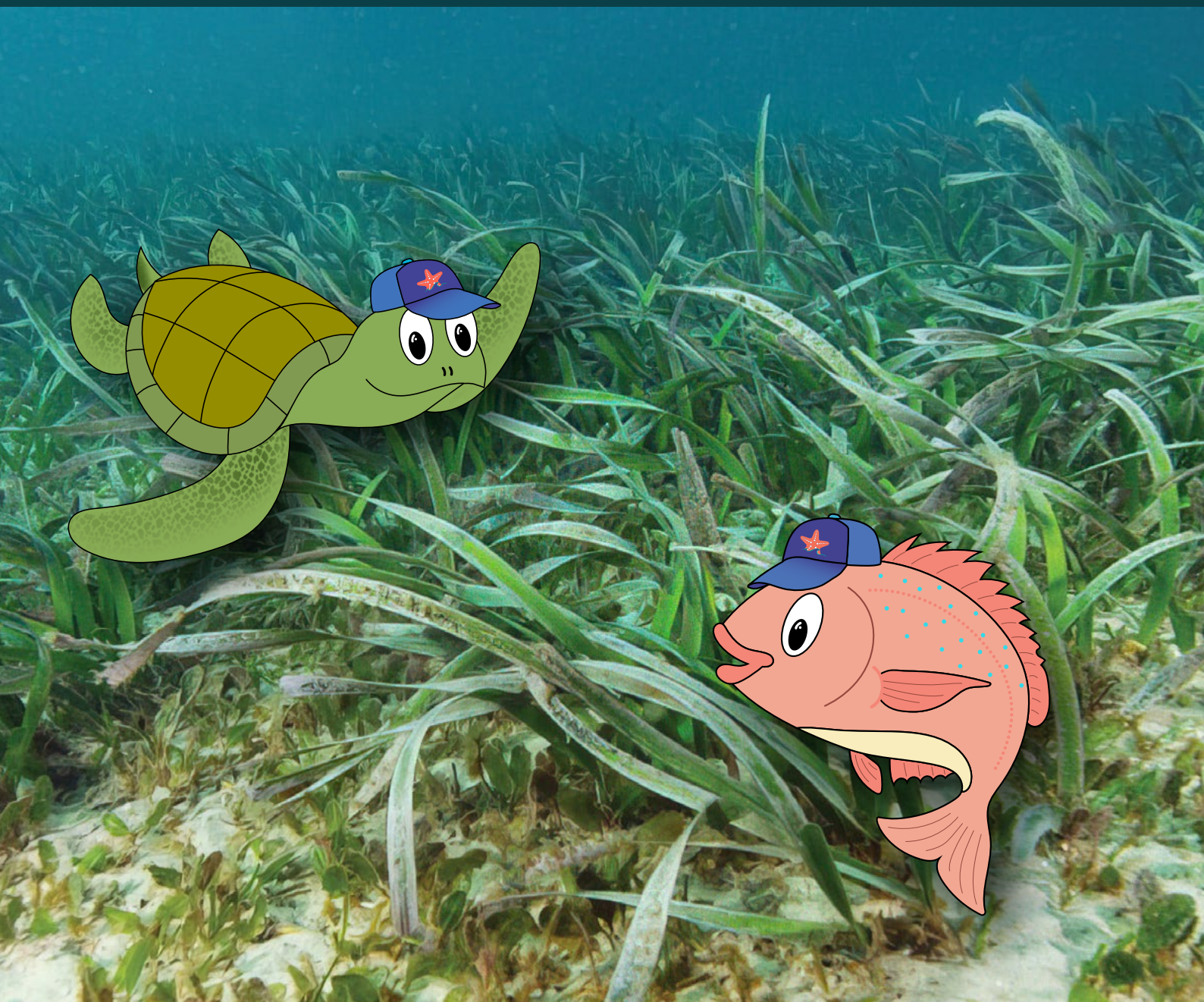
Marine Estate Agents Program

NSW GOVERNMENT

Teaching materials for Stage 3 (Years 5–6)



Contents

Acknowledgement of Country

We would like to acknowledge the Traditional Owners from the NSW Aboriginal family groups and pay respect to their Elders, past, present and emerging. We thank them for sharing their knowledge to help the wider community learn about their culture.

Introduction

About the Marine Estate Agents Program

The Marine Estate Agents Program is an education program for HSIE and Science subjects under the NSW syllabus. Many activities are also aligned with the cross-curriculum priorities of Sustainability and Aboriginal and Torres Strait Islander Cultures and Histories.

The program's lessons are associated with the marine estate's priority initiatives:

1. Improving water quality and reducing litter
2. Delivering healthy coastal habitats with sustainable use and development
3. Planning for climate change
4. Protecting the Aboriginal cultural values of the marine estate
5. Reducing impacts on threatened and protected species
6. Ensuring sustainable fishing and aquaculture
7. Enabling safe and sustainable boating
8. Enhancing social, cultural and economic benefits
9. Delivering effective governance

You can find out more about the Marine Estate and all the project work that is being achieved across the state at marine.nsw.gov.au

Photographer: Kelly Coleman/PeeKdesigns

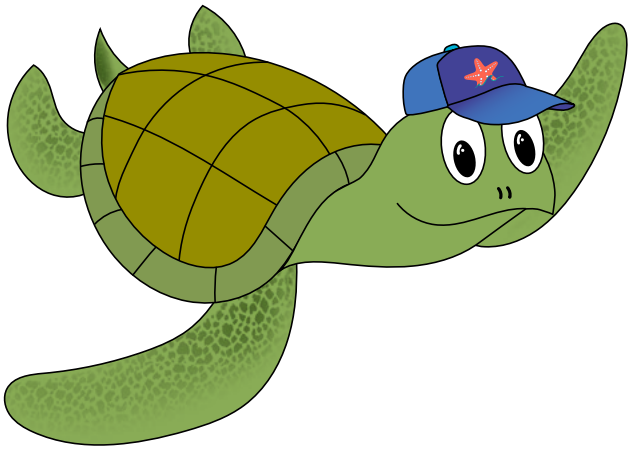
What is a Marine Estate Agent?

Marine Estate Agents are our champions or 'agents' of change, looking after the marine estate.

Anyone can be a Marine Estate Agent.

Several mascots have been chosen to help students connect with becoming an Agent... they are learning and doing good things in the marine estate to look after our mascots.

The Stage 3 (Years 5–6) mascots are Finn the Green Sea Turtle and Pinky the Snapper. Finn is an endangered species that needs our support and protection. Pinky swims along the coastline, from the open ocean to the estuaries. They like to be SunSmart and wear their Marine Estate Agent hats in the sun.



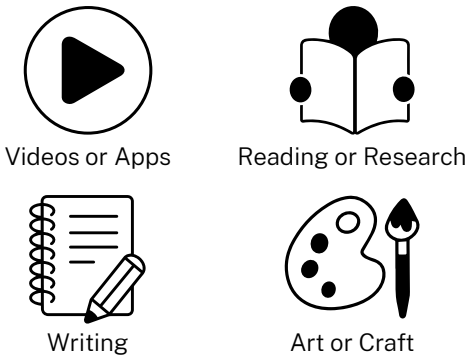
Once you have completed this unit of work, students can be awarded their Marine Estate Agent certificate and sea star badge.

The sea star symbol on their certificate acknowledges the student's awareness of the marine estate environment and how to look after it. It is a 'badge of honour' and it is every student's mission to help others understand this message.

Using this resource

This resource can be delivered in parts, or as a whole integrated subject. It has been designed so that teachers can pick and choose what lessons will work best for their class. It is recommended that the minimum requirement for this program is to complete the introductory **Unit 1 – The marine estate**.

Units of work



Each unit of work includes:

- key curriculum outcomes
- a suggested assessment task
- 2–3 topics with accompanying presentations and worksheets
- key identifying icons to understand what's included at first glance
- estimate time to complete the topic (this is subjective based on each teacher's discretion)
- optional excursion activities that can be mixed and matched to suit class requirements and location suitability.

Two units are aligned with the HSIE subjects of Geography and History. Unit 2 is aligned with the Science–Living World subject. A breakdown of each unit and its learning outcomes are shown on the following page.

Units can be applied to suit other syllabus outcomes, such as English, Technology and Visual Arts. Teachers can use the research and topic ideas from this resource to support their writing or art programs – see the example photo of applying learning about pollution in our oceans to an art project.

Background content

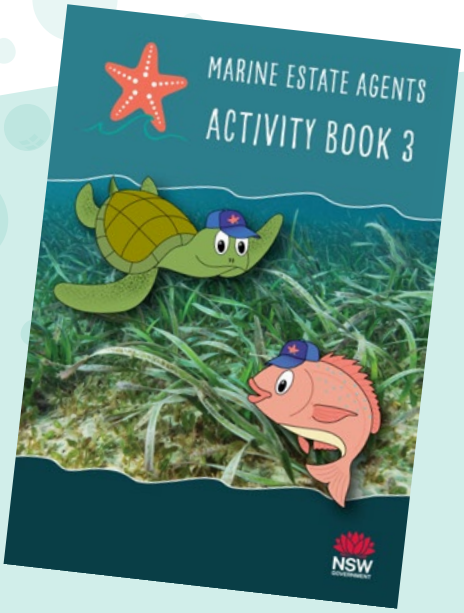
The Marine Estate Agents Program is supported by background topic-related content that can be used by teachers and students to help the teaching/learning process. The relevant topics have been referenced within the teaching materials.

