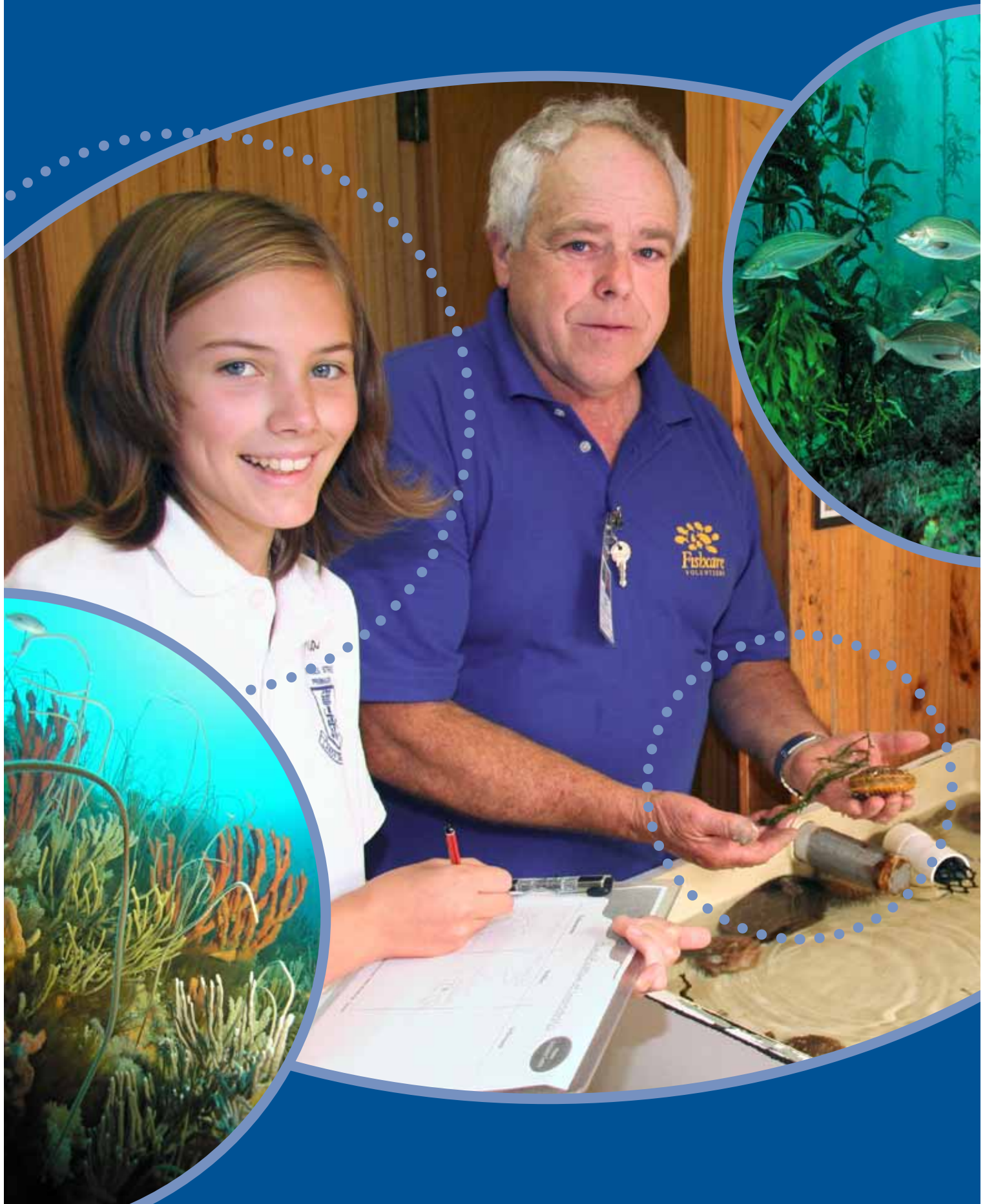


MARINE Links

A Tasmanian Marine Education Resource for Grades 5-8



Marine Links

Contents

Introduction

Resource Kit Contents

Teacher Appraisal Form

Acknowledgements

Teaching Units

1. Marine and Coastal Habitats
2. Marine Life
3. Sustainable Fisheries
4. Marine Reserves
5. Human Influences



Introduction

Marine Links is an Education Resource Kit for use by teachers and marine educators. The kit has been developed to align with school curriculums and contains marine information, textbooks and practical hands-on marine teaching materials.

Marine Links is organised into five sequential teaching units:

1. **Marine and Coastal Habitats**
2. **Marine Life**
3. **Sustainable Fisheries**
4. **Marine Reserves**
5. **Human Influences**

What's in the Kit?

The *Marine Links Resource Kit* includes classroom exercises (suitable for Grades 5-8) and teaching aids such as marine textbooks, fish display posters and banners, maps, fisheries awareness brochures, a set of model fishing gear and moulds of popular recreational fish species.



Why Use Marine Links?

- To increase students knowledge of Tasmania's fish resources and habitats and the need to manage them sustainably;
- To educate students about adopting responsible fishing behaviours;
- To develop students ability to think about the marine environment and the impacts on it; and
- To educate students about the social and economic importance of commercial and recreational fishing to Tasmanian coastal communities.



Sand Flathead

Where is it available?

Kits are available for loan from DPIPWE's Fishcare Tasmania Regional Coordinators and the Woodbridge Marine Discovery Centre. Teachers working in partnership with schools trained Fishcare Coordinators or Volunteers who can add a practical dimension to classroom marine studies will gain the maximum benefit from using *Marine Links*.

The *Marine Links* education folder is a living document for use by teachers. It has been produced in a loose-leaf format to allow for easy updating. Teachers can help to keep the teaching material relevant by completing the Teacher Appraisal Form where applicable.

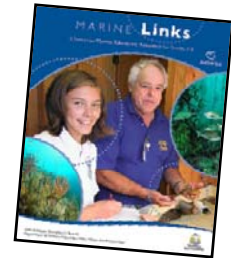
The education folder content is available online at fishing.tas.gov.au under 'Fishing Publications'.

Marine Links Education Resource Kit

Contents – What's in the Kit?

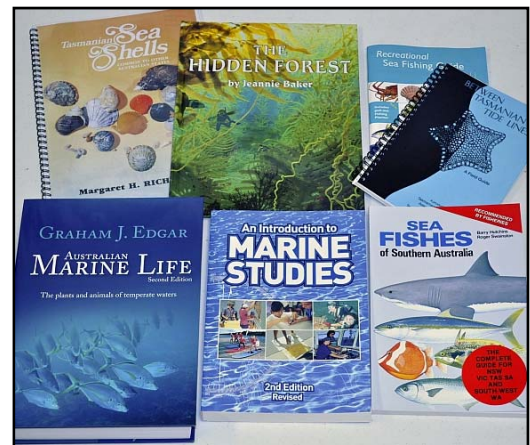
Marine Links Education Folder

This workbook contains marine information, classroom activities and exercise sheets. It also includes curriculum standards, Fishcare Volunteer lesson plans and teacher feedback forms.



Marine Textbooks

- *Australian Marine Life: The Plants and Animals of Temperate Waters (2nd Ed)*, Edgar G, Reed New Holland, 2008
- *Between Tasmanian Tidelines: A Field Guide*, Tasmanian Marine Naturalists Association, 2000
- *Sea Fishes of Southern Australia*, Hutchins, B, & Swainston R, Gary Allen Publishing, 1986
- *An Introduction to Marine Studies*, Moffat B, et al, Wet Paper Publishers, 1997
- *Tasmanian Sea Shells*, Richmond M, Richmond Printers, 1997
- *The Hidden Forest*, Baker J, Walker Books, 2000



Display Posters

- *Tasmanian fish size and possession poster (2m x 1m) featuring actual size fish*
- *Fishes of Tasmania*, Wild Fisheries Management Branch, DPIPW, including
 - *Crustaceans and Molluscs of Tasmania*, *Forty Recreational Sea Fishes of Tasmania*,
 - *Ten Most Wanted Scale Fishes of Tasmania*
 - *Sharks, Skates and Rays of Tasmania*
- *Fletcher the Fish poster*, DPIPW
- *14 Years Sea Surface Temperature poster*, CSIRO



Model Fishing Gear



- Rock lobster pot with bait saver and marker buoy
- Rock lobster ring
- Gillnet with marker buoys
- Mullet net with marker buoys
- Longline with marker buoys
- Dropline with marker buoy
- Telescopic fishing rod
- Bait net

Plastic Moulded Fish

- Flathead (legal and undersize versions)
- Flounder
- Rock lobster - large
- Rock lobster - small



Recreational Fisheries Materials

- Scalefish measuring rulers
- Fish measuring gauges
- Recreational Sea Fishing Guide (latest version)
- Fishing pamphlets, maps and brochures from the Wild Fisheries Management Branch and the Parks and Wildlife Service
- Reward stickers

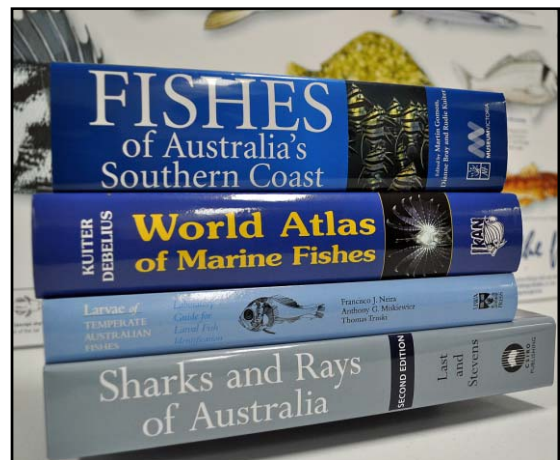


Additional Material

The Marine Links Resource Kit also contains additional textbooks and display materials which the Fishcare Presenter may bring to the classroom during a schools visit. These include:

Textbooks:

- *Fishes of Australian Southern Coast*, Gomon M., Bray, D., & Kuitert, R. (Eds), Reed New Holland, 2008
- *World Atlas of Marine Fishes*, Debelius H, & Kuitert, R, IKAN, 2007
- *Sharks and Rays of Australia*, Last P, & Stevens, J, CSIRO Publishing, 2009
- *Larvae of Temperate Australian Fishes*, Neira F., Miskiewicz, A & Trnski, T, UWA Press 1998



Display Aids

- Pull-up marine display banners designed as a teaching aid: one themed Responsible Recreational Fishing and one displaying life-sized Tasmanian fish illustrations
- Display panel boards – allows the set-up of a marine 'educational booth'

Available for loan from the Woodbridge Marine Discovery Centre, Fishcare Regional Coordinators and the Wild Fisheries Management Branch, DPIWPE

Acknowledgements

Acknowledgements

Marine Links is a joint initiative of the Department of Primary Industries, Parks, Water and Environment, the Department of Education and the Woodbridge Marine Discovery Centre. Funding support includes the Fishwise Community Grants Fund and the Australian Government through the previous Natural Heritage Trust.

