

## 1. INTRODUCTION

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### 1.1 Main idea

This unit introduces students to the features of whales and dolphins exploring what makes them unique, in relation to each other and all other creatures, as well as the similarities between different species and humans (as mammals). Explain to students that this theme is the introductory part of an overall topic that will lead them to understand a range of issues with particular reference to Australian whales and dolphins. An outline of the content covered within each unit of work is listed below:

<b>Unit 1</b>	<b>Unique features of whales and dolphins.</b> This introductory unit of work enables students to investigate the anatomy, communication, feeding and migratory habits of whales and dolphins.
<b>Unit 2</b>	<b>Whale &amp; dolphin conservation and protection.</b> This unit enables students to learn about the history of whaling, current conservation and protection rules and the agencies responsible. It addresses issues such as the types of research conducted in various countries and the concerns and actions taken by the international community to promote the conservation and recovery of whales and dolphins.
<b>Unit 3</b>	<b>Whale watching.</b> This unit enables students to investigate information regarding rules and regulations applied to the practice of whale watching. It provides opportunities for students to explore the benefits and impacts that whale watching as a tourism industry has upon these marine mammals.

### 1.2 Key understandings

- Whales and dolphins are unique, charismatic creatures.
- Australian waters are home to over 45 species of whales and dolphins.
- Whales and dolphins can be grouped into 2 categories – those with teeth and those without. Dolphins, toothed & baleen whales are physically different from each other and as a result, have different diets.
- Some whales and dolphins migrate around the Australian coastline at different times of the year as part of their annual life cycle.
- Because they live in the marine environment, whales and dolphins have had to develop novel ways of communicating with each other.

### 1.3 Focus questions

- What are the different types/species of whales and dolphins found in Australian waters?
- What are the physical features of whales?
- What are the migratory patterns of whales – why do they migrate and where can they be seen throughout the year?
- What are the differences between dolphins, toothed whales and baleen whales?
- What do these different whales and dolphins eat? How do we know?
- How do whales and dolphins communicate with each other?

### Key terms

Cetacean, toothed, baleen, pectoral fins, fluke, blubber, blowhole, krill, entanglement, stranding

### Key Learning Areas (KLAs)

- Studies of Society and Environment
- Science & Technology
- Mathematics
- English
- Visual Arts

## 2. SAMPLE LEARNING AND TEACHING SEQUENCE - TUNING IN

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### 2.1 What do we know about whales and dolphins already?

Pose questions to the class such as:

**Q** Name some facts – What do we already know about whales and dolphins?

Record facts nominated by students on a board, whiteboard or a flipchart. Then ask students to assess the facts listed and to choose how to categorise them. Prepare a separate flip-chart sheet for each category, and ask students to sort the listed facts and record them on the relevant chart. Some categories may be covered in more detail as part of the remaining units (“Whale conservation & protection”, and “Whale watching”). Where category sheets relate to these alternative units, store these sheets for future reference and display further in this unit and within the overall topic.

### 3. PREPARING TO FIND OUT

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How are whales and dolphins different from each other?

**Resource: Science Lab – laptop**

- Ask students to visit the Science Lab and click on the laptop (interactive object).
- Ask students to read the information in this section and explore the details hidden behind each type of whale (baleen & toothed).
- As students begin their online investigation within this object, ensure that students click beyond the page that shows the two images (toothed and baleen). These next screens reveal a series of images of different whale & dolphin species. Clicking on each image will reveal common and scientific names and other information, including length (required for the following activity).

To engage students to fully explore this section, pose the following questions:

1. What is the difference between baleen & toothed whales?
2. Name four (4) species of baleen whale.
3. Name four (4) species of toothed whale.
4. What is the length of the following whales and dolphins?

▪ Killer whale	)	<b>Toothed</b>	Length = 9.8 metres
▪ Sperm whale	)		= 18 metres
▪ Common dolphin	)		= 2.6 metres
▪ Humpback whale	)	<b>Baleen</b>	Length = 16 metres
▪ Blue whale	)		= 33 metres
▪ Pygmy right whale	)		= 6.4 metres

5. Locate images of each of the above six (6) whales and dolphins. This can be done using external library references, or by printing the specific content pages displaying those species.