To access this content, navigate to the Marine Estate Education Hub at marine.nsw.gov.au

Marine Estate Agents Activity Book

Included is the Marine Estate Agents Activity Book 3 with simple, fun activities that relate to the lessons. Once completed, these activity books show that your students know how to help our marine estate and become Marine Estate Agents.

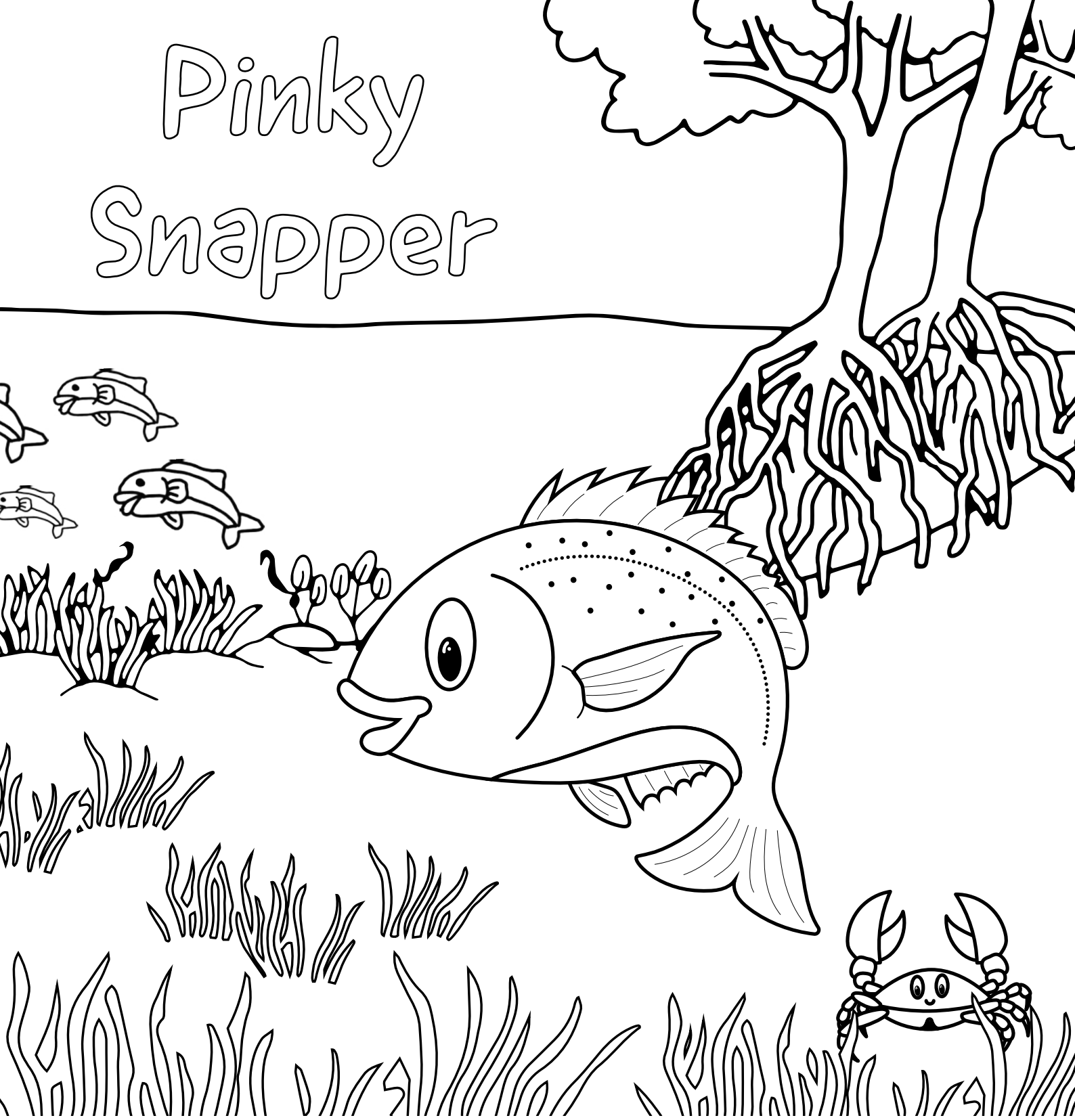
If you choose not to use the activity book, students can still receive their certificate – see page 43 of this resource.



Stage 3 Learning Outcomes

	Unit 1: The marine estate	Unit 2: Sea turtles	Unit 3: Sea tucker
Topics	Connections to the marine estate Bushfires in the catchment	Seagrass meadows Sea turtle stories Climate change and sea turtles	Traditional sea tucker Farming the ocean Being safe around oyster farms
Background content	The marine estate Catchment management	Ecosystems in the marine estate Climate change	Traditional use Fishing and boating
Syllabus Link	GE3-1 GE3-2	ST3-4LW-S	GE3-2
Cross-curriculum priorities	Sustainability	Sustainability	Aboriginal and Torres Strait Islander Culture and Histories Sustainability
Excursion Activity	A special place Items on the beach Mapping marine features	Marine ecosystem investigation	Visit an aquaculture facility

Photographer: Dr David Harasti

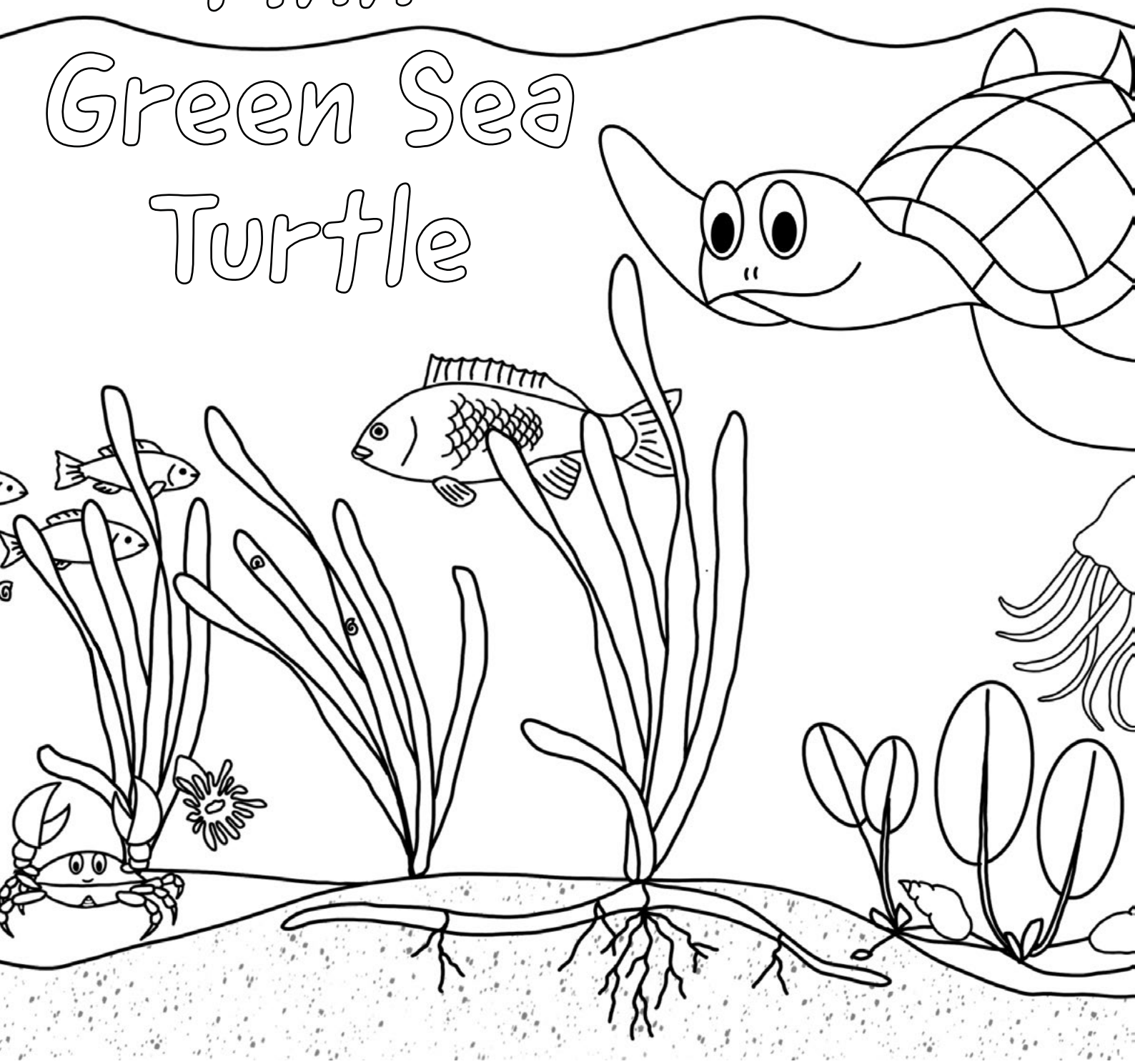


I’m a Marine Estate Agent.

I swim up and down the marine estate helping people understand the connections between the estuaries and the open ocean.

You can be a Marine Estate Agent too!

Finn Green Sea Turtle



I’m a Marine Estate Agent.