This kit was originally developed and prepared by Jennifer Pratt from the Department of Education with input from Wild Fisheries Management Branch staff and the Woodbridge Marine Discovery Centre staff. This revised edition has been developed by staff of the Recreational Fisheries Section of the Wild Fisheries Management Branch including Rod Pearn, Sally Williams and Damian Heran with input from the original author. Thanks also to Ros Asten and Pam Elliott from the Woodbridge Marine Discovery Centre for their contributions and to Northern Fishcare Volunteer Alan Ekert for his advice about the lesson plans.

Photos of Princes Street Primary students at Woodbridge Marine Discovery Centre by Simon de Salis. Underwater photos by James Parkinson. Other photos by Wild Fisheries Management Branch staff. Graphic design by Brett Littleton of DPIPWE. Fish illustrations by Peter Gouldthorpe.



Marine Links Kit Teacher Appraisal Form



Please complete this appraisal form if you use the Marine Links Kit. Record any comments which may help future users of the Kit or could be used in during updates.

Date	School	Teacher	Class	Class Size

Contact:

Evaluation/Comments: Your evaluation is important to assist with future updates of the Kit.

Date	School	Teacher	Class	Class Size

Contact:

Evaluation/Comments: Your evaluation is important to assist with future updates of the Kit.

Date	School	Teacher	Class	Class Size

Contact:

Evaluation/Comments: Your evaluation is important to assist with future updates of the Kit.

MARINE and COASTAL **Habitats**

MARINE **Links**



Unit 1: Marine *and* Coastal Habitats

Activities in this Unit:

*This unit will enhance students understanding of the diversity of Tasmanian marine habitats from estuaries and inlets to kelp forests and deep oceans. There is also an opportunity to scientifically investigate the properties of seawater. Key assessment activities are in **bold**.*

1 Marine and Coastal Memories

- 1.1 Marine Journal
- 1.2 **Interview (Exercise sheet included)**
- 1.3 Analysing Data

2 Discovering Marine Habitats

- 2.1 What is a Habitat?
- 2.2 Marine Profile
- 2.3 Topic Wheel (**Exercise sheet included**)
- 2.4 Something from Home
- 2.5 **Marine Habitats Brochure**

3 Science and Marine Habitats

- 3.1 **Investigating Salinity**
- 3.2 Investigating Seawater
- 3.3 Freezing Seawater
- 3.4 Extension Questions

4 Sea Surface Temperature

- 4.1 Class Discussion
- 4.2 **Map Reading (Exercise sheet included)**

5 Climate Change and Marine Habitats

- 5.1 The Effect of Climate Change on Marine Habitats
- 5.2 Long-Spined Sea Urchins – A Case Study

Resources for Marine Habitats

Texts and Teaching Aids

The Hidden Forest by Jeannie Baker

Between Tasmanian Tidelines: A Field Guide by the Tasmanian Marine Naturalists Association

Wilderness Under the Waves CD

14 Years of Sea Surface Temperature

Marine Education Society of Australasia (MESA) Field Activities Guide CD

Web Links

Marine Life and their Habitats (DPIPWE Fisheries)

www.fishing.tas.gov.au > [The Marine Environment](#) > [Fisheries Habitats](#)

Background Notes

The environmental conditions in a habitat determine the number, type, size, shape and colour of organisms.

Abyssal Plain – a deep ocean basin usually 3000–5000 m depth.

Continental Shelf- a shallow (less than 200 m) gently sloping subtidal margin of continents, that is, the seabed from the shore to the edge of the continental shelf.

Continental Slope – steeply sloping margins of continents between the continental shelf (less than 200 metres depth) and the deep ocean basin (greater than 4000 metres).

Intertidal – the zone of the shore between the high and low tide marks.

Seamounts – extinct submarine volcanoes that are between 650 and 1000 metres below the sea surface. They are oases on a relatively barren sea floor.

Subtidal – below the low water mark.

Trench – deep, up to 11 000 metres.

Curriculum Links

Science

Working Scientifically
Life and Living

English

Speaking and Listening
Reading and Viewing
Writing

SOSE

Natural and Social Systems
Place and Space
Investigation, Communication and Participation

Technology

Information

I. Marine and Coastal Memories

I.1 MARINE JOURNAL

- Students are to complete a journal entry outlining a particular memory or experience they have had in the Tasmanian marine and coastal environment. Some examples: a fishing trip with the family or a friend, a day playing cricket on the beach. Emphasise the use of adjectives so that the experience is written as descriptively as possible. Students could share this information through a verbal presentation, production of a class booklet, display or picture book.
- Compile a class list of 'marine and coastal words'. These could be used as a spelling list, reference list etc.

I.2 INTERVIEW

- Students are to use the attached **Exercise sheet for I.2 - Marine and Coastal Interview** to interview an adult and record their answers. Students will need to develop at least one of their own questions for the interview.
- You may wish to invite a Fishcare Volunteer into the classroom to tell their story and be interviewed.
- Discuss interview techniques with students.
 - An interview is not a conversation. The aim of the interview is to let the interviewee tell their story. The interviewer should try to limit their remarks to a few acknowledgments of the answers and guiding questions if necessary.
 - Ask one question at a time.
 - Do not let periods of silence worry you. Give the person you are interviewing a chance to think of what they may want to add to their answer before you move on to the next question.
 - Ask the person if they have any other comments to add.

I.3 ANALYSING DATA

- On a blank A3 map of Tasmania, students mark in the location of their interviewee's favourite memory. Include a title for the map, key, direction arrow and scale. What conclusions can be drawn from this information?
- Alternatively – students could compile a class booklet of the stories told by the people they interviewed.

Grade 6 at Albuera Street Primary collated their interview results on a large map on the classroom wall.



2. Discovering Marine Habitats

2.1 WHAT IS A HABITAT?

- Students draw a picture of their own home and list the things it provides their family. For example, shelter, comfort, a place to obtain meals, have family celebrations. Discuss the basic requirements for life: food, water, shelter, protection, and ability to reproduce.
- As a class develop a definition of a habitat. Consider the following: a habitat is a particular living space or environment in which an animal or plant lives, eats and breeds. Therefore, a habitat must be able to provide shelter, protection, breeding space and food for the plants and animals.

2.2 MARINE PROFILE

- What is a profile? Discuss with students facial and personality profiles.
- Brainstorm the geographical features that should be included on a marine profile. Consider sand dunes, beach or rock platforms, intertidal zone, continental shelf, continental slope, abyssal plains and seamounts (see background notes for details and depths). Draw a large version of a marine profile and display it in the classroom. In small groups, have students make a list of all the living things they have seen in the Tasmanian marine and coastal environment.



- Decide in which habitat each organism belongs and place it on the profile.
- Identify the fishing practices that occur within each habitat with reference to target species.
- Ask a Fishcare Volunteer to talk about fishing practices and their favourite target species.

2.3 TOPIC WHEEL

- Students are to begin the **Exercise Sheet for 2.3 - Topic Wheel** and update it throughout the unit. Students should detail the things they already know and search for information they would like to find out.

2.4 SOMETHING FROM HOME

- Bring from home items related to the Tasmanian marine and coastal environment. The items could be placed on the profile (see activity 2.2) in the appropriate habitat. For example, pamphlets on marine tourism, photos of days at the beach, shells and wrappers from fish products. Remind students that when they are on the coast they should follow the rule: **“look, but don’t take.”**

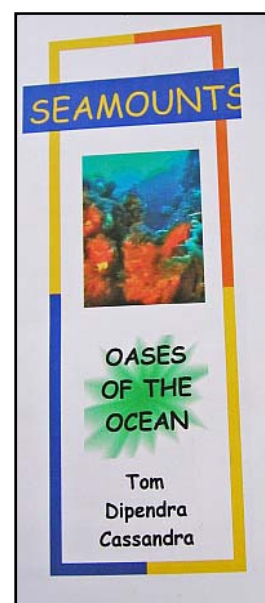
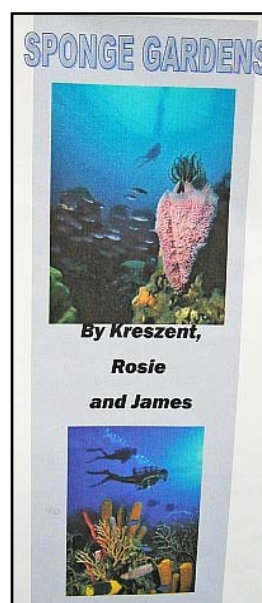
2.5 MARINE HABITATS BROCHURE

- In small groups students are allocated one of the ten marine habitats in the table overleaf. Each group is to research their habitat using the resources listed at the front of this unit, and produce a brochure for a particular audience (for example, parents, lower primary students etc). The habitat brochure should include:
 - location and distribution
 - general features
 - animals and plants
 - human use and influence
 - importance to science, education and tourism
 - diagrams and drawings where possible.
- A verbal presentation could be given to a lower primary class or parent group. The presentations could include audience participation. It would be interesting to hear what people in the audience know or believe about the different habitats with regard to what they look like, what plants and animals live there, etc.
- Consider using a Fishcare Volunteer as a resource person to discuss marine habitats.

Tasmanian Marine Habitats	
<ul style="list-style-type: none">• estuaries and inlets• rocky reefs• oceans• kelp forests• seagrass meadows	<ul style="list-style-type: none">• intertidal zones• seamounts• sandy plains• offshore islands• sponge gardens

- Students could look at some Tasmanian maps and examine the sorts of symbols and methods used to convey information about marine habitats.

Tasmanian Marine Habitat brochures produced by Grade 6 students at Albuera Street Primary School.