#### 3.1 Gathering feedback on findings (Tasks 1 to 3) **KLA = English**

























Ask students to share their findings with the whole group. As they share their findings, prompt them to state how each piece of feedback is to be sorted based on the categories prepared in the *tuning in* activity. Record this new information onto the existing flip-charts as a visual record of student knowledge development.

**3.2 Making a chart on different types of whales and dolphins (Tasks 4 & 5) KLA = Maths**

- As a whole class, use the information gathered within tasks 4 and 5 to prepare a chart to record the different species of whales and dolphins in order of length. Include the name and type (baleen or toothed) in the labelling.
- Use images (located from content printouts) within the labels to assist in developing identification skills.
- Record this on paper so it can be referred to in the future.

Once whales are ordered according to length, the data can be charted using one of the following methods (based on student ability levels):

1. Create a line or bar graph. Use a Y and X axis, with X axis measuring in units of metres for length.
2. Create a line graph using symbols to illustrate ratio and images to represent each whale. Where 1 car length equals approximately 4 metres. X axis shows number of car lengths to help illustrate “real length” of each whale. Describe concept of rounding and use this to round up/down to the nearest quarter of a car. Include this information as a key at the foot of the chart: **Key:** Length of whale shown in car lengths if 1 x car = 4 metres
3. Upper Primary can extend this into a physical outdoor maths activity – using materials such as pegs and string to “peg out” the length of each whale, measuring outside on a school oval or against a hall or gym building to create a visual graph. The graph should be labelled by creating cardboard titles with the name and length of each whale, also pegged into the ground.

Type	Length (metres)									
Killer Whale	9.8 (2.45 cars)									
Sperm Whale	18 (4.5 cars)									
Common Dolphin	2.6 (0.65 cars)									
Humpback Whale	16 (3.75 cars)									
Blue Whale	33 (8.25 cars)									
Pygmy Right Whale	6.4 (1.6 cars)									

### 3.3 Setting the inquiry

The following lists describe the tasks to be completed as a result of the research conducted during the upcoming *finding out* and *sorting out* stages of inquiry.

#### For upper-level students (Yr 6-8)

Explain to students that the research activities they are about to undertake (working individually) will equip them with the information they need to develop and deliver the following item(s).

- A script for a TV presenter. Provide students with the following brief: You have been offered a job as a TV presenter on the TV program, Totally Wild. The producer has asked you to do a series of 3 segments on Australian whales and dolphins, but the person who normally does the research for the program has gone on holidays and you need to do your own research for the segment. **The first segment you need to prepare for is about the unique features of whales and dolphins that can be found in Australian waters.** The producer has let you know that the other 2 segments aren't required just yet, and that s/he will give you a brief for these at a later date. You need to do your research, and then write your script. Your segment will run 5 mins. You can present the segment to your class as a practice run before the camera starts rolling.
- Prepare an activity sheet on whales and dolphins for younger students. Provide students with the following brief: Using the computer, **develop a series of three A4-sized worksheets for Year 2 & 3 students to use during class.** The idea is for students to use these worksheets as they **learn about the unique features and types of Australian whales and dolphins.** Students can decide how to divide the information into the 3 different worksheets.

Each worksheet is to contain a passage of facts, and should be presented to include some activities, for example a passage followed by some simple comprehension questions at the end of the passage, matching facts to illustrations of different types of whales, or information presented as a cloze passage.

If students are not sure how to set the information out, encourage them to think about the types of worksheets they remember from Year 2 and Year 3, or to visit the Library to access some workbooks for those grades. Once they have collected your data, remind them to consider the level of word difficulty and reading ability of students in Yrs 2 & 3.

Remind them to also consider the presentation of the worksheet (font style, size and layout) to make sure that it is relevant and appealing to younger students.

**For mid-level students (Yr 3-5)**

The following activities can be done in pairs.

- Prepare a multimedia presentation for the class (for example, using MS PowerPoint). Provide students with the following brief: Your task is to gather information from the resources provided to produce **a presentation that provides the audience with an understanding of the unique features of whales and dolphins found in Australian waters**. Sort your information into the appropriate structure for a presentation. Each group will then provide an oral presentation to the class which will accompany the display of their slideshow.
- Prepare a quiz. Each pair will create a Q & A card to be used during the quiz. Before the cards are created, the teacher (or class) nominates a pair to act as the Quiz Masters who will ask the questions during the quiz and act as caretaker of all the Q & A cards. Students work in pairs to conduct their research and create one card each (writing the question on the front and answer on the back). **Each question is based on a new fact they have learned about whales and dolphins found in Australian waters**. Quiz Masters will collect all the questions (and answers), sort through them to make sure there are no duplications, put them in order and guard the cards until the game is ready to commence. The quiz can be conducted in class or before a school assembly to share the information learned with the school.