I like hanging around the seagrass meadows. My sisters and cousins visit northern NSW beaches to lay clutches of eggs. I am Vulnerable and need YOUR help.

Become a Marine Estate Agent and care for Finn’s habitat.

Unit 1: The marine estate

Content focus

Students are introduced to the term 'marine estate' and who is responsible for looking after it.

Students will develop an understanding of how a catchment works and investigate the impact of bushfires on the quality of the water that ends up in our marine environments.

Key vocabulary

Marine estate, catchment, bushfires, management, cultural burning.

Excursion activities

The following excursion activities can be used to support this unit:

- A special place
- Items on the beach
- Mapping marine features

Resources

Presentations: The marine estate, Jobs in the marine estate, Bushfires and water quality

Map: Marine protected areas

Worksheet: Marine estate features

Materials: Soil erosion experiment (see activity)

Marine Estate Agents Activity Book 3

Assessment task

Students use their reflections and findings from both lessons to create a short video about the effect large-scale bushfires could have on the marine ecosystem, their favourite local place, and how we can reduce that impact in the future.

Curriculum outcomes

HSIE: Geography

GE3-1 describes the diverse features and characteristics of places and environments

GE3-2 explains interactions and connections between people, places and environments

Cross-curriculum priorities

Sustainability

Concepts

Place: the significance of places and what they are like.

Space: the significance of location and spatial distribution.

Environment: the significance of the environment in human life and the important interrelationships between them.

Sustainability: the capacity of the environment to support our lives and the lives of other living creatures into the future.

Inquiry skills

Acquiring geographical information: develop geographical questions to investigate and plan an inquiry.

Processing geographical information: represent data in different forms, e.g. graphs and tables, represent geographical information by constructing maps that conform to cartographic conventions.

Communicating geographical information: present findings in a range of communication forms.

Geographical tools

Maps: large-scale and small-scale maps.

Graphs and statistics: tally charts, column graphs.

Visual representations: multimedia.

Connections to the marine estate

Overview

Students are introduced to the term 'marine estate', the various management zones and who protects them. Students survey individual perceptions of places within the marine estate and how they feel about them.

Description

Marine estate

Show students a slideshow of images from the marine estate. Help students understand that all these images are from an area we call the 'marine estate'. This area includes estuaries, mangrove forests, seagrass beds, urban foreshores, saltmarshes, beaches, open ocean, rocky shores, oyster reeefs, marinas, reefs, offshore islands, coastal lagoons and wetlands.

Show students a map of the marine estate. Help them identify the different colours on the map and explain what they represent:

- National parks – conservation areas on land
- NSW marine estate – coastline
- NSW marine parks – conservation areas in the marine estate
- Aquatic reserves – conserve biodiversity in the marine estate

Discuss with students:

- Why are these areas important for the environment?
- What are some of the living things found in the marine estate? Such as fish, coral, mangroves, whales, people etc.
- Discuss the importance of the marine estate to people (food, recreation, industry/business, transport, cultural connections) and wildlife (shelter and food).

Students use their discussion answers to complete the *Marine Estate Agents Activity Book 3 – Importance of the marine estate*.

Marine estate features

Students are provided with the worksheet: Marine estate features.

Using the numbered clues, students work out the different parts of the marine estate. These answers can then be also put in the corresponding spots on the map key. Students shade in the boxes on the key in different colours and use the symbols and colours in the key to complete their marine estate map. Students also create a title for the map and include a north arrow.

Extension activity

Use Google Maps, or other mapping applications, to view a section of coastline that is close to your school or has interesting features. As a class, work together to identify the different marine estate features.

Inquiry questions

How do people influence places and the management of spaces within them?

Resources

Presentations: The marine estate, Jobs in the marine estate

Map: Marine Protected Areas

Worksheet: Marine estate features

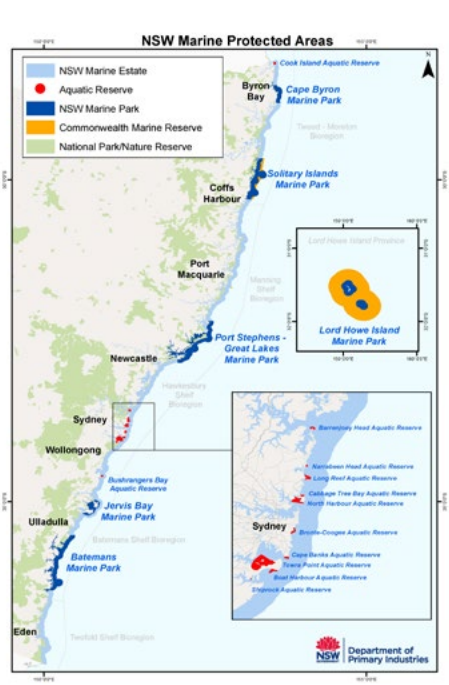
Marine Estate Agents Activity Book 3 – Importance of the marine estate, Your actions count

Background topic

Marine estate

Estimated time

3 lessons



Students could use classroom tablets (if available) to take a 'snapshot' of the map and place it in a drawing app. They can draw over the map the different marine estate features, using the key from the previous activity.

Connections to the coast*

Using the slideshow of images from the marine estate, ask students to vote on (1) places they like to visit and (2) places they would like to experience – students can vote more than once. Record this on the board. Discuss what was it about these images that made students want to experience a new place. How did the photo make them feel? What do they think it would be like?

The rest of the activity will be based on the place that most students have visited in the marine estate. Inform them that you're going to perform a class survey about their experiences going to this location. See the example survey questions** to help this process. Students respond by putting their hands up, and the results are recorded on the board. Students make a column graph for each survey question.

Looking after the marine estate

Introduce this activity by conducting a brainstorming of all the impacts on the location your class has visited the most (previous survey). This could include land clearing, soil erosion, chemical use, product and consumer decisions, discarded fishing gear, fish waste, collection of seashells and other beach materials, runoff from roads and hard surfaces and boats travelling too fast causing waves.

How can we prevent these impacts? Who can help us?

Many different people manage areas and help look after different parts of the marine estate. They include people who look after fish and ocean life, boat harbours, parks and reserves as well as European and Aboriginal cultural heritage sites.

Go through the presentation 'Jobs in the marine estate' and ask students if they have seen these people before, or if there are other jobs that they could add to the list. Students can create their own marine estate job descriptions.

Many more people who look after the catchment areas located inland, where the water that feeds our rivers flows. We can all play a role in looking after the marine estate.

Identify ways you can help look after [your location].

In small groups, students create a campaign video about looking after our marine estate, focusing on the following:

- What is the threat/people's behaviours?
- What is the negative impact it has?
- What is an alternate behaviour?
- What is the call to action?

*Connections to the coast

Inland schools can modify this activity by creating a slideshow of places near your school and include rivers, dams, lakes and other natural features.

**Example survey questions

1. Do you like going to [your location]?
   Yes or no.
2. When do you go to [your location]?
   Summer, autumn, winter or spring.
3. Who do you go to [your location] with?
   Family or friends.
4. What activities do you like to do at [your location]?
   Brainstorm the answers before asking the question.
5. Is there anything you don't like about going to [your location]?
6. Do you pick up your rubbish when leaving [your location]?
   Always, sometimes or never.
7. Do you pick up other people's rubbish when leaving [your location]?
   Always, sometimes or never.
8. How do you dispose of the rubbish?
   Bins at [your location] or take it home.

In the *Marine Estate Agents Activity Book 3 – Your actions count*, students match the impact with the correct action.

Students make a campaign video (such as a TV advertisement or short 2-3 minute documentary) to showcase the threats to the marine estate and how we can act to reduce those threats. Provide students with tablets that have movie making software installed and let their creativity unfold. This could take a few lessons to complete. You could have a competition and the top 2 or 3 could be played at a school assembly to help spread the message in the video.

Worksheet answers: Marine estate features

1. Open ocean
2. Beaches and dunes
3. Rocky shores
4. Estuary
5. Mangrove forests
6. Boat harbours or marinas
7. Seagrass beds
8. Saltmarsh
9. Coastal lagoon
10. Reefs
11. Islands
12. Marine parks

Marine estate features

Your task

Your task is to map different features for a section of the marine estate.

Things you need to include on your map:

- [ ] Title
- [ ] North arrow
- [ ] Key with colour-coded features

To complete the Key, and your map, you have to follow the clues.