3. Science and Marine Habitats

Teacher Notes - Salinity

- *Salinity is the amount of dissolved salts in water.*
- *Seawater has 30–35 grams of salt per litre. As you travel up a river away from the sea, the salinity will decrease as a result of the fresh water entering from creeks and streams.*
- *All the oceans on Earth are connected, so the chemical make-up of the oceans is relatively constant. However, the salinity of seawater in a particular region depends on the amount of evaporation and precipitation.*
- *Water temperature, precipitation and evaporation rates and the parent rock influence salinity. Warm water dissolves more salt and other minerals.*
- *The salinity changes from region to region influence how ships are loaded, as a ship will rise in the water as it passes through regions of high salinity.*
- *Salt water is denser than fresh water and salt water ‘wedges’ are therefore formed in rivers.*
- *The freezing point of water is affected by salinity because salt inhibits the formation of ice. The higher the salt concentration, the lower the freezing point of the solution.*
- *The salt in seawater does not become part of the ice. Therefore, as ice forms in the oceans, the salinity of the surrounding water increases, this further decreases the freezing point of the water.*
- *The salt most commonly used by people is called sodium chloride (NaCl). Most of this salt comes from seawater. There are many places in Australia that have lots of hot sunshine and low rainfall, so salt is harvested in all states except Tasmania. The harvest process is simple and mainly uses solar energy or evaporation.*

3.1 INVESTIGATING SALINITY

- *What does seawater taste like if you get some in your mouth whilst swimming, sailing or surfing? Sometimes your sun hat, bathers or wetsuit have white marks on them once they have dried off after being in the seawater. Why is this?*
- *Make a list of the large number of ways salt is used in everyday life, for example, cooking, removing stains from carpets, removing leeches from people’s legs or arms, pickling.*
- *Introduce the idea of hypothesising. What is a hypothesis? Good science is about asking questions and finding ways to determine the answers.*
- *Students should predict what they think will be left when moisture is removed from seawater.*
- *Students could design a safe classroom experiment to show what happens when the moisture is removed from seawater. **If students are unable to design a safe and efficient classroom experiment they could use the procedure set out below.***
- *As an extension, introduce the idea of controls and comparisons, ie, repeat the experiment using tap water, distilled water and river or pond water.*

INVESTIGATING SALINITY

Equipment

Petri dish, beaker or clear container	Dropper or teaspoon for each sample
Bunsen burner or other safe heat source	Seawater
Distilled water	Tap water
River or pond water	Magnifying glass

Method

1. Use a glass petri dish, beaker or other clear container and label the bottom of the container so you will know which is the tap water, seawater etc.
2. Place a drop of each type of water in the dish in the designated spot. Make sure you clean the dropper or item you are using to transfer the water between each drop to avoid contamination.
3. Place the dish in a warm place in the classroom or use a safe heat source to gently warm the glass dish until the water has evaporated. Only use a low flame on the Bunsen burner.
4. Look at what is left from each drop of water. Which water left the most residue? What does it look like? What could it be?
5. What questions do you have about this?

- Students could write a report about the science experiment, using the headings set out below.

Aim: Explain why you are doing the experiment and what your hypothesis is. Students may like to go a step further and explain why they think that their hypothesis is correct.

Equipment: What equipment is needed to carry out the experiment? This step is only necessary if students are designing their own experiment and need assistance in collecting the equipment.

Method: In dot points describe exactly what you did. A person reading your method should be able to repeat your experiment exactly. A large, clear and fully labelled diagram should be part of the method. Scientific diagrams are best drawn in pencil. This is like a recipe for someone else to follow.

Results: The results could be in the form of written descriptions, diagrams, digital photos or numerical results presented in a table.

Discussion/Conclusion: State the main findings and suggest any improvements you could make to your experiment. Why do you think you obtained these results?

3.2 INVESTIGATING SEAWATER

- Can you tell the difference between salt water, seawater and tap water? Each group of students is given three beakers or cups of water, labelled A, B, and C. Students need to use their senses (sight, smell, touch and hearing) to determine which are salt, tap and seawater. Note: scientists do not use taste in the laboratory. Students could then address the questions: Which sense or senses assisted most? Was it difficult to tell the difference between the salt water and seawater? Why or why not?

- In Australia, the salt making season is between November and April. Explain the reasons behind this. Why is Tasmania not a good place to harvest salt?
- If there were 25g of salt in a litre of seawater, how many litres of water would have to be evaporated to produce 6 million tonnes of salt, which is about the amount of salt Australia produces each year?
- Some countries have large populations and insufficient supplies of clean water for drinking, washing etc., so seawater is used to make drinking water. Investigate how this is done.
- During some Tasmanian summers there is a higher than normal amount of rainfall. Why is it that oceans do not rise significantly or overflow when rivers, creeks and rivulets continue to flow into them?



3.3 FREEZING SEAWATER

- Ask students to predict whether seawater will freeze at a higher or lower temperature than fresh water. This prediction can be written in the form of a hypothesis. Again, students should be encouraged to design their own scientific method to prove or disprove their prediction. Students can use equipment that is available in the classroom, school or brought from home. **If students are unable to design a safe and efficient classroom experiment they could use the procedure set out below.**
- Instead of writing a formal scientific report about the experiment, students could compose a letter to a relative or friend that explains in clear steps the activity they carried out at school and the results they obtained. The letter could also include a large, clear and neatly labelled diagram.

FREEZING SEAWATER

Aim

To determine whether seawater freezes at a higher or lower temperature than fresh water.

Equipment

Thermometer

Ice cubes

Measuring cup or medicine glass

Fresh water

Large glass bowl

Test tube or tall thin glass

Table salt

Stirring rod

Method

1. Put the test tube in the glass bowl and pack the ice cubes firmly around the test tube. Sprinkle some table salt on the ice cubes; be careful that none goes into the test tube.
2. Use the measuring cup to measure 10ml of fresh water and pour it into the test tube. Use the stirring stick to keep the water moving around every minute or so.
3. When ice starts to appear in the water, use the thermometer to record the water temperature. Be careful not to hit the thermometer with the stirring stick or use the thermometer to do the stirring. Thermometers are fragile and can break very easily.
4. Record the temperature shown by the thermometer.
5. Tip the fresh water from the test tube into a sink.
6. Measure 10 ml of seawater and put it into the test tube. Repeat the steps outlined above. Record the freezing temperature of seawater.
7. All the equipment can be rinsed with fresh water, dried and put away.

3.4 EXTENSION QUESTIONS

- Use the results from the experiment to explain why salt used to be placed on roads where ice formed.
- What do you predict the boiling point of seawater would be? How could you test this?
- What is a salt-water wedge? How do they form?
- Why is it that some organisms can live in both fresh and salt water?



4. Sea Surface Temperature

Teacher Notes

- *Increasing our understanding of the currents around Tasmania will lead to a greater understanding of marine ecosystems, better management of wild fisheries, more knowledge of the factors influencing rainfall, and help to define the ocean's circulation for sea safety, environmental protection and aquaculture. Research and information on currents is used by the defence force, oil and gas industries, tourism operators and shipping companies.*
- *Water is very good at absorbing heat energy from the sun. The ocean absorbs more than half of the sun's energy.*
- *Only a small amount of solar energy is needed to raise the temperature of a shallow rock pool, but the ocean requires a large amount of energy to cause the same temperature fluctuation. Therefore, the smaller the volume of water, the larger the range of temperatures.*
- *Surface temperatures of oceans vary from 30° C at the equator to -2° C at the poles.*
- *Warmer water is only found at the surface because the energy from the sun does not penetrate to the depths of the oceans. There is very little mixing of the surface water and deeper water because the warmer water cannot displace the deeper, colder water.*
- *The winds and sinking cold water in the polar and subpolar oceans “drive” the ocean. The resulting ocean currents redistribute the energy absorbed from the sun throughout the world's oceans by taking it away from the region of greatest heat (the tropics), towards the colder polar regions.*



4.1 CLASS DISCUSSION

- Ask students to think about the temperature of seawater.
 - Does the water feel warmer at some beaches than others?
 - If you woke up in July and the air temperature outside was 5°C, would the water be warmer or cooler? Why?
 - Estimate the Tasmanian sea surface temperature in winter and summer.
 - What factors influence sea surface temperature?
 - If you had to advise a tourist about what part of the Tasmanian coastline could offer the warmest places to swim, what advice would you give?
 - Ask a Fishcare Volunteer to discuss the effect of saltwater temperature on fish and fishing.

4.2 MAP READING

- What questions do you have about the temperature of the sea?
- Students to form small groups and use the poster *14 Years of Sea Surface Temperature* (in the *Marine Links Resource Kit*) to answer the questions on **Exercise Sheet for 4.2 - Map Reading**.

5. Climate Change and Marine Habitats

5.1 THE EFFECT OF CLIMATE CHANGE ON MARINE HABITATS

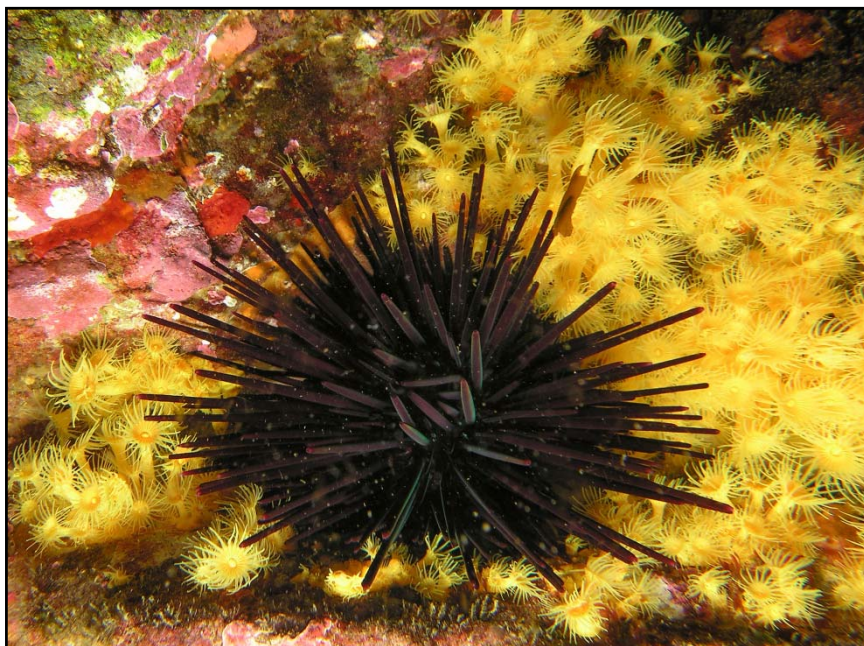
- Scientists have determined that waters off the east coast of Tasmania, are warming at greater rate than the global average. As such, climate change and the associated effects of sea water temperatures will present challenges to the way we use and manage our fish resources in the future.
- A project that documents the range extension of species is being carried out by the Institute for Marine and Antarctic Studies (IMAS). The **Redmap Project** being conducted by the Institute for Marine and Antarctic Studies also provides information and [educational resources](#) on Tasmanian marine environments, marine species and climate change.

Refer to the Redmap website: www.redmap.org.au/resources/impact-of-climate-change-on-the-marine-environment/ocean-temperature/

5.1 LONG-SPINED SEA URCHINS – A CASE STUDY

- Long-spined sea urchins (*Centrostephanus rodgersii*) have become established in Tasmania in recent years as a result of warmer waters in Tasmania due to climate change. Overgrazing on algae by these urchins is a serious threat to biodiversity, fisheries and the ecology of seaweed and algae covered rocky reef areas.
- Scientific research conducted has shown that large rock lobsters have the potential to be an effective predator of the long-spined sea urchin. To test how effective they are in wild conditions, research trials are increasing the population of large rock lobsters in an attempt to reduce long-spined sea urchin numbers in urchin affected areas in Tasmania.