**For lower-level students (Yr K-2)**

- Prepare a scrap book. Students collect images and facts to produce a **scrap book on the facts learned about the features of whales and dolphins found in Australian waters**. They are to accompany these illustrations with text written in report writing style. Students can add to the book throughout each of the remaining 2 units on this topic. Once compiled, students can present their books to the class and display this within the classroom or in the Library. This would also form part of the student's portfolio of work for the term/year.

## 4. FINDING OUT

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### 4.1 Resources

Content areas	Object	Location
Types of whales & dolphins	PC	Science Lab
Whales found within Australian waters	Chart & Binoculars	Bridge
Parts of a whale	Skeleton Poster	Science Lab
Why whales migrate	Chart	Bridge
Migration patterns and schedule	Chart Globe	Bridge Research Centre
What they eat (toothed and baleen)	Fish Tank & Test Tubes	Science Lab
How they communicate with each other	Notice Board Sonar Receiver Headphones	Science Lab Research Centre Bridge

To complete the tasks provided to students (explained in the section “Setting the inquiry”), students will use a variety of web-based and library resources to investigate the questions listed below.

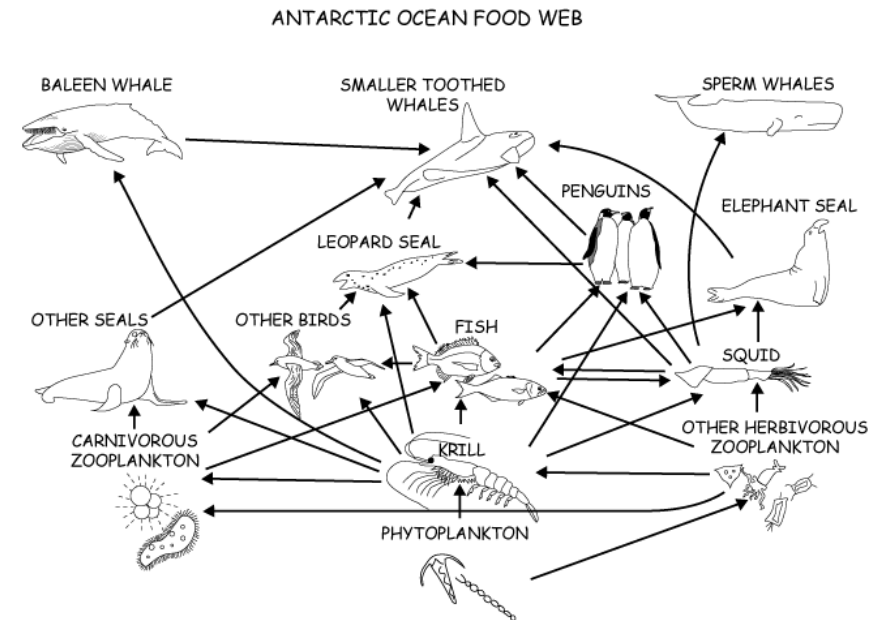
1. New application – objects and location as per the above table
2. <http://www.environment.gov.au/coasts/species/cetaceans/>
3. <http://www.environment.gov.au/coasts/publications/pubs/guide.pdf>
4. <http://www.environment.gov.au/coasts/species/cetaceans/rescue.html#entanglements>
5. <http://www.environment.gov.au/coasts/publications/pubs/fishing-for-facts-brochure.pdf>
6. <http://www.environment.gov.au/coasts/publications/pubs/poster.pdf>
7. <http://www.environment.gov.au/coasts/species/cetaceans/pubs/australian-whale-sanctuary.pdf>
8. <http://www.environment.gov.au/coasts/species/cetaceans/seismic-sonar.html>