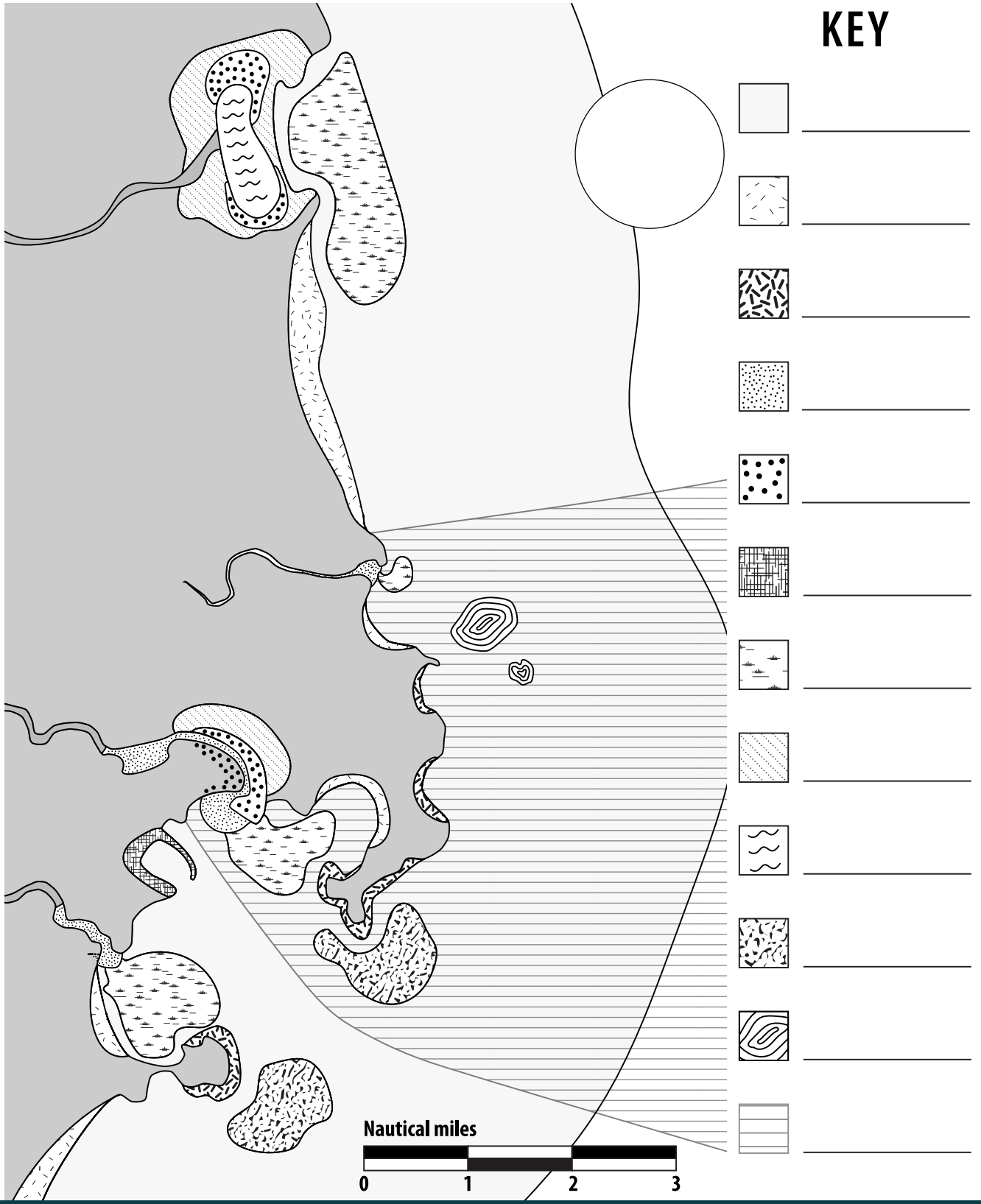
The answer to each of the following marine estate feature clues helps you create your key. Record your answers next to one of the 14 boxes in the key. Colour each answer's box a different colour. Match up the pattern and feature of the key with the map. Colour each map feature based on your Key.

Marine estate feature clues

1. The body of water off the coastline.
2. Areas made up of sand deposited along the coast.
3. Places where the coastline is made up of loose or solid stone.
4. Where the river meets the ocean.
5. Small trees with roots that are exposed and living in the tidal zone.
6. Areas where people moor their boats.
7. Grass-like plants that grow underwater.
8. Swampy areas with lots of low growing plants that look like jellybeans.
9. Coastal bodies of water that are sometimes open to the ocean.
10. Rock and coral make these underwater areas a haven for marine life.
11. Bodies of land in the ocean that are not connected to the mainland.
12. Areas in the marine estate that are set aside to conserve marine habitats.

Marine estate features

Title: _____



Bushfires in the catchment

Overview

Students will develop an understanding of how a catchment works. Students will investigate the impact of bushfires on water quality that ends up in our marine environments.

PLEASE NOTE: this activity does not cover how bushfires occur.

Description

What is a catchment?

Introduce students to the vocabulary term 'catchment'.

> A catchment describes any surface where water falls and drains to an end point. That means that everywhere on Earth is located within a catchment. A catchment can be small like the roof of a house, or it can be huge, like the Murray-Darling Basin.
>
> Whatever we do in a catchment affects the water that flows through it. For example, if a town pollutes its river water then other water users downstream will be using that same polluted water. This is not healthy for our wildlife, our agriculture or our own health.
>
> To look after our catchments, we need to be careful of how we look after our land and everything it supports. A healthy landscape gives us healthy and productive farms, wildlife that flourishes and happy communities.

Watch A Catchment Story by Field of MARS Environmental Education Centre to help describe how catchments works.

Watch the Love it or lose it videos to help develop an understanding of about how our actions can impact a catchment.

Discuss with students how the activities in a catchment can impact the marine estate and what activities we can do in a catchment to help look after the marine estate.

Bushfires and water quality

Bushfires can be devastating to the landscape. The damage bushfires can cause to our freshwater and marine aquatic ecosystems is just as bad. The 2019-20 bushfires had a significant impact on our catchments, and this had a flow-on effect on the aquatic environment.

Show students the narrated presentation Bushfires and water quality. Students use their new understanding of the impacts that bushfires can have away from the initial burn area to complete the diagram in the *Marine Estate Agents Activity Book 3 – The impacts of bushfires*.

Inquiry questions

How can we care for places?

Resources

Presentation: Bushfires and water quality

Erosion activity: Juice cartons, soil, collection container, watering can, mulch and charcoal/ash from a campfire or wood heater

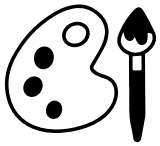
Marine Estate Agents Activity Book 3 – The impacts of bushfires

Background topic

Catchments

Estimated time

3 lessons



The following conditions in a catchment may affect the water quality of the rivers and eventually the ocean:

- Loss of groundcover plants and debris
- Lots of ash on the surface of the ground
- Loss of, or damage to, trees
- Tonnes of smoke and chemicals in the air
- Large rainfall events following bushfires

Students investigate how different land management techniques can have a direct impact on soil erosion and water quality after large bushfire events.

Soil erosion experiment

Soil erosion experiment video: youtu.be/7B31SfQzFo4

As a class, identify various natural and man-made features you might find in a catchment (for example forests, groundcover, houses, farms, rubbish, towns, roads and cars). For each core feature, students predict what will happen when water is poured on a simulated catchment.

Split the class into small groups – enough for one catchment feature per group. Using juice cartons, soil, a collection container and a watering can, create a simulated catchment and add items to the surface of the soil (landscape).

Prepare the juice carton as described in the video. Tilt the juice carton so that sediment and water from the watering can drain into the collection container. Use one juice container as a 'control' and the other can be used to experiment with different surface covers. After you pour the water into the juice container measure the amount of water collected and record the amount of debris in the container and the colour of the water. Take a photo to help your record keeping.

Next, place a good layer of mulch on the surface of your test container. Before adding water, make a prediction about the amount and colour of water that will flow out of the juice carton catchment. Pour the same amount of water and record the results. This simulates a catchment area that has lots of ground cover. Was the prediction correct? What changed?

Remove the mulch and replace it with a layer of charcoal/ash. Pour the same amount of water and record the results. This simulates a catchment area that has lost its ground cover in a bushfire. What has happened to the water in the collection container? Is this good for the rivers?

Extension activity

Apply the Biodiversity Sustainability Action Process to your local catchment.

Unit 2: Sea turtles

Content focus

Students learn about marine ecosystems, with a focus on seagrass meadows.

Students investigate how the environment affects the growth and survival of sea turtles and how environmental changes can/are threatening their survival.

Students describe how changing physical conditions in the environment (rising water temperatures and sea-level rise) affect sea turtles' survival and habitat.

Key vocabulary

Habitat, ecosystem, adaptations, reproduction, threatened species, climate change, life cycle.

Excursion activities

The following excursion activities can be used to support this unit:

- Marine ecosystem investigation

Resources

Presentation: Marine ecosystems

Worksheets: Seagrass meadow investigation, Sea turtle nesting and feeding, Turtle tales

Scenarios: Threats to seagrass meadows

Activity book: *Posidonia australis*

Materials: Butcher's paper and markers

Marine Estate Agent Workbook – Know your ecosystems, Turtle tales, Climate change actions, The life of a sea turtle

Assessment task

Students conduct a group critical thinking discussion about the impact of climate change on the survival of sea turtles and their habitat. Students present their findings to the rest of the class.

Curriculum outcomes

Science

ST3-4LW-S examines how the environment affects the growth, survival and adaptation of living things

Cross-curriculum priorities

Sustainability

Skills

Working scientifically

Processing and analysing data: use a range of representations to represent and describe observations, patterns or relationships in data, employ appropriate technologies to represent data, present data as evidence in developing explanations.

Adaptations

This unit could be applied as an **English** unit using the research topics to further develop persuasive and informative texts.

This unit could be adapted as a **Technology** unit by introducing 3D printing, coding and Minecraft Education elements to the lessons.

Seagrass meadows

Overview

Students learn about marine ecosystems, with a focus on seagrass meadows.

Description

Introduction to marine ecosystems

Introduce students to the term 'ecosystem'.

An ecosystem is a collection of living things interacting with each other and with their non-living environment.