University of Tasmania urchin research website:
www.zoo.utas.edu.au/urchin/index.html



An invasive long-spined sea urchin off Tasmania's East Coast

Marine and Coastal Interview

Interview an adult about their memories of the Tasmanian marine and coastal environment. Use the questions below to assist with the interview.

Interviewer: _____

Interviewee: _____ Gender: M F

Age Group 18 – 25 26 – 35 36 – 45 46 – 55 56 – 65 66 +

Relationship to Interviewee: _____

Place, date and time of interview: _____

Introduce the interview by saying: “please shut your eyes and imagine your childhood times on the coast and in the Tasmanian marine environment”.

1. What is your favourite memory of a childhood experience in the Tasmanian coastal/marine environment?
 - Who were you with?
 - Where was the location?
 - In what year did this experience occur?
 - What did you do?
 - Briefly describe the place as you remember it.



2. Have you returned to this location since? _____

If you have, how has it changed? Why? Please describe the changes.

3. Name your five favourite marine or coastal locations in Tasmania.

4. Why are these places your favourites?

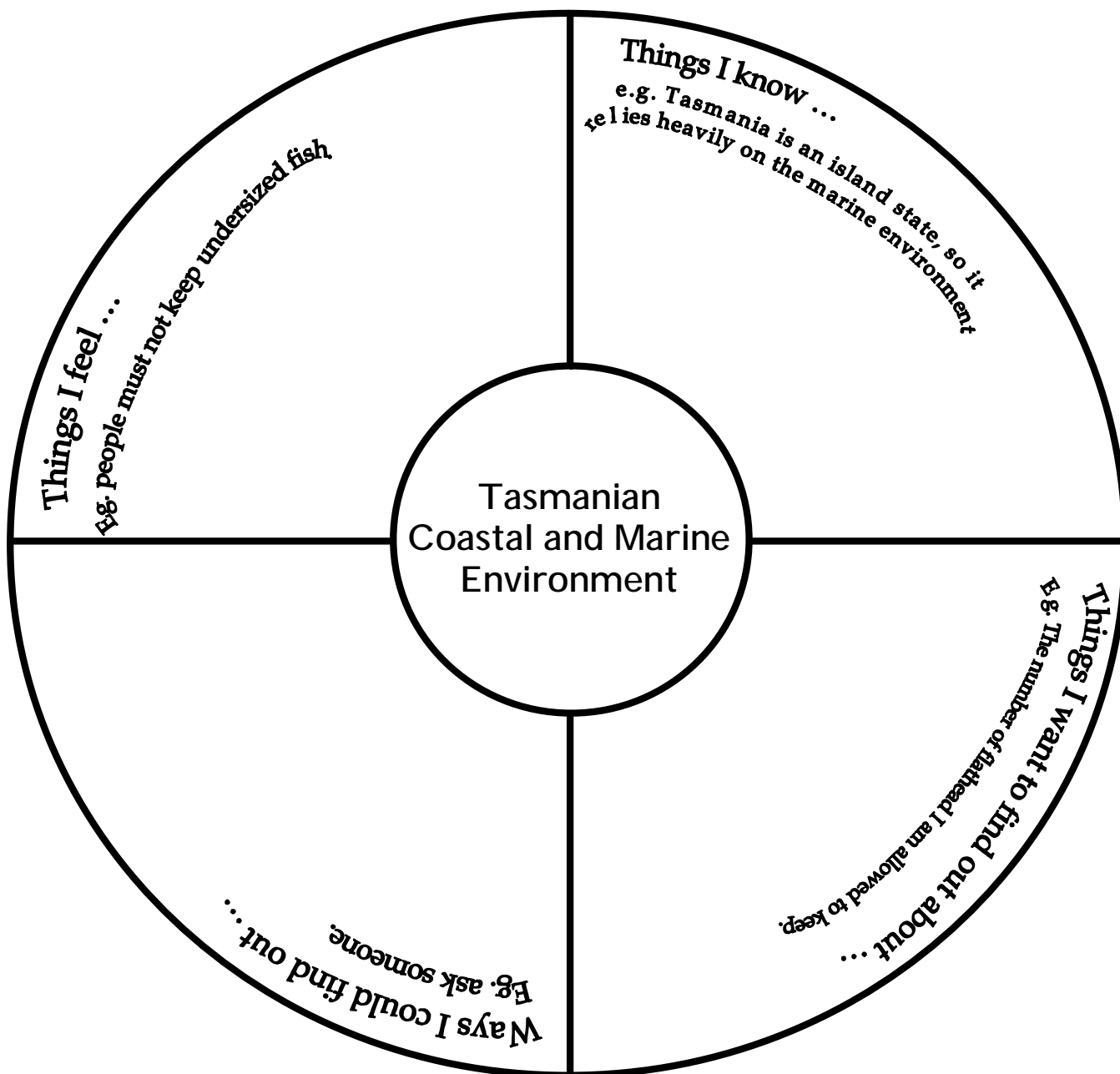


5. [Questions constructed by the interviewer]

Thank you for participating in our research.



Topic Wheel



Hint

Ways I Could Find Out.....

- Ask someone.
- Use the Internet.
- Visit the school or local library.

Look at the

- Brochures
- Posters in the *Marine Links Resource Kit*.
- Marine Textbooks

Tasmanian Sea Surface Temperature Map Reading



In small groups, use the poster *14 years of Sea Surface Temperature* to answer the following questions.

In which three years would it have been the warmest for swimming on the east coast of Tasmania in February?

In January of which two years did the warm currents fail to make it to the northeast tip of Tasmania?

November of which year saw cool water temperatures around the southwest coast of Tasmania?

The CSIRO Website

Visit the CSIRO website and use the information on Ocean Currents around Tasmania to research answers to the following questions.

<http://www.marine.csiro.au/remotesensing/oceancurrents>

What methods do scientists use today to investigate and map ocean currents?

What is the average depth of Bass Strait?

Bass Strait is known as one of the roughest stretches of water in the world. The rough waters have caused problems for sailors in the Sydney to Hobart and Melbourne to Hobart yacht races and some vessels that transport people and vehicles between Melbourne and Hobart. Explain why this stretch of water can be so treacherous.

Wind and the Earth's rotation are two of the factors that cause ocean currents. Using the information on *Currents* on the CSIRO website, mark the Tasmanian summer and winter currents on the maps below.

Summer Currents



Winter Currents



Why do we need to know information about the sea currents around Tasmania and Australia?

MARINE Life

MARINE Links



Unit 2: Marine Life

Activities in this Unit:

*This unit has been designed for students to investigate Tasmanian marine plants and animals. Students will enhance their understanding of the beauty and diversity of plant and animal communities in Tasmanian waters. They will also investigate adaptation, threatened species and dissection procedures. Key assessment activities are in **bold**.*

1 Introducing Marine Life

- 1.1 Brainstorm and Definition
- 1.2 Supermarket Visit
- 1.3 **Mini Investigation**

2 Fish Dissection

- 2.1 Fish Dissection
- 2.2 **Procedural Writing**
- 2.3 Class Debate

3 Marine Plants

- 3.1 Describing Marine Plants
- 3.2 **Cinquain Poem**
- 3.3 Marine Expressions (Exercise sheet included)

4 Sea Shells

- 4.1 Investigating Sea Shells

5 Adaptation

- 5.1 Brainstorm by Drawing
- 5.2 Adaptations Flyer
- 5.3 Camouflage

6 Threatened Species

- 6.1 Continuum
- 6.2 Threatened Tasmanian Marine Animals

Resources for Marine Life

Texts and Teaching Aids

Australian Marine Life: The Plants and Animals of Temperate Waters by Graham Edgar

Tasmanian Sea Shells by Margaret Richmond

The Hidden Forest by Jeannie Baker

Between Tasmanian Tidelines: A Field Guide by the Tasmanian Marine Naturalists Association

Wilderness Under the Waves CD

Fishes of Tasmania poster set

Recreational Sea Fishing Guide

Web Links

Fishcare Tasmania - www.fishing.tas.gov.au/fishcare

Fish Species Information-www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Fish Species Information](#)

Melbourne Aquarium Education -www.melbourneaquarium.com.au/education

Australian Museum Fish Dissection - www.australianmuseum.net.au/Dissection-of-a-Blue-Mackerel-Scomber-australasicus (Blue Mackerel)

www.australianmuseum.net.au/image/Dissection-of-a-Bluespotted-Flathead-Internal-dissection-completed/ (Bluespotted Flathead)

Procedural Writing – Department of Education

www.education.tas.gov.au/curriculum/standards/english/english/teachers/writing/text#procedural

Cinquainpoems – Department of Education

www.education.tas.gov.au/curriculum/standards/english/english/teachers/ideas/forms#cinquains

Kelpwatch Tasmania – www.geol.utas.edu.au/kelpwatch

Woodbridge Marine Discovery Centre – Species Register

www.woodbridge.tased.edu.au/mdc/Species%20Register/Home%20-%20Species%20Register.htm

Woodbridge Marine Discovery Centre Teacher Resources -

www.woodbridge.tased.edu.au/mdc/TeacherResources.htm

Redmap (a website that logs unusual fish sightings): www.redmap.org.au

www.redmap.org.au/resources/teaching-resources/

Seafood Services Australia www.seafood.net.au

Searchable Fish Names Database: www.fishnames.com.au

Curriculum Links

Science

Working Scientifically

Life and Living

SOSE

Natural and Social Systems

Investigation, Communication and Participation

English

Speaking and Listening

Reading and Viewing

Writing

Technology

Information

I. Introducing Marine Life

I.1 BRAINSTORM AND DEFINITION

- Students to brainstorm all the experiences they have had with Tasmanian marine life. For example, fishing, rock pools, skeletons washed up on beaches, cuttlefish, takeaway fish and chips, Woodbridge Marine Discovery Centre. Compile and display a class list of Tasmanian marine life experiences.
- Students form their own definition of a fish or discuss the following definition. “Fish are aquatic vertebrates, which as adults breathe using gills. If they have limbs, they are in the shape of fins.”
- Search magazines, websites, brochures, tourist guides, etc. for pictures of ‘living’ marine life. Temperate water examples could be collected by students and displayed in a scrapbook or on a poster.



I.2 SUPERMARKET VISIT

- Visit a supermarket or corner store and list at least five products that have something to do with the sea. How many of these products have links to the Tasmanian marine environment? Your home pantry or advertising catalogues will suffice if a supermarket visit is not possible.
- Compile a class list and display near the marine profile (see Marine Habitats Unit), students can add to the list throughout the unit.