## 4.2 Finding out questions

- Q What are some of the physical features that help us identify whales and dolphins?
- Q Name and describe 5 parts of whale or dolphin anatomy.
- Q What is ambergris?
- Q What types of food do baleen & toothed whales and dolphins each eat?
- Q Describe how baleen whales take in their food.
- Q Do some whales travel in family groups, and if so, which species? Which whales are solitary creatures? What about dolphins?
- Q Are whales fast or slow swimmers? Find out the speed of at least two (2) different whale or dolphin species.
- Q Do whales affect the fish population?
- Q Does fishing affect whale and dolphin populations?
- Q What is meant by the term “entanglement”? What are some of the causes? What is Australia doing about entanglements? What can we do to reduce the causes of whale and dolphin entanglement?
- Q What is known about why whales and dolphins strand? Is there a particular group of whales or dolphins that strand more often than others? What is the procedure for assisting whales and dolphins that have stranded?
- Q Locate a map of the Australian Whale Sanctuary. What is the purpose of the Australian Whale Sanctuary? What types of activities are permitted within these waters? And what activities are not permitted?
- Q Why do some whales and dolphins migrate?
- Q What methods can be used to locate whales? How can we measure their movement and migration patterns?
- Q Where are you likely to see whales and dolphins within Australian waters, and at what time of year?
- Q Describe how whales are able to communicate with each other. Do these techniques differ between different species, and if so, how? Why would there be differences?
- Q Name 1 fact that you learned about how whales communicate.
- Q Locate and listen to a whale song.

## 5. SORTING OUT

- Whole-class knowledge discussion.** Ask students to share a piece of information learned during their *finding out* stage. List facts on one side of the board, then ask students to nominate how the information might be sorted into categories. Ask for various volunteers to assist in drawing and developing a brainstorm chart, ticking off each listed fact as it is assigned. Keep a record of these findings as this chart will be displayed for future reference further within this unit.
- Design a food chain/web.** Design a presentation (can be computer generated or made from art materials such as cardboard) that illustrates the food chain for a whale or dolphin. Students devise their own method of sorting their data. Younger students may narrow the data to only display the items in the food chain for a toothed whale (perhaps in a sequential/line format), whereas students from the upper primary/lower secondary years should include data to produce a more comprehensive chart. If one animal in the food chain disappeared, how would this affect the others?
- Whales & their food.** Devise a game that the whole class can play, based on the idea of matching whales and dolphins to the types of food they each eat. The object of the game is to match the cards of particular whales and dolphins to the corresponding card that contains an illustration of the appropriate food type they prefer to eat. Students first decide how to categorise the whales and dolphins. Then, using cut-out images printed from internet research, design and create 2 sets of cards – one set of cards contains illustrations of the different whales & dolphins, and the other set contains illustrations of various food types. When all cards are created and mounted on the board in a random manner, students discuss and decide which food types are eaten by the examples or categories of whales and dolphins.
- Migration diary.** Based on the information gathered regarding whale migration patterns throughout the year, prepare a holiday itinerary that could be used as a guide to their annual migration movements, listing the towns you would visit in each month and which whales you would see at each stop.
- Size comparison chart.** Create a pictorial chart that shows a number of different whale and dolphin species in order of size (length). Students devise their own key for the scale (for example, cars used in *preparing to find out* activity).
- Design a promotional poster** that describes some of the unique features of whales and dolphins found in Australia. Include facts, illustrations and a catch-phrase (like those used in an advertising campaign) that describes why whales and dolphins are great! This can be displayed in the school library.



## Theme 1: Unique Features of Whales & Dolphins

7. **Write a recount** of a time where you had a close encounter with a whale. Describe the effect this had on you at the time and afterwards. Did this change your attitude towards whales and dolphins, and if so, how?
8. **Create a mobile.** Using a combination of art materials, design, create and assemble a mobile that includes a range of sea creatures that live within the whales' and dolphins' environment. All items are to include a label to assist in identification. Suitable for younger students.
9. **Paint an underwater scene.** Using water colour paints, (younger) students can draw an underwater scene of whales and dolphins in their natural habitat. Their painting should include a number of the creatures investigated during their *finding out* activities. These scenes can be used in later units to produce more comprehensive displays (such as an information booth or creation of a larger classroom display).