Show students a presentation of the different marine ecosystems in NSW, including coral reef, rocky shore, seagrass meadow, kelp forest, mangrove, saltmarsh, sandy shore and open ocean. Discuss the different living things or features in the photos. Students record these ecosystem features in the *Marine Estate Agents Activity Book 3 – Know your ecosystems*.

Seagrass meadow investigation

Students undertake an investigation into the seagrass meadow ecosystem and present their investigation data in a creative way. Students will be required to look at:

- where seagrass meadows are found
- adaptations
- reproduction
- other plants and animals that need seagrass for their survival.

Students tracking well in their investigation can also look up the role of seagrass in helping absorb carbon dioxide from the atmosphere and its role in reducing climate change.

Threats to seagrass meadows

Divide the class into six groups. Provide each group with a scenario of a threatening process that could affect the survival of seagrass. Each scenario includes an explanation of the threatening process, what is causing it and the impact it has on seagrass meadows. Students can discuss in their groups the actions that can be taken to prevent the threatening process. They present their scenario and list of actions back to the rest of the class. Are there similarities in the actions?

Extension activity

Learn about the threatened seagrass *Posidonia australis* and why it's important to protect this endangered underwater ecosystem - see activity book weblink in Resources. Students create a campaign poster about the importance of protecting *Posidonia australis*.

Inquiry questions

How do environmental conditions affect the survival of living things?

Resources

Presentation: Marine ecosystems

Scenarios: Threats to seagrass meadows

Activity book: Posidonia Australis

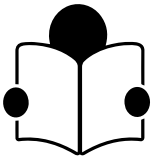
Marine Estate Agents Activity Book 3 – Know your ecosystems

Background topic

Ecosystems

Estimated time

2-3 lessons



Scenarios: Threats to seagrass meadows

Too much shade

The construction of foreshore structures such as jetties, pontoons and berthing areas is having an impact on seagrass. The structures are shading the seagrass so not enough sun is getting to the seagrass plants and they are disappearing.

What can be done to reduce this impact?

Dredging

Dredging of the seabed to open channels for big marine vessels removes sea floor sediment and the depth of water is increased. This destroys the seagrass habitat and makes it too deep for light to get to the growing seagrass plants.

What can be done to reduce this impact?

Physical damage

Anchors and mooring chains from boats will pull up seagrass when they are retrieved or dragged. Boat propellers can tear up and damage seagrass when operated in shallow water. Kayaks dragged from the shoreline through seagrass meadows create “scars”, lines of bare seagrass patches.

What can be done to reduce this impact?

Too much sediment

Poor land management that leads to erosion can bring lots of sediment into an estuary. The increased sediment entering waterways can smother seagrass and block light, killing large areas of seagrass.

What can be done to reduce this impact?

Too much activity

When there is too much activity from people and animals, seagrass can struggle to survive. Trampling of seagrass beds due to wading by humans and domestic animals can tear up sensitive seagrass and increase sediment in the water.

What can be done to reduce this impact?

Storm events

Extreme storm events can cause lots of damage to seagrass. Big wave action and large debris can rip out seagrass from the sea floor, increased sediment from land can smother seagrass and stormwater can change water quality and salinity levels.

What can be done to reduce this impact?

Sea turtle stories

Overview

Students investigate how the environment affects the growth and survival of sea turtles and how changes in the environment are threatening their survival.

Description

Turtle tales

As an introduction to sea turtles, look at the following resources with your students. Students use the content from the first two resources to answer the questions in the *Marine Estate Agents Activity Book 3 – Turtle tales*.

- The Adventures of Timmy Turtle – make sure to explore the pop-up facts about sea turtles bit.ly/adv-timmy
- Fascinating facts about sea turtles
- Explore the SEE Turtles website
- What to do if you find a sick or injured turtle poster
- ABC's Turtles and the EAC

Sea turtle investigation

Students are assigned one of the four species of sea turtles (Loggerhead, Hawkesbill, Green and Leatherback) that visit NSW shores to investigate. They need to research and report on the following:

- Identification: size, colour, shell (carapace) pattern
- Habits: travel distances
- Habitat needs: food, ocean temperature (warm or cold), beaches
- Breeding: age, beach locations, nest temperature
- Adaptations: diving, swimming, respiration, salt secretion
- Threats: Pollution, loss of habitat, boat strikes, fishing nets

A useful resource for this research activity is the Oceania report: why healthy oceans need sea turtles

Introduce the concept of 'citizen science programs' such as the NSW TurtleWatch program and how ordinary people are helping scientists look after and monitor sea turtle movements.

Extension activity

Students investigate organisations that are working towards rescuing turtles or protecting turtle habitats. Ask students to develop a set of research questions to find out about the organisation. Some example research questions have been prepared (see box).

Students research another threatened marine species and the actions that organisations are doing to protect their habitat. Students can also identify actions that they can do at home, school or at their local beach/park to protect that threatened species.

Inquiry questions

How do environmental conditions affect the survival of living things?

How do the structural and behavioural features of living things support survival?

Resources

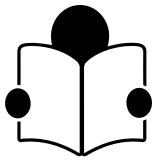
Marine Estate Agents Activity Book 3 – Turtle tales

Background topic

Ecosystems

Estimated time

4 lessons



Example research questions

1. Across what area, geographically, does the organisation work in?
2. What kind of turtle, habitat or other animals does it look after?
3. What types of activities does it carry out?
4. Who works in the organisation? Types of jobs/roles.
5. Do they use volunteers?
6. How do people become volunteers?

Climate change and sea turtles

Overview

Students describe how changing physical conditions in the environment (rising water temperatures and sea-level rise) affect the survival of sea turtles and their habitat.

Description

What is climate change?

Introduce students to the concepts of weather and climate.

Weather is a specific event — like a rainstorm or hot day — that happens over a few hours, days or weeks. Climate is the average weather condition in a place over 30 years or more.

Watch this video for a crash course in climate change.

There are many actions we can take to reduce the emission of greenhouse gases and slow the rate of climate change. Brainstorm some of these actions. Show students this short video on kids talking about climate change and revisit the brainstorm of actions.

Students record these actions in the *Marine Estate Agents Activity Book 3 – Climate change actions*.

Impacts on sea turtle life

Instruct students to reflect on the 'Sea turtle investigation' activity from Lesson 2. Did they find any interesting facts?

Students prepare a life cycle diagram of the green turtle or loggerhead turtle in the *Marine Estate Agents Activity Book 3 – The life of a sea turtle*.

Split the class into two groups. Provide Group 1 with the sea turtle nesting facts and questions sheet. Provide Group 2 with the sea turtle feeding facts and questions sheet.

Each group will focus on one aspect of sea turtle life that is impacted by climate change. In this critical thinking exercise, students must discuss their assigned topic before making a group presentation to the rest of the class about their discussion.

Each group needs to pick a 'scribe' to record the discussion ideas on a sheet of butcher's paper and nominate 3-5 students to make the presentation. Other students can contribute with diagrams or pictures to illustrate their topic and/or solutions.

Inquiry questions

How do physical conditions affect the survival of living things?

Resources

SmartBoard

Worksheets: Sea turtle nesting, Sea turtle feeding

Materials: Butcher's paper and markers

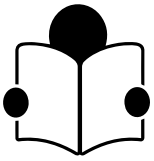
Marine Estate Agents Activity Book 3 – Climate change actions, The life of a sea turtle

Background topic

Climate change

Estimated time

2 lessons



Group 1

Sea turtle nesting

Problem 1: Temperature rise

The sex of turtles is determined by the temperature of the sand. Warmer eggs usually develop as female, and colder eggs tend to be male

Group discussion questions

How will warmer global temperatures affect turtle populations?

What problem will this cause for turtle populations?

What do you think would happen if the sand got too hot?

Problem 2: Sea level rise

Female sea turtles come ashore to a sandy beach to lay their clutch of eggs, usually on the beach where they hatched. Sea level rise and storm surges can cause lots of damage to once wide sandy beaches.

Group discussion questions

If climate change causes sea levels to rise, what could happen to the sea turtle nesting beaches?

What can people do to help sea turtle nesting beaches?

Photos: NSW TurtleWatch Instagram

Group 2

Sea turtle feeding

Problem 1: Sea temperature rises

Seagrass is a marine flowering plant that, in the right conditions, can grow in large meadows.

Adult green sea turtles are vegetarians and feed on seagrasses, seaweed and algae. However, temperatures over 40 degrees Celsius, even for a short time, cause irreversible damage to seagrass.

Group discussion questions

How will warmer sea temperatures affect seagrass meadows?

Will this affect green sea turtles?

Problem 2: Plastic pollution

The loggerhead sea turtle is carnivorous. They eat crabs and marine invertebrates, like whelks and conchs, when close to the shore or reef. They also eat floating marine life in open water, like jellyfish.

Unfortunately, small fragments of plastic are often mistaken for food and eaten by turtles.

Group discussion questions

What can happen to sea turtles when they eat plastic and other non-natural materials?

What can people do to reduce the threat to sea turtles caused by marine debris?

Unit 3: Sea tucker

Content focus

Students investigate the meaning of cultural fishing to Traditional Owners and compare fishing practices between traditional methods and modern technology.

Students explore different fishing methods, how to harvest fish and other seafood sustainably and how marine environments can be managed to produce sustainably farmed food.

Students investigate the oyster aquaculture industry and develop an understanding of the safety requirements that recreational fishers need to consider when around oyster farms.