I.3 MINI INVESTIGATION

- Students choose a marine animal from the *Fishes of Tasmania* poster set or the *Recreational Sea Fishing Guide* (in the *Marine Links Resource Kit*) and then research the following information about their choice:
 - Habitat
 - Appearance - size, shape, colour
 - Diet
 - Adaptations
 - Origin of the name
 - Other information of interest

The information could be presented on a large paper or cardboard cut out of the animal so they can hang from the classroom ceiling. Students may also produce a small paper cut out of the animal and place it on the habitat profile in the appropriate place.

Student Resources for the Mini Investigation

- **Tasmanian Fish Species Information:**
www.fishing.tas.gov.au > Fishing > Recreational Fishing > Fish Species Information
- **Australian Museum Fish Site:**
www.australianmuseum.net.au/Fishes
- **Melbourne Aquarium Education:**
www.melbourneaquarium.com.au/Education.aspx
- **Woodbridge Marine Discovery Centre – Species Register**
www.woodbridge.tased.edu.au/mdc/Species%20Register/Home%20-%20Species%20Register.htm
- *Australian Marine Life* by Graham Edgar

2. Fish Dissection

Teacher Notes

Purchase a whole fish, preferably one that has not been scaled or gutted.

Equipment

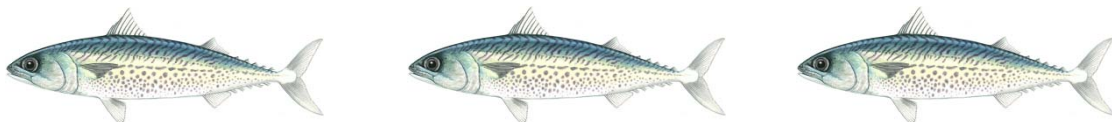
- Cutting board or newspaper
- Scalpel with a new sterile blade
- Dissecting scissors
- Tweezers / forceps
- Gloves
- Goggles (optional)
- Whole fish



2.1 FISH DISSECTION

- Discuss the ethical/moral issues with dissections. Is it appropriate to kill animals purely for dissection? Are there any animals that should never be killed? What can be gained from carrying out dissections? List other ways research and investigations can be carried out without the need for dissection, for example, x-rays.
- Invite a Fishcare Volunteer who is trained in fish dissection and experienced in handling and cleaning fish to the classroom to undertake this activity.
- Ask students to consider safety issues. Mention: washing hands and using gloves, using sterile blades in case you accidentally cut yourself, disposing of the fish in a way that will not interfere with others in the school, wearing goggles if you think something might squirt out and being careful of the fish spines.
- Place the fish on newspaper or a cutting board. Discuss the external features: scales, gills, spines, backbone, shape of the tail and head. Students should consider the type of habitat the fish lives in, why it is the shape it is, the function of the spines.
- Remove two or three scales and place them under a microscope or on an overhead projector. Students can examine and discuss the projected image.
- When carrying out the dissection, teachers can follow the dissection instructions and pictures on the Australian Museum Fish site. The dissection is of a blue mackerel and can be viewed at:

www.australianmuseum.net.au/Dissection-of-a-Blue-Mackerel-Scomber-australasicus



www.australianmuseum.net.au/image/Dissection-of-a-Bluespotted-Flathead-Internal-dissection-completed/



2.2 CLASS DEBATE

- If it is inappropriate for a dissection to occur in the classroom, then a fish dissection can be viewed on the Australian Museum Fish site. A class debate on an issue surrounding animal dissections or animal welfare could follow. A possible question could be 'do fish have rights, whether they are alive or dead?'
- Consider inviting a Fishcare Volunteer to contribute to a debate on animal welfare issues in relation to fishing.



2.3 PROCEDURAL WRITING

- Tell students that to successfully achieve some tasks we need to follow a set of written step-by-step instructions. Ask them to work with a partner to note down ideas for a piece of procedural writing explaining how to dissect a fish. They can list their ideas under the headings: equipment needed and steps to follow. The procedural writing can be based on the dissection carried out in the classroom or the one viewed on the Australian Museum Fish site.
- Share with students examples of procedural writing from the English Learning Area website.

www.education.tas.gov.au/curriculum/standards/english/english/teachers/writing/text#procedural

- Discuss with students the structures and features of procedural texts. Some points to cover:

Purpose: to provide ordered steps for achieving an outcome.

Style: simple language, short sentences and second person point of view, for example, 'you'.

Layout: a heading, an explanation of the goal to be achieved, a list of equipment, a list of numbered instructions and diagrams or photographs (use a digital camera if possible).

- Two 'fact boxes' could accompany the procedural text. The fact boxes should each be five or six sentences in length and should describe the appearance and function of two features or internal organs of the fish.
- Students work with a partner to complete the procedural writing. The text could be presented as a poster, booklet or PowerPoint display, using digital photos if possible.

3. Marine Plants

Teacher Notes

Marine plants trap the sun's energy and convert it into food, which can be used by other marine organisms. Marine plants include macro and microalgae such as kelp beds and seagrasses. Microalgae (phytoplankton) are the primary producers of the sea, the basis of the food web in the ocean and the source of most of the oxygen in our atmosphere.

Marine plants are imperative to the food chains of the sea, provide a range of habitats for marine animals and other plants to live and stabilise the sediments in which they grow.

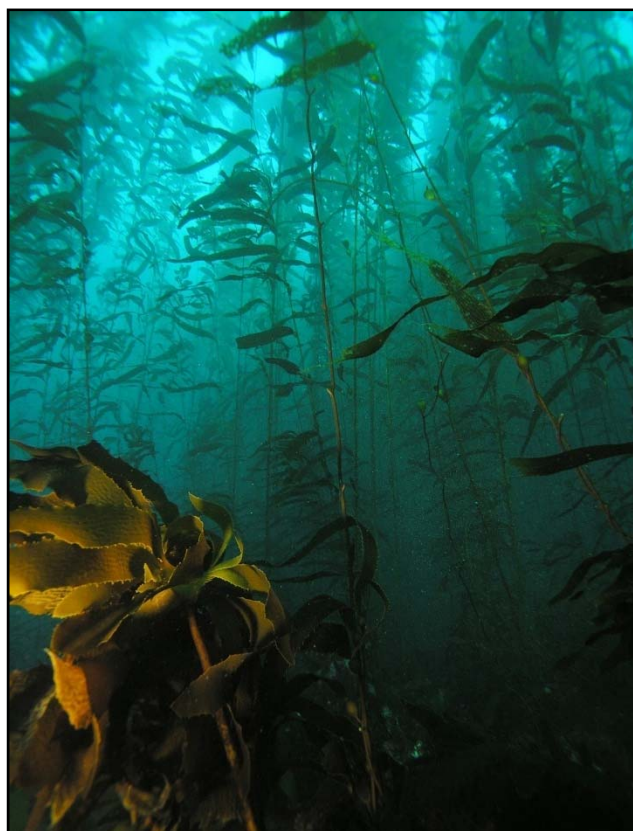
Three main groups of seaweed can usually be seen on Tasmania's coast at low tide.

1. **Green seaweeds** are found in the shallowest water closest to the brightest light. The green colour is the chlorophyll pigment that the plant uses to convert the sun's energy to chemical energy.
2. **Brown seaweeds** are usually found slightly deeper than the green seaweeds. Brown seaweeds are very common on all sheltered rock platforms at the lower tide level where they provide good shelter for many other animals.
3. **Red seaweeds** are found in deeper or shaded waters. They often wash up on beaches where the sun bleaches them white.

Seagrass

Seagrass provides a very important marine habitat because it slows the water currents and provides shelter for juvenile fish and molluscs in addition to helping the sediment to settle.

Seagrass is threatened or dying out in many places due to increases in silt and nutrients.



Kelp Forests

Large forests of string kelp grow offshore in the cool waters of Tasmania. The size and number of kelp beds around Tasmania have decreased over the past 100 years. Scientists are trying to determine whether warmer seas, pollution or over-fishing may have changed the balance in the ecosystem to reduce the extent of the kelp forests.

String Kelp (*Macrocystis pyrifera*)

This kelp forms the kelp forests and is found in southern Tasmania (a similar but smaller species, *Macrocystis angustifolia*, grows along the northern coast). It has long, rope-like stems and air bladders at the base of the fronds that help float them up to the surface nearer the light. They are one of the fastest growing plants in the world, growing up to 50 centimetres a day (in ideal conditions), to a height of at least 30 metres from the seafloor.

3.1 DESCRIBING MARINE PLANTS

- Encourage students to close their eyes and think about a time they were on the water or foreshore and came into contact with some marine plants. Remind students of the types of marine plants that are in Tasmanian waters. Ask students to construct a list of adjectives to describe the marine plants they saw, smelt, or felt. If students are having difficulties visualising marine plants, the following resources may be of assistance (available in the *Marine Links Resource Kit*).
 - *Australian Marine Life* by Graham Edgar
 - *The Hidden Forest* by Jeannie Baker
 - *Wilderness Under The Waves* – CD
 - Kelp Watch website
www.geol.utas.edu.au/kelpwatch/
- Discuss the differences between a plant and animal.



Photo courtesy Kelp Industries

3.2 CINQUAIN POEM

Each student can construct a cinquain poem using the adjectives in their lists. A cinquain poem has five lines and 22 syllables. An outline and example, from the English Learning Area website is set out below:

www.education.tas.gov.au/curriculum/standards/english/english/teachers/ideas/forms#cinquains

Line 1 - two syllables	Listen
Line 2 - four syllables	With faint dry sound
Line 3 - six syllables	Like steps of passing ghosts,
Line 4 - eight syllables	The leaves, frost crisped, break from the trees
Line 5 - two syllables	and fall.

Adelaide Crapsey (who invented the cinquain)

The poem could be accompanied by colour drawings of the marine plant that is described in the poem. If possible, use the *Australian Marine Life* book to find the scientific name of the marine plant.

3.3 MARINE SAYINGS

- Discuss why people use colloquial expressions as a form of communication. Distribute **Exercise Sheet for 3.3 - Marine Expressions** and discuss the meaning of the expressions. Students have the opportunity to design their own expressions with a Tasmanian marine theme.

4. Tasmanian Sea Shells

Note: Encourage students to follow the rule “**look, but don’t take.**”

4.1 INVESTIGATING SEA SHELLS

- Ask students to bring from home a shell that has been collected from a Tasmanian beach. If students do not have any at home, and intend to collect **one** from the beach, then emphasise that it is permitted, so long as the beach is not in a National Park, Marine Reserve or State/Coastal Reserve and the shell does not contain a living organism. **Shells are potential homes for some marine organisms, so the best rule to follow is look, but don’t take.** Schools within safe walking distance to the beach can do this activity in the field.
- Place the shell in a well-lit environment and have students examine and draw the shell. Remember, a sharp grey lead pencil is the most appropriate for scientific diagrams. The diagram could include a scale.
- Using the *Tasmanian Sea Shells* books by Margaret Richmond (in the *Marine Links Resource Kit*) students can find the common and scientific name for the shell and write it on the diagram.
- Students could carry out a number of shell rubbings for display in the classroom.



