Some hide, others scare, others use prickles or poisons to say 'stay away'.

Ask students to come up with a list of prey in the ocean and the predators that dine upon them. Divide the list among groups or individuals and ask them to investigate how the prey evade their predators. Use Chapter 2 in *Ocean Animals* for ideas.

Work with students to come up with some rules for a card game based on the predators and prey. Provide them with playing-card-size (or larger) bits of card, as well as other art materials, to create playing cards and tokens as needed for the game.

Fantastic adaptations

Thanks to its size and vast depths, the oceans have inspired stories of mysterious creatures and enormous monsters throughout history. Mermaids, sea serpents and 'the kraken' are a few examples.

Read through Chapter 4 of *Ocean Animals* with the students and discuss the strange adaptations of various animals in the oceans. Discuss with them why we might find them so fascinating, and why many discoveries are exaggerated and transformed into legends.

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Provide students with art supplies to come up with their own 'creatures of legend' based on an actual animal. Encourage them to think critically about how their creature could be mistaken for a real animal, and to develop a 'fake' news article about it that portrays this misinformation.

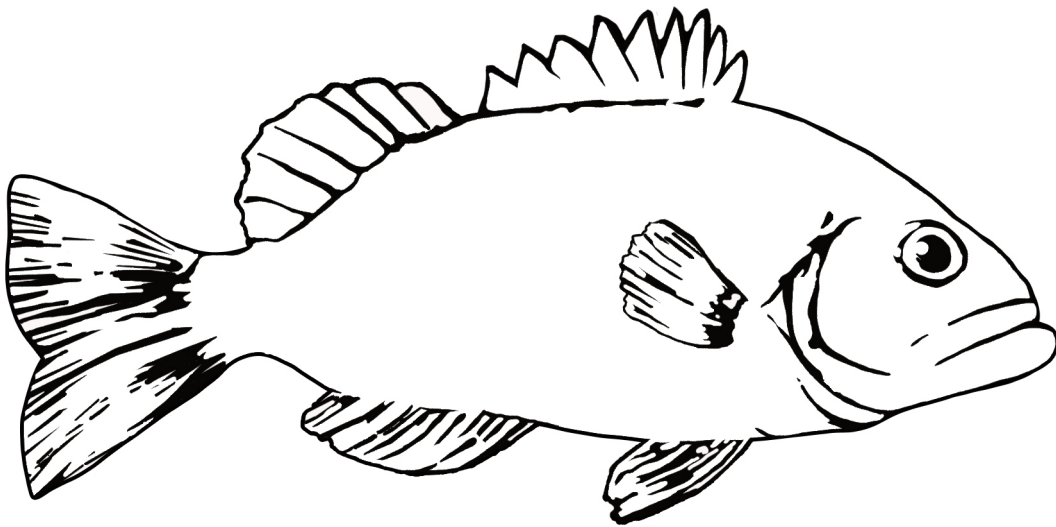
Fish 'n bits

Safety and ethics:

All biological materials need to be dealt with in a classroom in a safe and responsible manner. Please check with your school's health and safety policies in maintaining hygiene and safe disposal of biological waste.

Some students and their families may have religious or personal concerns over handling and dissection of animal remains. Remain sensitive to these needs by discussing participation in the days prior to the activity with students and their families.

Provide students with a black-and-white outlined diagram of a bony fish, or use the one below, and ask them to fill in the missing descriptors of the fins. Ask them to name any other body parts they can identify.



Visit your local fishmonger and purchase an assortment of sustainably caught fish, preferably fully intact. Lay the examples of marine life out in tubs or on plastic sheeting for easy observation. Ask students to compare anatomical features, such as fins, eyes, scales or other appendages.

If your school has appropriate tools and biological dissection policies, work with the students to examine internal anatomical features as well.

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Current affairs (demonstration)

Materials

- Small to medium size fish tank
- Tap water (enough to fill the fish tank more than once)
- Refrigerator
- Kettle
- 2 x small plastic containers
- 2 x eye droppers or pipettes
- Red food colouring
- Blue food colouring

Method

1. Fill a small plastic container with water and add a drop or two of blue food colouring. Place this into a refrigerator overnight or until cold.
2. Fill a small fish tank with room-temperature water from a tap.
3. Prior to the demonstration, fill a small plastic container with hot water from a recently boiled kettle and add a drop or two of red food colouring.
4. Ask students to watch carefully as you use an eye dropper to squeeze a generous amount (at least a few millilitres) of hot water under the surface of the room-temperature tap water. Does the liquid seem to rise, sink or stay in place?
5. Empty the fish tank and refill it (note, if the tank is large enough you might be able to repeat the process on the far side of the tank for comparisons).
6. Repeat the process with a second eye dropper as several millilitres of cold water is squeezed into the tank below the surface. Does it seem to rise, sink or disperse more or less than the hot water?
7. Discuss with the students how hot water and cold water might flow differently.

Note: This activity can be conducted in different ways depending on the equipment. Creating a divider for the tank and filling each side with hot and cold water before removing the separating barrier can also generate discussion on temperature and layering.

Connect the conversation with how ocean temperatures might vary around the world, and what effect this could have on the way water moves. Use this as an introduction to reading Chapter 7 of *Ocean Animals*.

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English

Ocean Animals review

Collect together some book reviews from different sources. *Double Helix* magazine contains book reviews written by kids in every issue – order some back copies to share.