Key vocabulary

Sea tucker, cultural fishing, recreational fishing, commercial fishing, aquaculture, sustainable fishing.

Excursion activities

The following excursion activity can be used to support this unit:

- Visit an aquaculture facility

Resources

Presentation: Fishing tools

Information sheet: An introduction to the types of fishing

Worksheets: What is aquaculture? South Coast NSW Oysters, Oyster farm safety

Marine Estate Agents Activity Book 3 – Cultural fishing, Fishing, what's changed? A sustainable fish, Safe activities in an estuary

Assessment task

Students create a visual display about oysters and oyster farms. Use content and research gathered across the unit to create either: video, play, PowerPoint (or similar) presentation, poster, mural or model. The aim is to show the connection between how people, oyster farms and the natural environment are connected.

Curriculum outcomes

HSIE: Geography and History

GE3-2 explains interactions and connections between people, places and environments

HT3-2 describes and explains different experiences of people living in Australia over time

Cross-curriculum priorities

Aboriginal and Torres Strait Islander Culture and Histories

Sustainability

Concepts

Place: the significance of places and what they are like.

Space: the ways people organise and manage the spaces that we live in.

Environment: the significance of the environment in human life, and the interrelationships between them.

Interconnection: no object of geographical study can be viewed in isolation.

Sustainability: the capacity of the environment to support our lives and the lives of other living creatures into the future.

Inquiry skills

Acquiring geographical information: develop geographical questions to investigate and plan an inquiry.

Processing geographical information: represent data in different forms.

Communicating geographical information: present ideas in a range of forms.

Geographical tools

Maps: large-scale and small-scale maps.

Visual representations: photographs, illustrations, diagrams, web and app tools.

Traditional sea tucker

Overview

Students will investigate the meaning of cultural fishing to Traditional Owners and compare fishing practices between traditional methods and those using modern technology.

Description

Cultural fishing

Discuss the following statement with your students: "*Cultural fishing recognises the spiritual, social and customary significance to Aboriginal people*". What does this mean? How can fishing be spiritual and social and form part of a cultural custom?

Students record the meaning of cultural fishing in the *Marine Estate Agents Activity Book 3 – Cultural fishing*.

In NSW, Aboriginal people have special rights to continue cultural fishing practices for the purpose of satisfying personal, domestic or communal needs, or for educational or ceremonial purposes or other traditional purposes, and which do not have a commercial purpose.

Brainstorm some fish/marine species that students think Aboriginal people traditionally hunted for their family(s). Do you think this list has changed today?

A key message about Aboriginal culture is respect for country and by respecting country we ensure that the landscape is managed sustainably for the future. Watch the Working with Nature video.

Then and now

Provide students with the 'View in Port Jackson' worksheet. Students write down what they can see in the image. Next, provide students with the 'View of Sydney Harbour' worksheet. Students write down what they can see in the image.

Discuss the differences. Some discussion topics include:

- How has it changed?
- Do you think there is a large difference in the population of people the area now supports, compared to pre-European arrival?
- Do you think the traditional sea tucker diet has changed?
- Do you think the different species of sea tucker have changed?
- How has the use and management of our coastal zone impacted the change in an Indigenous sea tucker diets?
- Are there lessons that we could learn from how Aboriginal people harvested and protected their environment?

Inquiry questions

How do people and environments influence one another?

Resources

Presentation: Fishing tools

Worksheets: Then and Now

Marine Estate Agents Activity Book 3 – Cultural fishing, Fishing, what's changed?

Additional notes

It is recommended that an Aboriginal Education Officer should be present when delivering this activity. Invite them to talk about cultural fishing, fishing tools and sea tucker or other bush tucker.

Background topic

Traditional use

Estimated time

2 lessons

Using the fishing tools presentation, look at a series of photos of traditional Aboriginal fishing tools – such as nets, canoes, spears, knives and a pole with line and hook. Discuss how technology has changed how we fish today, for example:

- Big boats with motors help us travel further
- GPS devices that take us to repeated spots
- Sonar or echo-sounders help find fish and tell us the depth of water
- Fishing rods are light and strong and hold large amounts of line to help us fish deeper and catch bigger fish
- Fridges and freezers allow us to harvest more fish than we need
- Trawlers have large nets that harvest tonnes of fish at one time

In the *Marine Estate Agents Activity Book 3 – Fishing, what's changed?* students have to determine what's different between the old ways and the new ways of fishing. They also need to identify how traditional fishing methods can be more sustainable compared to some of our current methods.

Supporting activities

WilderQuest Campfire An introduction resource to what connection to Country and storytelling means to Aboriginal people.

360 Aboriginal Storytelling Dolphin Story, Fish Traps, Sydney Harbour National Park

View in Port Jackson

What can you see?

Series 01
Views of Australasia
Album of prints from various sources, some hand coloured, ca. 1773-1848
Dixson Library, State Library of New South Wales

View of Sydney Harbour

What can you see?

Aerial view of Sydney Harbour
Michael Coghlan, CC BY-SA 2.0, via Wikimedia Commons

Farming the ocean

Overview

Students explore different fishing methods, how to harvest fish and other seafood sustainably and how marine environments can be managed to produce sustainably farmed food. Students investigate the oyster aquaculture industry.

Description

Fishing methods

Fishing plays a big role in our health and wellbeing, whether it's for food or its many recreational benefits.

Discuss as a class the following questions and record your answers:

- How many different types of seafood have you eaten, seen or caught yourself?
- Do you know the different ways that seafood is gathered or harvested?

  e.g. Seafood: shark, fish (all types), prawns, scallops, oysters, mussels, crayfish/lobster, abalone, sea urchin, crab, octopus, squid/calamari

  e.g. Fishing methods: trawler, nets, fishing lines (with a pole or long lines), scuba diving, farm set lines/racks/cages, traps

Inform students of the 3 main types of fishing: cultural, recreational and commercial.

- Cultural fishing – Cultural fishing recognises the spiritual, social and customary significance to Aboriginal people.
- Recreational – Recreational fishing includes any fishing activity that is for sport, pleasure or personal use.
- Commercial – Commercial fishing includes any fishing activity that is for commercial profit.

For all types of fishing (cultural, recreational and commercial) it is important that we practice *sustainable fishing*. Ask students to create their own definition of what they think sustainable fishing means. How did they compare to this simple definition?

Sustainable fishing means leaving enough fish in the ocean and protecting habitats and threatened species.

Provide students with the information sheet: An introduction to the types of fishing. Highlight the importance of sustainable fishing to students.

Watch This is a Sustainable Fish and have students complete the activity in the *Marine Estate Agents Activity Book 3 – A sustainable fish*.

Inquiry questions

How do people and environments influence one another?

How do people influence places and the management of spaces within them?

Resources

Information sheet: An introduction to the types of fishing

Worksheet: What is aquaculture?

Worksheet: South Coast NSW Oysters

Marine Estate Agents Activity Book – A sustainable fish

Background topic

Tradition use, Fishing and boating

Estimated time

3 lessons

What is aquaculture?

What is the name for farming marine and freshwater species? Aquaculture! Aquaculture is the commercial farming of fish, molluscs, crustaceans and aquatic plants, in natural or controlled marine or freshwater environments.

Introduce students to aquaculture by watching this video: What is aquaculture and why do we need it? Students fill out their worksheet while watching this video. Check their answers.

The main marine species farmed in NSW are oysters, prawns and mussels. Mulloway and snapper are also being developed as farmed species. Species farmed in inland ponds, or in freshwater, include silver perch, trout, yabbies, Murray cod and barramundi.

The NSW oyster industry

The aquaculture industry in NSW is dominated by oyster farming, the oldest aquaculture industry in the state starting in the 1870s. The oyster industry in 2018–2019 was worth $59 million.

Introduce students to NSW Oyster Industry by watching segments of the South Coast NSW Oyster Documentary that follows chef and personality Paul West visiting four oyster farms from Batemans Bay to Pambula. Students fill out their documentary worksheet on the environmental conditions of each location and the farming method/s used.

Students conduct a research project on the importance of the oyster industry to NSW. This can be in small groups, individually or tasks split across the class. Topics of investigation can include:

- biology of oysters
- history of the oyster industry
- value of the industry to the economy
- location of oyster estuaries in NSW – create a map of NSW oyster estuaries
- how the industry has changed to suit environmental conditions and the protection of other habitats (e.g. seagrass)
- the importance of the industry being managed to be sustainably.

Worksheet answers: What is aquaculture?

1. Farming, food, science, technology
2. Indoor tanks, outdoor ponds, aquaria, ocean net pens, semi-wild conditions
3. Produce healthy, nutritious food that is good for you and the environment
4. Healthy protein, good flavour, good taste, good appeal, healthy product
5. Only way to increase our seafood supply.
6. Be one of the main stays of human nutrition.

South Coast NSW Oyster Documentary

Running times

Total time 42:27 min

Narooma
0:00 – 3:26 min
5:06 – 6:45 min

Pambula
7:45 – 12:25 min

Merimbula
17:30 – 26:05 min

Batemans Bay
38:53 – 40:00 min

youtu.be/qxQH6fL2zHM

Types of fishing

Cultural fishing

Cultural fishing recognises the spiritual, social and customary significance to Aboriginal people.

Importance of sustainable cultural fishing

Cultural fishing practices consider the availability of fish stocks for next season's harvest, as well as the family's food requirements.