Artwork by Woodbridge District High School

5. Adaptations

Teacher Notes

An adaptation is something that helps an animal or plant survive. Organisms that are poorly adapted may die before they can reproduce – known as the survival of the fittest. Adaptations may be structural, functional or behavioural. Adaptations help organisms to avoid predators, obtain food, reproduce successfully and withstand different environmental conditions.

Structural adaptations are changes to body characteristics that help the organism survive. For example, commercial scallops and blacklip abalone have outer shells to protect their soft bodies from predators. Most animals that have armour to protect their bodies are slow moving and hence need to have another form of protection. Sea urchins are one of the many organisms that have developed spines for protection.

Pressure increases with depth, so whales that dive to great depths have to adapt to this. Their lungs collapse in deep water, so they have a special network of blood vessels that carries oxygen around their bodies.

Animals like sharks that need to move quickly through the water have to be streamlined, just like racing cars need to be streamlined. These animals have muscular bodies, a cylindrical shape and use fins to give them added thrust through the water.

Some other animals use camouflage to escape detection. They are camouflaged to blend in with their habitat. For example, greenback flounder camouflage with the colour of the sediment in the estuaries and bays in which they live and flathead blend with the sandy bottom they inhabit.

5.1 BRAINSTORM BY DRAWING

- Have students 'brainstorm by drawing' how people adapt to situations and their surroundings. For example, what do fire brigade officers, Antarctic expeditioners, deep-sea divers wear and use to adapt to situations they work in.
- With this in mind, brainstorm how fish adapt to their habitats.

5.2 ADAPTATIONS FLYER

- The following website has information about the adaptations of fish species. Visit the site and use three fish species that inhabit Tasmanian waters when examining the traits of the fish.

www.dep.state.fl.us/secretary/ed/life/apalachicola/files/fish_adaptations_boat.pdf

- Working in pairs, select a Tasmanian fish and research its structural, physiological and behavioural adaptations. This information could be presented on a small pamphlet produced in *Word*, *Publisher* or other programs.

5.3 CAMOUFLAGE

- Select a page from *The Hidden Forest* and have students design a marine creature that will be camouflaged.
- Alternatively, design a marine scene using paint, crayon, and pencils or pictures from magazines. When the scene is complete, design a marine animal that would be camouflaged in that environment. Share the scene with the class and play 'spot the marine animal.'

6. Threatened Species

Teacher Notes

Governments in Australia have listed plants and animals that biologists consider are at risk of extinction – threatened species. Those most at risk are listed as endangered. The list includes species of fish, reptiles, birds, amphibians, mammals and plants. In addition, there are many more species that are listed as vulnerable and some classified as rare.

There are two main threats to the survival of species in Australia, and these threats have already caused extinctions. They are:

- loss of habitat – this may result from climate change, human activities or natural events;
- introduced species that prey on and compete with native species for food and habitat.

Why Should We Be Concerned About Threatened Species?

We need to be aware of threatened plants and animals because a certain level of biological diversity is necessary to keep the world's ecosystems healthy. In an ecosystem, species interact and rely on each other. One species may be a source of food for another, or may help keep another's population in check.

People correctly argue that extinction is a part of life and has always occurred. The main concern for us today is that the rate of extinctions has greatly accelerated. As a result, some ecosystems have become unstable and plants and animals that could prove useful for food and medication have been lost. There are also aesthetic, ethical and conservation concerns.

Tasmanians - Can We Make a Difference?

If people are aware and concerned about the issues surrounding endangered plants and animals, there is a good chance that we will slow the rate at which organisms are becoming extinct. People can take heart from some of the success stories; for example, the humpback whale population is beginning to grow since it has been protected from exploitation.

Tasmanian Example

The spotted handfish (*Brachionichthys hirsutus*), found in south eastern Tasmania, uses its fins to walk along the bottom of the sea, rather than swim. The handfish was commonly seen in the deeper bays of southeastern Tasmania, but the population seems to have virtually disappeared during recent years and is considered endangered. The spotted handfish lays its eggs on a marine animal (stalked ascidian) that is being eaten by introduced sea stars, hence leaving the fish fewer places to lay eggs and reproduce.



Endangered Spotted Handfish in the Derwent River

Definitions

Endangered – refers to species that are likely to become extinct unless the various threats and pressures affecting them cease.

Vulnerable – sometimes used synonymously with endangered, but also used to refer to species believed likely to move into the endangered category within the next 25 years if no action is taken.

Rare – used to describe species with small populations or a very restricted distribution. Rarity may be a natural characteristic of some species, but it can also come about because of various pressures, and thus be a worrying sign about the future viability of a species. A rare species is more likely to become endangered or extinct, and needs to be considered carefully in management plans.

6.1 CONTINUUM

- Brainstorm a list of all the terms and words that mean an animal or plants is disappearing; for example, threatened, endangered, extinct, rare, and vulnerable. Use a dictionary to define the meaning of these terms and then place them on a threatened species continuum.

6.2 THREATENED TASMANIAN MARINE ANIMALS

- Visit the natural environment website below to view the Threatened Tasmanian Animal Species List. In small groups, select a fish, mammal or bird and design a flyer, poster, interview or drama activity that communicates to an audience information about the animals' habitat, diet, distribution, why it is threatened, what it needs to survive and the strategies that are in place to protect the species. Note, most of the fish are fresh water fish.

List of Threatened species

www.dpipwe.tas.gov.au > Native Plants & Animals > Threatened Species > List of Threatened Species

Go to: **Spotted Handfish**
 Southern Right Whale
 New Zealand Fur Seal
 Seastar
 Shy Albatross

- Students could interview a variety of people and ask about their involvement with or awareness of any threatened species (plant or animal) in Tasmania. These interviews could form part of display for Threatened Species Month (September). Alternatively, students could communicate the information in the form of a banner, song, or a documentary script; or
- Have students design a board game where bonus squares address the issues facing threatened species and penalty squares are for increasing problems; or
- Organise a class display or exhibition in the entrance foyer of the school on Tasmanian threatened mammals, birds and fish. Include a list of the threatened species, students' feelings about the situation and information on what people can do to help; or
- Hold a threatened species forum – invite guest speakers from the Parks and Wildlife Service Threatened Species Unit, local Coastcare groups; or
- Contact the Education and Interpretation section of the Tasmanian Parks and Wildlife Service and borrow the Threatened Species Kit that is available to schools.

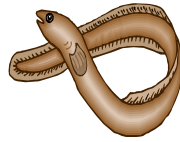
Threatened Species Kit: www.parks.tas.gov.au/index.aspx?base=461

Marine Expressions



Simple expressions are commonly used in conversations to communicate a particular point or idea. The following expressions have links to the marine environment.

- Slippery as an eel
- Sluggish
- Come out of one's shell
- High and dry
- Ship shape
- Cling like a limpet
- Wishy washy
- A fine kettle of fish
- A big fish in a little pond



- Loan shark
- Tide me over
- Sounds fishy to me
- There are plenty more fish in the sea
- Do you get my drift?
- The world is my oyster
- Coast is clear
- Your teeth are like pearls



1. Choose three of the marine expressions from the list and explain their meaning.

2. Make up a sentence that includes one of the three expressions. Turn to a partner and tell them the sentence.

3. With a partner, write two expressions about plants or animals that live in the Tasmanian marine and coastal environment. Include a diagram with each expression.

SUSTAINABLE Fisheries

MARINE Links



Unit 3: Sustainable Fisheries

Activities in this Unit:

*This unit is designed for students to investigate recreational and commercial fishing in Tasmanian waters and to understand the management of fish resources and habitats. Students will develop an increased awareness of individual responsibility for sustainable recreational fishing, and the economic importance of the commercial wild fisheries to Tasmania. Key assessment activities are in **bold**.*

1 Sustainable Fishing Practices

- 1.1 Class Discussions
- 1.2 ***Factual Reports***

2 Recreational Fishing

- 2.1 Personal Experiences
- 2.2 ***Fish for the Future Writing Tasks***
- 2.3 Fish for the Future Mathematics Tasks
- 2.4 “Planning a Fishing Trip” Display
- 2.5 Measuring your Catch

3 Commercial Fishing

- 3.1 Catch Per Unit Effort
- 3.2 ***Fishy Maths (Exercise sheet included)***
- 3.3 ***Valuing Fish (Exercise sheet included)***
- 3.4 Match Making (Exercise sheet included)
- 3.5 Extension Activities

Resources for Sustainable Fisheries

Texts and Teaching Aids

Australian Marine Life: The Plants and Animals of Temperate Waters by Graham Edgar

Fishes of Tasmania posters

Tasmanian fish size and possession poster

Fletcher the Fish poster

Model Fishing Gear

Recreational Sea Fishing Guide, fish measuring rulers and gauges

Plastic Moulded Fish

Web Links

Responsible and Safe fishing

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Fish Species Information](#) > [Responsible & Safe Fishing](#)

Recreational Limits, Seasons, Area and Gear Restrictions

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Seasons, Limits and Restrictions](#)

Recreational Sea Fishing Licences

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Recreational Sea Fishing Licences](#)

Size Limits

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Fish Species Information](#) > [Size Limits](#)

How to Measure Scalefish

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Fish Species Information](#) > [How to Measure Scalefish](#)

Protected Species

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Fish Species Information](#) > [Protected Species](#)

Fishing Gear Restrictions

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Fish Species Information](#) > [Gear Restrictions](#)

Fishcare Tasmania

www.fishing.tas.gov.au/fishcare

Commercial Fishing

www.fishing.tas.gov.au > [Fishing](#) > [Commercial Fishing](#)

Marine and Safety Tasmania

www.mast.tas.gov.au

Tasmanian Seafood Industry Council

www.tsic.org.au

Curriculum Links

Science

Working Scientifically

Life and Living

SOSE

Natural and Social Systems

Place and Space

Resources

Investigation, Communication and Participation

English

Speaking and Listening

Reading and Viewing

Writing

Technology

Information

Design, Make and Appraise

Background Notes

Sustainable Fisheries

Sustainable harvesting of a fishery involves gathering a potentially renewable resource at a rate no faster than it is able to replenish itself.

Tasmanian fisheries are managed to ensure that stocks are harvested at sustainable levels for the benefit of current and future generations. Tasmanian fish resources are very diverse and our commercial fisheries are highly regarded for supplying fresh, quality seafood and make a significant economic and social contribution to Tasmania. Recreational fisheries also make a valuable contribution to our state by providing opportunities for leisure, sport and for Tasmanians to catch their own seafood.