Discuss with students what details they might want to know in a review. Work with the students to find examples of facts and descriptions in the book and place them in a list titled 'objective'. Ask them to describe things they personally enjoyed or disliked. Place this in a list titled 'subjective'. Discuss how these lists are different before asking students to use their own lists to write a review for *Ocean Animals*.

Painting with words

Ocean Animals is full of images of sea animals in a variety of marine environments, illustrating different bodies, behaviours and relationships.

Divide students into pairs, or a group with one student as the reader. The reader finds a picture and comes up with a way to describe it without explicitly naming the animal or objects in it. They can only describe the image's subject using adjectives and general or high-level nouns. For example, for the crocodile picture on page 101 they might say, 'the picture has a scaly reptile with lots of sharp teeth, and only its eyes can be seen above the water'.

Other students are required to use this description to find the picture from a selection, or within the book.

Mathematics

Sea facts

Ocean Animals is full of numerical facts about our oceans and the creatures in it. Ask students to collect their favourite figures describing speeds, sizes or characteristics of the oceans and ocean animals.

These numbers on their own might not make a great deal of sense. Ask students to come up with illustrations that might help others understand the fact on a scale, to know if it is big or small, fast or slow by comparison with other phenomena.

Teacher Notes

How big is a ... ?

Whales include some of the biggest animals ever to exist on Earth. *Ocean Animals* describes a number of super-sized animals, including whales, seals and the world's largest fish, the whale shark.

Using various measuring tools, such as scales and tapes, work with students to measure and weigh familiar objects (including themselves!). Use these statistics to develop ways of physically presenting sizes in familiar ways. Have them research other heavy or long animals – living and extinct – to compare.

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Australian Curriculum Links

Year level	Learning area: science	Other learning areas
Year 3/4	<p>Science Understanding: Biological sciences</p> <ul style="list-style-type: none"> Living things can be grouped on the basis of observable features and can be distinguished from non-living things (ACSSU044) Living things have life cycles (ACSSU072) Living things depend on each other and the environment to survive (ACSSU073) <p>Science Understanding: Chemical sciences</p> <ul style="list-style-type: none"> Natural and processed materials have a range of physical properties that can influence their use (ACSSU074) <p>Science as a Human Endeavour</p> <ul style="list-style-type: none"> Science knowledge helps people to understand the effect of their actions (ACSHE051, ACSHE062) <p>Science Inquiry Skills</p> <ul style="list-style-type: none"> With guidance, plan and conduct scientific investigations to find answers to questions, considering the safe use of appropriate materials and equipment (AC SIS054, AC SIS065) Represent and communicate observations, ideas and findings using formal and informal representations (AC SIS060, AC SIS071) 	<p>English</p> <ul style="list-style-type: none"> Understand how different types of texts vary in use of language choices, depending on their purpose and context (for example, tense and types of sentences) (ACELA1478) Understand differences between the language of opinion and feeling and the language of factual reporting or recording (ACELA1489) Understand how texts vary in complexity and technicality depending on the approach to the topic, the purpose and the intended audience (ACELA1490) <p>Mathematics</p> <ul style="list-style-type: none"> Recognise, represent and order numbers to at least tens of thousands (ACMNA052, ACMNA072) Use scaled instruments to measure and compare lengths, masses, capacities and temperatures (ACMMG084) Compare objects using familiar metric units of area and volume (ACMMG290)
Year 5/6	<p>Science Understanding: Biological sciences</p> <ul style="list-style-type: none"> Living things have structural features and adaptations that help them to survive in their environment (ACSSU043) The growth and survival of living things are affected by physical conditions of their environment (ACSSU094) Sudden geological changes and extreme weather events can affect Earth's surface (ACSSU096) <p>Science as a Human Endeavour</p> <ul style="list-style-type: none"> Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions (ACSHE098) Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE083, ACSHE100) <p>Science Inquiry Skills</p> <ul style="list-style-type: none"> Identify, plan and apply the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks (AC SIS086, AC SIS103) 	<p>English</p> <ul style="list-style-type: none"> Understand the uses of objective and subjective language and bias (ACELA1517) Identify and explain how analytical images like figures, tables, diagrams, maps and graphs contribute to our understanding of verbal information in factual and persuasive texts (ACELA1517) Select, navigate and read texts for a range of purposes, applying appropriate text processing strategies and interpreting structural features, for example table of contents, glossary, chapters, headings and subheadings (ACELY1712) <p>Mathematics</p> <ul style="list-style-type: none"> Choose appropriate units of measurement for length, area, volume, capacity and mass (ACMMG108) Pose questions and collect categorical or numerical data by observation or survey (ACMSP118)

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Year level	Learning area: science	Other learning areas
All	<p>Cross Curriculum priority: Sustainability</p> <p>01.2 All life forms, including human life, are connected through ecosystems on which they depend for their wellbeing and survival.</p> <p>01.3 Sustainable patterns of living rely on the interdependence of healthy social, economic and ecological systems.</p> <p>01.4 World views that recognise the dependence of living things on healthy ecosystems, and value diversity and social justice, are essential for achieving sustainability.</p> <p>01.7 Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments.</p>	

Related books from CSIRO Publishing

A Hollow Is a Home (2019)

Bouncing Back (2018)

Animal Eco-Warriors (2017)

Phasmid (2015)