Recreational fishing

Recreational fishing includes any fishing activity that is for sport, pleasure or personal use.

Importance of sustainable recreational fishing

There are bag and size limits for recreational fishers/anglers to reduce the impact on local fish populations. This keeps breeding fish in the ocean so that they can produce more fish in the future.

Photographer: Kelly Coleman

Commercial fishing

Commercial fishing includes any fishing activity that is for commercial profit.

Importance of sustainable commercial fishing

There are limits on certain species of fish but there is a lot of by-catch that gets caught in the process. Not all commercial fishing is sustainable.

What is aquaculture?

Watch the video **'Aquaculture 101: What is aquaculture?'** youtu.be/k6U3IgT1lVQ and complete the questions below.

1. Aquaculture is the _____ of _____ in the marine environment and in freshwater.

   It uses the same _____ and _____ practices that are used on land.

2. The presenter mentions five different systems that are used in aquaculture. Circle the ones mentioned from the options below.

Indoor tanks	Creeks	Ocean net pens
Cages	Aquaria	Nets
Outdoor ponds	Boats	Semi-wild conditions

3. Some people have the incorrect view that all aquaculture 'is dirty and uses too many resources'. When acting responsibly, aquaculture producers can...

   _____

4. Seafood is a primary source of protein all over the world. List two of the benefits that are mentioned about seafood:

   _____ _____

5. Why is aquaculture becoming more and more important?

   _____

6. Complete the sentence: If aquaculture can remain sustainable, that's the key, then it has tremendous potential to...

   _____

South Coast NSW Oysters

The oyster industry is an important form of aquaculture throughout the coastal regions of NSW. This documentary looks at four different south coast estuaries, the farming methods and the estuary conditions that make those oysters unique.

As you watch the documentary youtu.be/qxQH6fL2zHM fill in the table below.

Oyster farm details	What is unique about the environmental factors of the estuary?	What farming techniques are used?	What are the unique oyster flavours?
Location 1: **Business name:**			
Location 2: **Business name:**			
Location 3: **Business name:**			
Location 4: **Business name:**			

Do the environmental factors and farming techniques influence the oyster's flavour? Explain.

Being safe around oyster farms

Overview

Students develop an understanding of the safety requirements that recreational fishers need to consider when around oyster farms.

Description

Responsible fishing

Review what an estuary is (see Unit 1, Lesson 1). Who uses estuaries? What activities can you do in estuaries? Brainstorm the class ideas. You could include: boating, sailing, jet skiing, stand up paddle boarding, water skiing, kayaking, snorkelling, SCUBA diving, swimming, shore fishing, jetty fishing, marina/boat harbour, aquaculture (oysters, mussels), commercial fishing.

It is important to be safe when doing these activities or when around infrastructure. Add these safety options to the class brainstorm.

In the *Marine Estate Agents Activity Book 3 – Safe activities in an estuary*, students record the safety actions for each of the estuarine users or activities in the illustration.

Oyster farm safety

Students review what they learnt about oyster farms in Lesson 2. The oyster industry is the biggest aquacultural industry in NSW and there are many rules that need to be followed near oyster farms. This is to make sure the oyster farms are looked after and to ensure the safety of watercraft users. Read Safe and responsible fishing around oyster farms for some useful background understanding before the lesson.

Provide students with their oyster farm safety worksheet and watch this short video on Responsible fishing around oyster leases. This is an opportunity to start a conversation about being responsible on or around the water and boats. Additionally, students who have been fishing, might like to tell the class about some of their experiences.

Extension activity

Register your class with the Get Hooked... It's Fun to Fish program that encourages students to take an active role in the management of their waterways and fish stocks.

Order copies of the Water safety activity book for the class.

Inquiry questions

How do people and environments influence one another?

What actions positively influence the health, safety and wellbeing of my community?

Resources

Worksheet: Oyster farm safety

Marine Estate Agents Activity Book 3 – Safe activities in an estuary

Background topic

Fishing and boating

Estimated time

2-3 lessons

Worksheet answers: Oyster farm safety

1. infrastructure 2. dangerous, submerged 3. private property 4. slow down 5. crime 6. dispose, overboard 7. public toilets 8. pollution 9. maritime.

Oyster farm safety

Recreational fishing in estuaries is a fun pastime. Commercial oyster leases provide great habitat for fish. How can recreational fishers and oyster leases co-exist? Watch the video '**Responsible fishing: Do the right thing around oyster leases**' youtu.be/YpAKCqlYOrg and use the word list below to complete these key safety messages.

SLOW DOWN	DANGEROUS	SUBMERGED
POLLUTION	PUBLIC TOILETS	PERMISSION
PRIVATE PROPERTY	INFRASTRUCTURE	OVERBOARD
DISPOSE	MARITIME	CRIME

Don't damage oyster leases

1. Keep away from _____.
2. Leases can be _____ due to _____ objects.
3. Never tie up to oyster leases they are _____ _____.
4. _____ _____ near oyster leases.
5. Oyster theft is a _____.

Keep water quality healthy

6. Never _____ of anything _____.
7. Know where _____ _____ are located.
8. Report any _____ out on the water
9. Follow all _____ regulations.

By working together, recreational fishers and the oyster industry can share and benefit from our wonderful waterways.

Excursion suggestions

Excursions greatly enhance students' ability to experience the marine estate and to understand and connect with the environment. It is recommended to contact a local community group, tourism operator, National Parks or fisheries office as they run guided excursion activities in various locations along the NSW coastline.

The following excursion activities are optional and have been provided to help plan a school or class excursion to the marine estate. A sample risk management plan has been included to help facilitate the excursion process, however, only tasks/activities associated with a marine estate excursion have been included. You must follow your school's risk management procedures.

A special place

Visit a special place in the marine estate that is close to your school. If possible, invite someone to come down to talk about why that place is special to them. They could be someone who works in the area, a Traditional Owner, or a parent who wants to share their story. Explore their special place together and encourage your students to ask questions. At the end of the walking tour, start a discussion of the ways that the children could help to look after this place.

If suitable, have students find their own little special place when on the excursion. Have them sit quietly in their special place and use their eyes, ears and touch to 'connect' to that spot. When back in the classroom students can paint an image that represents that place. Display the artworks in the classroom and see how many are similar or different.

Creating a coastal artwork

At the end of your excursion before your head back to school, allow 15 minutes or longer for students to reflect and create a small artwork using the materials they find on the ground, using a stick to draw images in the sand etc. Practice beach safety by not picking up anything dangerous.

This is a solo activity for students – a time to be quiet, reflective and meditative. At the end of the activity, ask students about what they created, why they created it and how it made them feel. Was it relaxing, enjoyable or too quiet? Take photos of their creations and leave them as they are.

Discuss how it would feel if they could no longer do this activity because of development or some other impact on the environment. Explain the concept of 'sense of belonging' to an area. Do students now have a greater 'sense of belonging' to this location after the activity?

* This activity is best conducted at a beach where you have space and materials to use.

** This activity could be completed back at school using natural items found on the ground around the school, such as sticks, leaves, stones, flowers etc.

Items on the beach

Take your class on an excursion to a local beach, or another natural spot in the marine estate. As you walk along you will find different items that are lying around – some are natural, and others are man-made. Collect some different items and place them in a rubbish bag. Gather students in a circle and empty the contents of the bag on the ground.

Have a discussion about:

- What items belong on the beach?
- What items don't belong on the beach? Are they man-made?
- How did they get on the beach?
- Are there any items that could harm wildlife?

Sort the items into groups – leave behind, rubbish or recycle. Create a tally sheet of the different items as they are sorted into groups. When back in the classroom, students create a column graph showing the number of items against their groups. Students compare the groups of items and use the data to interpret the cleanliness of their marine estate place.

Calculate the percentages of each bar in the bar graph. Students can use the results to create a column graph. Students perform the same activity on the school grounds to create a tally sheet. Students include the school tally results on the column graph as dot plots. They then compare the beach and school ground results and interpret the data to determine which site has less or more litter.

As you continue your excursion, collect more rubbish using gloves and tongs. Place the rubbish in bins on the way back to school. Take photos of what you found along the excursion to use back in the classroom.

Mapping marine features

Before the excursion, introduce students to an online map (such as Google Maps) of the area you are going to visit. Guide students through identifying the features that are on the map and that they need to look for these features when on the excursion. Talk through what they can see on the satellite map. Provide students with a basic 'mud-map' of the location. Students mark on their map some of the features that they hope to see.

Students bring their mud-maps on the excursion and identify the features they had hoped to see, and mark down new features that they did see. This could include things like an eagle's nest in a big tree, fishing or swimming spot, shell midden or another cultural feature. These features need to be able to help students remember what was there when back in the classroom.

If possible, invite someone to come down to talk about why that place is special to them. They could be someone who works in the area, a Traditional Owner, or a parent who wants to share their story. Explore their special place together and encourage students to ask questions. At the end of the walking tour, start a discussion of the ways that the children could help to look after this place. Students can mark significant sites told by their guest speaker on their map.

Back in the classroom, students submit their map, making sure it has the following features:

- Map title
- North arrow
- Distance measure (if known)
- Place names
- Key/Legend with features mapped out
- Excursion route (optional) showing where they walked

Needs of living things

When on an excursion, take a close look at the different living things you can find. Discuss the basic needs of these living things – air, food, water and shelter. Here are some examples:

Crab

- Air: Oxygen is absorbed by their gills.
- Food: Filter out tiny food from the sand.
- Water: They live mostly in water.
- Shelter: Bury themselves in the sand or hide under rocks.