To ensure the long-term sustainability of fish stocks in Tasmanian waters, it is imperative that enough of each species remain to reproduce and replace the fish removed through fishing (including those that die after being released), and through natural mortality (eg. dying of old age, sickness or through predation). While we can not generally control natural mortality, we can restrict the type, size and amount of fish taken.

Fisheries laws set fishing restrictions under the *Living Marine Resources Management Act 1995*. The Department of Primary Industries, Parks, Water and Environment (DPIPWE) is responsible for managing fishing in state marine waters. Managing fisheries include: developing regulations and management plans, engaging research, and promoting, communicating and educating the community about the sustainable use of our fish resources.

Stocks of some species have come under increasing fishing pressure in recent years partially as a result of population increases, increased ownership of recreational boats, coastal development and improved fishing technology (better navigation and fish finding equipment).

Recreational Fisheries

Recreational fishing is an important part of the lifestyle of many Tasmanians with around one in every four Tasmanians participating in fishing at least once per year. There is a high level of community involvement in a diverse range of recreational fishing activities.

People fish for a variety of reasons including catching fish to eat, sport, relaxation and excitement. Many fishers say that the main reason they fish is to be in an outdoor environment, with family or friends.



The amount of the catch is not therefore the only measure of a quality recreational fishing.

Recreational fishers in Tasmania fish for a wide range of fish species, including scalefish, rock lobster, abalone and scallops. Scalefish are taken using hooks and lines, nets and spears. Popular scalefish species are flathead, flounder, Australian salmon, pike, trevally, warehou,

bastard and striped trumpeter, morwong, bream, cod, and various reef fish. Use the Recreational Sea Fishing Guide, or the *Fishes of Tasmania* posters to see what some popular recreational fish species look like.

Recreational fishers are only allowed to take fish using recreational fishing gear and are not allowed to sell fish or gain any reward for giving fish away.

Recreational fishing is controlled mainly through seasons, gear restrictions, possession and bag limits, restricting the number of fish recreational fishers may catch, and size limits – undersized fish must be released back to the water.

Recreational fishers do not require licences for rod and line fishing in the sea but an Inland Fisheries licence is required for freshwater fishing. Recreational fishers require licences for taking abalone rock lobster and scallops: and for using certain fishing gear including using a rock lobster pot or rings; graball net, mullet net and beach seine nets; or a setline.

Recreational licences help inform fisheries managers who is doing the fishing, and the money from the fees assists in managing our fisheries for the benefit of the community.

As our population increases, it is likely that more people will participate in fishing. In addition, technological innovations increase the ability to successfully catch fish.

As such, the amount of catch and fishing activities need to be periodically reviewed to ensure there is not too much fishing pressure on the fish stocks and catch controls considered. Information that is collected from recreational fishers through periodic surveys help estimate how much and what species of fish are being taken by recreational fishers.

Recreational fishing survey results are available from www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Recreational Fishing Survey Results](#)



Commercial Fisheries

Under the *Living Marine Resources Management Act 1995*, no person can take fish for the purpose of sale or business, or sell fish (which includes marine plants) unless they hold the appropriate commercial licences.

The harvesting of fish resources are categorised into distinct fisheries for ease of management. A fishery can be based on the category of people involved, fish harvested, area of fishery or method used. The two distinct groups are recreational fisheries and commercial fisheries.

The following are some examples of Tasmanian commercial fisheries:

- abalone fishery – by diving
- rock lobster fishery – rock lobster pots
- scallop fishery – dredge
- giant crab fishery – pots
- scalefish fishery – nets, fish traps and hooks
- shellfish – by hand and by diving
- marine plant fishery – by hand and by diving

The Tasmanian scalefish fishery is complex fishery to manage, as many types of species are harvested and a range of gear types used.

Catches may be limited by restricting the amount of fishing effort including:

- Limiting the number of licences,
- Limiting amount of fishing gear eg. number of pots, number and the length nets,
- Type of gear - net mesh size, escape gaps in rock lobster pots
- Seasons – limits the amount of days that can be worked.
- Area closures.

The total amount of catch allowed to be taken in a year, known as a quota, can be set for some fisheries. This works well with higher value fisheries that are based on single species such as the abalone, rock lobster and giant crab fisheries. Each fisher has to record the amount of fish caught in these fisheries to ensure their individual quotas are not exceeded.

Management Plans (the rules of the fishery) and policies are made for each fishery to assist in limiting the catch and effects on the wider environment. Developing a fishery management plan involves extensive consultation with the community, including commercial fishers, recreational fishers, fishing associations and other interested community groups.

Tasmanian commercial wild fishing was worth at least \$157 million in the 2007–2008 year to the state's fishers. Over 90% of the value of the fishery comes from the valuable abalone and rock lobster fisheries around our coast.

To gain more information about commercial fisheries, teachers may seek assistance from a commercial fisher or marine farmer through the “*Adopt a Fishing Boat and Adopt a Marine Farm*” program being conducted by OceanWatch Australia and the Tasmanian Seafood Industry Council. Refer www.oceanwatch.org.au/our-work/sips for more details

Sustainable Harvesting

Sustainable harvesting of a fishery involves gathering a potentially renewable resource at a rate no faster than it is able to replenish itself.

Tasmania has an international reputation for high quality fisheries. DPIPWE places emphasis on the conservation of the marine environment to ensure that Tasmanian fishing industries are harvested within environmentally sustainable parameters so that they can continue to prosper into the future.

The Tasmanian abalone, giant crab, rock lobster and scallop fisheries have export exemptions under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Only catch from fisheries that can demonstrate that they are being managed in an ecologically sustainable way can be exempted from the export controls of the EPBC Act which is designed to ensure that trade does not threaten Australia's wildlife.



Size Limits

Size limits are imposed to protect fish stocks. Minimum size limits mean that people are only able to take the larger fish, giving the juvenile fish the chance to grow into an adult and breed. The general aim is to allow fish to breed at least once before they are taken from the fishery. If too many young fish are taken, fish numbers may decline.

Scientists provide information about the breeding size and the rules about size limits are made by the government in consultation with the community. Other considerations in setting size limits may be the survival of released fish and the amount of meat derived from a fish. The larger the fish, the more meat recovered and therefore less fish may need to be taken. In some fish, however, large fish are important as they have better breeding success (from better quality and larger eggs).

The minimum legal size limit for flathead of 300 mm is an example of protecting fish for spawning stock. By releasing a fish that is undersize the fish is able to grow and breed.

Some fishing gear is designed to minimise the chance of catching undersize fish. Rock lobster pots have escape gaps that allows undersize fish to escape. The size of mesh in gillnets, aims to let small fish swim through the mesh.



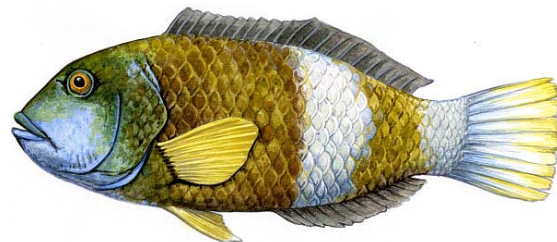
Closed Seasons

Fishing may not be allowed at times corresponding to spawning for some species to protect breeding stock. This is termed a closed season. The period in which fishing is allowed is known as the open season. For example, no female rock lobsters can be taken between May and November because that is the time that they carry eggs and spawn.

Interesting Facts about Wrasse



Female

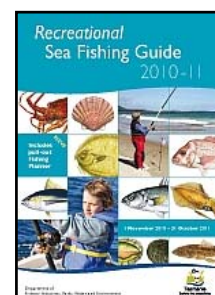


Male

Students might be interested to hear about the blue-throat wrasse, which is found in Tasmanian waters. Juvenile blue-throat wrasse mature and reproduce as females for a few seasons before they change sex and function as males. The timing of sex change appears to be a function of the size and behaviour of the group. Female blue-throat wrasse mature at around three years of age, but only enter the fishery (that is, reach the fishing size limit) at around eight years of age. So the female fish are able to reproduce for quite a few years before they become vulnerable to fishing. All male blue-throats are derived from mature females and are therefore vulnerable to fishing.

Classroom Display

Place the **Recreational Sea Fishing Guide** on display in the classroom. There are multiple copies of this guide in the *Marine Links Resource Kit* so students are able to have a look at it. Additional guides are available from Service Tasmania, Regional Fishcare Coordinator and Fishcare Volunteers.



I. Sustainable Fishing Practices

I.1 CLASS DISCUSSION

- Conduct a class discussion on the following questions:
 - Why do people eat fish?
 - Why do we eat some fish, but not others?
 - How often does your family eat fish?
 - Why do people fish?
 - Compare the fish you have caught on fishing trips with family or friends.
 - What is the difference between recreational and commercial fishing?
 - What types of fish do commercial fishers catch?

I.2 FACTUAL REPORTS

- Form groups of three or four and randomly select a sustainable fishing topic from the list below. Research the topic and present a brief factual article for the school newsletter, to communicate the “Fish for the Future” message to the school community. Students could then give a two minute verbal presentation to the class.
- Invite a Fishcare Volunteer to make a presentation to the class covering all aspects of sustainable fishing.

1. Returning Undersized and Unwanted Fish to the Water

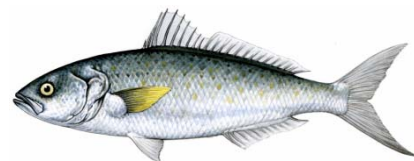
- when must fishers return fish to the water?
- catch and release
- unhooking
- protecting the fish
- protecting the fisher



www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Fish Species Information](#) > [Responsible & Safe Fishing](#)

2. Fish Handling

- Landing fish
 - Handling fish
 - Killing fish
- www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Fish Species Information](#) > [Responsible Fishing](#)



3. Fishing Restrictions

- restrictions in your local area
- area and gear restrictions – eg. the role of rock lobster pot escape gaps.

Recreational Sea Fishing Guide

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Area Restrictions](#)

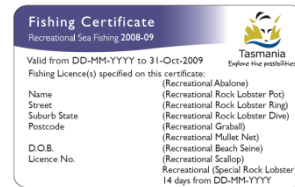


4. Recreational Fishing Licences

- when are they required
- how can they be obtained

Recreational Sea Fishing Guide

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Recreational Sea Fishing Licences](#)



5. Recreational Size, Possession and Bag Limits

- what are size, possession and bag limits?
- why do we have them?
- how do you measure fish?