## 6. GOING FURTHER

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1. **Global species and migration patterns.** Extend the investigation about whale and dolphin species to discover the similarities or differences between the whale and dolphin species that live in the Australian Whale Sanctuary and those living in other parts of the world, for example in the Northern Hemisphere around the Arctic Circle.
2. **Write an information report** about the features of whales and dolphins found in Australia. Students construct the information report by first sorting their information into categories within a table format and develop layout and presentation ideas using a pictorial storyboard approach. This activity is suitable for younger students.
3. **Investigate the methods used to track whales and dolphins.** Ask students to write a couple of paragraphs describing the methods used by researchers to locate whales and dolphins and how they track their movements. Comment on how effective you believe these techniques are.
4. **Research potential sonar and seismic impacts on the marine environment.** Based on students' knowledge about whale and dolphin underwater communication, ask them to research and write an information report that describes this issue and the effect this technology has upon our whales and dolphins. Students share their findings by making an oral presentation to the class.
5. **Create a reading list. Working in pairs, students create a list of five (5) references that other people can use to help them find out more about the unique features of whales and dolphins in Australian waters.** Your list needs to include five (5) items. When you come to select the items for your list, you will need to record the following items for each book or article you want to include in your list:

## Theme 1: Unique Features of Whales & Dolphins

- a. The **title** of the book or article
- b. The **full name** of the author
- c. The **location** of the book or article (for example, in the school library, or the URL of the website link)
- d. Then, write a brief **summary** of the information discussed within that text

Once students have located resources and developed a list, support them to number the list and sort it alphabetically.

## 7. MAKING CONNECTIONS

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1. **Reflection** of knowledge development: Retrieve the fact sheets drawn up during class discussions at the *tuning in* and *sorting out* stages of this unit of inquiry. As a whole class, review and compare the facts known by the class about Australia's whales and dolphins both before and after the *finding out* stage.

2. **Complete the inquiry activity** described in "Preparing to find out – Setting the inquiry" (details provided on pg 5 & 6)

**For upper-level students (Yr 6-8):** Explain to students that the research activities they are about to undertake (working individually) will equip them with the information they need to develop and deliver the following item(s).

- A script for a TV presenter
- Prepare an activity sheet on whales and dolphins for younger students

**For mid-level students (Yr 3-5):** The following activities can be done by asking students to work in pairs

- Prepare a multimedia presentation
- Prepare a quiz

**For lower-level students (Yr K-2):**

- Prepare a scrap book

3. **Write a journal.** Working individually, students reflect on their own learning journey as they work through each stage of the inquiry completed to date. Entries will be added as the remaining themes of this topic are explored (Theme 2: Whale watching, and Theme 3: Whale conservation & protection).

## 8. TAKING ACTION

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1. **Write an article for the school newsletter.** Students seek permission to write a series of three articles for the school newsletter. Explain to students that as a whole class, they are to complete the following tasks as part of this activity. A simplified version of this activity will need to be devised by teachers of students in the lower primary school years.
  - a. **Gather** and review the facts learned about the unique features of whales and dolphins of Australian waters.
  - b. **Discuss** and agree upon the most suitable structure to be used when writing the article (for example, exposition, narration, information report). This step in the process can be removed for younger students by teachers advising this format and providing an outline of the structure to be used.
  - c. Once the structure has been agreed upon, students **design** a table/storyboard to visually allocate each piece of information to the appropriate section of the structure. Ask questions such as “What are the key messages that we want to convey?”
  - d. **Plan and design** the layout of the article – what should the heading be? How many images should we include? What is the main message we want to convey?
  - e. **Identify** the tasks to be completed in order to produce the articles and ask for volunteers to complete these tasks. Tasks might include the following:
    - i. **Publication** - Obtain permission from the office – find out the details such as publication dates, number of words/length limitations for the article, provision of final copy for publication in the newsletter.
    - ii. **Research** - Collate all facts in a single source (may be a document) ready for final layout/presentation editing.
    - iii. **Research** - Locate any facts or images that are not already researched but should be included in the article.
    - iv. **Layout** - How many people will be needed to type up the report and who will do this?
    - v. **Editing** – How many and who will perform the proof-reading tasks to check spelling and grammar within the article?
    - vi. **Promotion** – Provide other students with a preview of the article by making a presentation at the school assembly. Introduce the presentation explaining that the article is the first in a series which aim to document the students’ learning about whales and dolphins as a unique and threatened group.

**END OF DOCUMENT**