Turban snail

- Air: Oxygen is absorbed by a gill.
- Food: Feed on algae that grows on rocks.
- Water: They live mostly in water.
- Shelter: Shells provide shelter for the snail living inside. Their strong suction onto rocks makes it hard for predators to remove them from their shells. They have a shell-like 'door' that they can close if pulled from rocks.

Sea star

- Air: Oxygen is absorbed through their bodies.
- Food: Sea stars eat by unloading their stomach onto their prey, waiting for it to dissolve and sucking it all back in again.
- Water: They live in water.
- Shelter: Their strong suction-cups, tubular feet on the base of their arms, allows them to hang on tight to rocks and other strong surfaces.

Seagull

- Air: Seagulls breathe air like other land-based animals.
- Food: Feed on small crustaceans, fish and, if you're unlucky, hot chips!
- Water: Can drink freshwater and also get moisture from their food.
- Shelter: Roost in large flocks on islands when breeding. Can be found roosting on boats or rooftops.

Marine ecosystem investigation

Choose a marine ecosystem that you plan to visit. Before the visit, show students a presentation of the different marine ecosystems in NSW, including coral reef, rocky shore, seagrass meadow, mangrove, saltmarsh, sandy shore and open ocean. Discuss the different living things or features in the photos.

Brainstorm the features, plants or animals that you hope to see on your excursion. Create a worksheet from this session. Include tasks for students to investigate, such as:

- Sketching what they see (nature journaling)
- Making leaf/shell rubbings
- Taking photos or video
- Using field guides to identify birds or plants
- Survey the number and types of rubbish found
- Using apps to record where they walked

Back in the classroom, students create a visual representation of their marine ecosystem. This could be a poster, presentation, video or other format.

Get hooked

Get Hooked… It's Fun to Fish program is designed for school students in Stage 3. This NSW DPI program will introduce students to all things fishy.

The program:

- teaches students the basic skills necessary for recreational fishing with the view that it will become a lifelong interest
- introduces students to the concept of sustaining quality aquatic habitats by practising safe and responsible fishing
- allows all NSW schools equitable access to the program
- is delivered with all COVID-safe precautions.

As well as learning all about fishing, your class will get the chance to wet a line in a local waterway where all the in-class lessons are put into practice.

For more information www.dpi.nsw.gov.au/fishing/recreational/resources/fishing-workshops/get-hooked

Fishing workshops

NSW DPI runs free fishing workshops for kids aged 8–14. Students will learn about fishing rules, how to cast, knot tying, baiting and rigging followed by a supervised fishing session with our Education Officers and Fishcare Volunteers.

For more information: www.dpi.nsw.gov.au/fishing/recreational/resources/fishing-workshops/kids

Risk management plan

This risk management plan only includes tasks/activities that are specific to an excursion to the marine estate and does not include general risks such as food allergies or those related to transport to/from the excursion. It is intended as a guide only and no liability is accepted for its use. Please refer to your school's safety and risk management policies prior to undertaking field trips.

There can be limited mobile phone reception in some locations, so please make sure you have alternative means of communication.

Risk levels (as modelled from the Department of Education's Excursions Policy):

1 and 2	Extreme risk; deal with the hazard immediately
3 and 4	Moderate risk; deal with the hazard as soon possible
5 and 6	Low risk; deal with the hazard when able.

Task/ activity	Hazard and associated risk	Risk level	Elimination or control measures	Who	When
Observing animals and plants	Bites and stings from insects, spiders, ticks and snakes (including allergies) Exposure to sun	4	Ensure participation of students with known allergies has been considered, implement appropriate risk controls, e.g. a trained staff member is available to provide appropriate first aid and emergency response (e.g. adrenalin auto-injector, such as EpiPen®, for students with anaphylaxis).	Teachers	Before
		5	Ensure staff and students are aware of emergency response procedures.		
		5	Ensure students are wearing enclosed footwear and long pants and avoid walking through long grass.	All	Before and During
		4	Ensure students wear hats, shirts with sleeves and 30+ sunscreen.		
		4	Ensure students are provided with insect repellent on the day.		During
		6	Don't touch animals or hazardous plants.		
		6	Carry a first aid kit which includes general use adrenaline auto-injector such as EpiPen®.	Teachers	

Task/ activity	Hazard and associated risk	Risk level	Elimination or control measures	Who	When
Walking in a marine park or other protected area	Uneven ground surfaces, bites and stings, exposure to sun, wind, rain and dehydration Allergies to insects, reptiles and plants Becoming lost or isolated from the group Change in weather conditions	4	Notify Sea Rangers of expected arrival and departure times, number of participants and students with medical conditions.	Coordinating Teacher	Before
		3	Identify participants with known medical conditions and ensure appropriate medication/treatment is available.		
		3	Ensure participation of students with known allergies has been considered and implement appropriate risk controls (e.g. trained staff member who can apply first aid such as EpiPen® for anaphylaxis).	Teachers	
		4	Ensure staff and students are aware of emergency procedures, including knowing the symptoms of heat exhaustion/stroke.		
		6	Check weather forecast on day of excursion. Do not undertake physical activity in hot weather		
		5	Emergency plans communicated for dealing with potential incidents.		
		5	Carry a first aid kit.		
		5	Sea Ranger staff to the lead walk. Adult supervision at front and back to keep the group together.		During
		3	Ensure all participants carry water bottles. Take extra water to refill water bottles.		
		4	Staff carry insect repellent and additional sunscreen and ensure rest breaks are taken in the shade.		
		5	Wear enclosed footwear suitable for walking, clothing to protect arms and legs and suitable for changing weather conditions.	All	
		5	Wear hats, shirts with sleeves and sunscreen while outdoors. Seek out shade wherever possible to avoid heat exhaustion.		

Glossary

Adaptations: a special skill that helps an animal to survive and do everything it needs to do. Adaptations could be physical changes to the animal's body or behavioural changes in how an individual animal or a society do things in their daily lives.

Aquaculture: the commercial farming (breeding, rearing and harvesting) of fish, molluscs, crustaceans and aquatic plants, in natural or controlled marine or freshwater environments.

Bushfires: an unplanned vegetation fire that includes grass fires, woodland/forest fires and scrub fires.

Catchment: also known as a drainage basin, describes any surface where water falls, is collected and drains to a common endpoint.

Climate change: the term climate change refers to how the Earth's climate changes over time. These changes can be caused by long-term natural processes (such as changes in the Earth's orbit) but people often use the term 'climate change' to refer to how our climate is being affected by human activities.

Commercial fishing: includes any fishing activity that is for commercial profit.

Cultural burning: a cultural fire practice used by First Nations people to improve the health of Country and its people. It has been used for over 60,000 years to manage land, plants and animals.

Cultural fishing: recognises the spiritual, social and customary significance to Aboriginal people.

Ecosystem: a community of organisms and their physical environment interacting together.

Habitat: a habitat is like a home. All the things that plants and animals need to survive can be found in their habitat.

Life cycle: is a series of stages that a living thing goes through during its life.

Management: the planning and actions that people take to look after something.

Marine estate: The NSW marine estate includes the ocean, estuaries, coastline, offshore islands and coastal wetlands, lakes and lagoons.

Recreational fishing: includes any fishing activity that is for sport, pleasure, or personal use.

Reproduction: the process by which living things produce offspring.

Sea tucker: are the plants and animals that are harvested from the coastal environment by Australia's Indigenous people.

Sustainable fishing: fishing in a responsible way that prevents overfishing, minimises bycatch and maintains marine biodiversity.

Threatened species: an animal, plant or ecological community (a community of species) whose numbers have dropped so low they are struggling to survive. They are in danger of becoming extinct.

References

Click, Tap or Scan the QR Codes

Websites

NSW Marine Estate

NSW Dept Primary Industries - Fishing

NSW Environment and Heritage

WilderQuest Campfire

Love it or lose it

Impacts of the 2019-20 bushfires on freshwater and marine environments

The impacts of bushfires on coastal and marine environments

Why healthy oceans need sea turtles

Videos

A Catchment Story

A crash course in climate change

Working with Nature

This is a Sustainable Fish

South Coast NSW Oyster Documentary

Activities

Soil erosion experiment

Posidonia Australis Activity Book

MARINE ESTATE AGENTS

This is to certify that

_____

is a Marine Estate Agent.

They have pledged to look after the NSW marine estate and to help others look after it too.

NSW GOVERNMENT

Published by the NSW Marine Estate Management Authority

Acknowledgements

We acknowledge we live and work on Country and Sea Country, which always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters and we respect Aboriginal Elders, past, present and emerging. We celebrate the diversity of Aboriginal peoples and their ongoing cultures and connections to Country and Sea Country across NSW.

The Authority acknowledges Ministers, government agencies, organisations and individuals whose support, collaboration and input have made our work possible.

Key contributors include:

- PeeKdesigns consultants
- Marine Estate Expert Knowledge Panel
- Officers from the following agencies in preparing this document:
  - Department of Primary Industries
  - Department of Planning, Industry and Environment

Front cover photo: *Posidonia australis* seagrass (DPI)

Back cover photo: Sandon River Campground (Jessica Robertson/DPE)

#####-##/##