Recreational Sea Fishing Guide

Fish Measuring Ruler and Gauges

Possession Limits: www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Recreational Sea Fishing Licences](#) > [Fish Species Information](#) > [Possession Limits](#)

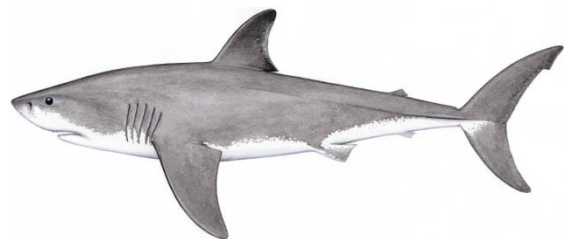
Size Limits: www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Recreational Sea Fishing Licences](#) > [Fish Species Information](#) > [Size Limits](#)

How to Measure Scalefish: www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Recreational Sea Fishing Licences](#) > [Fish Species Information](#) > [How to Measure Scalefish](#)



6. Prohibited Species in Tasmanian Waters

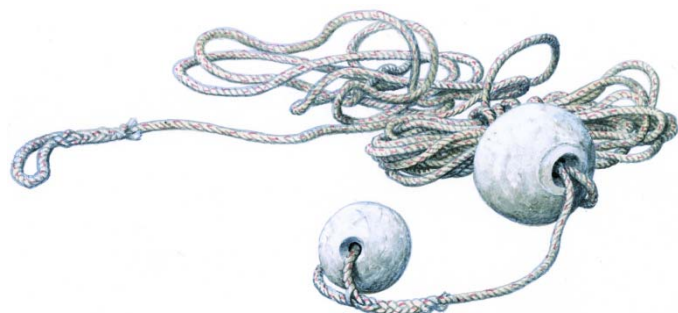
- which species are prohibited?
- why are they prohibited?
- what should fishers do if they catch a prohibited species?
- include diagrams of some prohibited species so people can recognise them.



Protected Species: www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Recreational Sea Fishing Licences](#) > [Fish Species Information](#) > [Protected Species](#)

7. Fishing Gear and Tackle

- what can be used by recreational fishers?
- what cannot be used by recreational fishers?
- what tackle is best for the fish, for example, barbless hooks?



Gear Restrictions:

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Recreational Sea Fishing Licences](#) > [Fish Species Information](#) > [Gear Restrictions](#)

2. Recreational Fishing

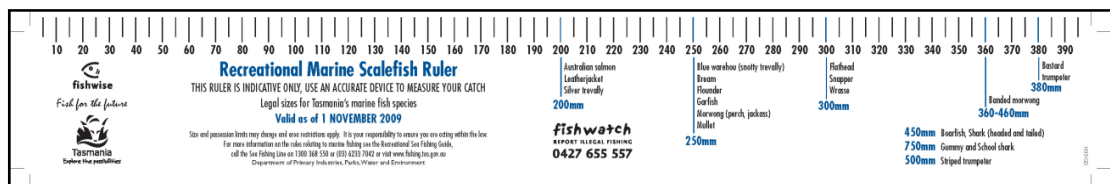
2.1 PERSONAL EXPERIENCES

- Students to recall and share a recent fishing trip experience. What made the trip an enjoyable one? Were there any negative experiences? What was the location like? Why did you decide to go on the trip?
- Invite a Fishcare Volunteer or Wild Fisheries Management Officer to present a talk to the class on size and possession limits, recreational fishing, fishing gear and tackle, local waterways etc. Or, request students who fish regularly to bring their fishing equipment to school and demonstrate safe and appropriate use.

2.2 FISH FOR THE FUTURE WRITING TASKS

- Distribute the *Fish for the Future* rulers to students in the class and then discuss: What is the purpose of the ruler? How would it be best to use the ruler? Who should carry the ruler?
- Choose one of the writing tasks set out below.
 1. Prepare a **brochure** on why people should abide by size limits and possession limits when fishing. Students should consider:
 - that there are enough fish left to breed and replace the fish taken
 - only take enough fish to meet immediate needs
 - ensure fish supplies for future fishing trips and other people
 - suitability of fish to eat etc.

Include the logo “Fish for the Future” on the brochure. These brochures could also be included in the school newsletter.



2. Design a **poster** promoting fish conservation and management. Aim the poster at a particular audience, for example, junior students or recreational fishers. Students may choose to focus on one particular species or the overall need for management. The following points should be considered:
 - reproduction
 - food chains
 - population stability
 - ecosystem protection
 - sustainable catches
 - the need to plan ahead
 - sharing our marine resources between different user groups

3. Create a colourful **bumper sticker** about why fishers must take particular care with their gear. Consider that fishing gear does not “know” if its encountered fish that are too small, are a protected species, exceeded the bag limits etc., and all marine animals will die if left entangled in fishing gear for too long.



Do the right thing. Release undersize fish.



2.3 FISH FOR THE FUTURE MATHEMATICS TASKS

1. There are about 130 000 recreational fishers in Tasmania. If each fisher caught their possession limit of flathead on 19 days of the year, how many flathead would be removed from Tasmanian waters?
 - 1a. The weight of legal-sized flathead averages 250g. What would be the weight of the flathead caught by the 130 000 recreational fishers in Tasmania if they all caught their possession limit of flathead on 19 days of a year?
 2. There are about 13,000 recreational abalone licences in Tasmania. If each person holding a licence caught their bag limit on 27 days of a year, how many abalone would be removed from Tasmanian waters?
 - 2a. The average weight of a black lip abalone is 340g. What would be the weight of the abalone caught by the 13,000 recreational abalone divers in Tasmania if they all caught their limit of abalone on 27 days of a year?
- As a concluding activity, construct a consequences wheel to examine the impact of people not abiding by size and bag limits. Consider the effects over several days, seasons and years. How will this affect the ability of species to reproduce and future fish stocks?

2.4 “PLANNING A FISHING TRIP” DISPLAY

- In small groups students draw a picture or diagram representing what a safe and sustainable fisher would have in their kit to take on a carefully planned fishing trip. The drawing should be fully labelled and include detailed annotations. Alternatively, students could create an actual kit, by collecting brochures, bringing equipment from home, cutting weather reports from a newspaper etc. In preparation for the activity, discuss the following:
 - **suitable fishing location** – safety, transport etc.
 - **weather** – where can you find accurate and up to date information, consider the need to cancel the trip in the case of poor weather.
 - **fishing in a group** – it is best to fish with two or three other people.

- **fishing equipment** – what do you need, is the equipment in good condition, do I have a bag for my rubbish?
- **water safety** – what should you be looking for, does your family know where you are going and how long you plan to be away?



Preparing for a Fishcare fishing clinic

- **boat safety** – do you have all the mandatory safety gear and know the rules? Consider the things you should not do on the water, for example, drink alcohol, ignore weather reports.
- **knowledge** – what type of fish am I aiming to catch, what are the legal size, bag and possession limits, how do I handle undersized or unwanted fish, where am I permitted to fish?

An actual fishing trip organised through Fishcare may be possible with assistance from staff and parents. If not, invite a Fishcare Volunteer to talk about safe and responsible fishing.

2.5 MEASURING YOUR CATCH

- Examine the flathead, flounder or rock lobster from the *Marine Links Resource Kit*. Has anyone caught one of these fish before? Do they meet the minimum size limit?
- Use the size limits and measuring instructions on the *Fish for the Future* ruler or fish measuring gauge to see whether it is sized.
- Use recycled materials to design an implement to assist fishers measure their catch quickly and accurately. The implement may be designed for fishers to measure rock lobster, abalone or scalefish.



3. Commercial Fishing

3.1 INCREASING CATCH EFFICIENCY

- Discuss the idea increasing efficiency in a fishery. Although fish numbers may be less that they were a few decades ago, they may still catch a similar amount of fish in the same amount of time due to using better equipment. Examples include:
 - Using monofilament nets that can not be easily seen underwater. Previously nets were made of cotton.
 - Colour depth sounders and fish finders that show what is on the bottom.
 - Global Positioning Systems that allow the fisher return to the exact location.
 - Sea surface temperature information and satellite imagery because as many fish are associated with certain water temperature profiles, these help indicate if a certain fish species may be present.
 - Efficiency of boats.



With increased efficiency, there may need to be periodic changes to the management of fisheries to ensure there is enough remaining stock to replace those taken.

- Develop an activity, using things in the classroom or school grounds to illustrate this concept. For example, if students had to individually pick up the gum nuts from part of the playground it would take a considerable amount of time, but if they were given a rake their proficiency would improve. A rake specifically designed for gum nuts would improve proficiency even more. This idea can be related to fishing techniques.
- List, research or draw the fishing gear used by commercial and or recreational fishers to increase proficiency.

3.2 FISHY MATHS

- Commercial wild fishing was worth \$157 million in the 2007–2008 year to Tasmanian fishers. To see the economic value of this industry to the Tasmanian economy and, therefore, the need for all fishers to act sustainably, students could complete **Exercise Sheet for 3.2 - Fishy Maths**.

3.3 VALUING FISH

- Distribute the **Exercise Sheet for 3.3 - Valuing Fish**. Explain to students that the table illustrates the catch weight and dollar value of commercial wild fishing in Tasmanian waters for the 2007–2008 period.



Greenlip Abalone: a valuable Tasmanian wild fisheries export

3.4 MATCH MAKING

- Complete in class or for homework the **Exercise Sheet for 3.4 - Sustainable Fishing Match Making** sheet.

3.5 EXTENSION ACTIVITY

- Both commercial and recreational fishing are important to Tasmanians and have benefits to the wider community.
- Is it cheaper to catch your own fish or buy it from the shop? Discuss this question and then ask students to complete a cost analysis for a particular scenario. For example, a recreational fisher using a boat would have the following expenses:
 - purchase of boat
 - boat fuel and maintenance expenses
 - boat registration and licence
 - safety equipment purchases – life jackets, flares etc.
 - fishing equipment etc
- Find out how Tasmania compares to other Australian states with regard to recreational or commercial fishing.
- The numbers of fish that live in Tasmanian waters are limited. Discuss why a marine resources management plan is necessary and have students design a management plan that satisfies the needs of both recreational and commercial fishers. Consider, for example, the social value of recreational fishing and the financial return for commercial fishers and coastal communities around Tasmania.



Fishy Maths

The fees paid by the Tasmanian commercial abalone fishery are around \$7.5 million dollars per year. Calculate what else this amount of money could buy.

1. A brand new primary school costs \$7 500 000 to build. How many new primary schools could be built over a 10 years period?



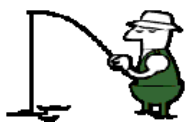
2. School gymnasiums cost \$1 200 000 to build. How many schools could have new gymnasiums for their students each year?



3. It costs \$1 350 000 to purchase new equipment and furniture for a large Tasmanian school. How many schools could be totally refurbished each year?

4. You are cooking a seafood dish requiring 1 kilogram of fish fillets. The fish you have are just over the minimum legal size of 300mm and when filleted each fish provides an average of 200 grams of fish meat. How many fish do you need for your recipe? If you had fish that measured an average of 350mm which provided an average of 340 grams of meat, how many fish would you need for the recipe?

5. It is important for people to act in a sustainable manner when fishing (follow size and possession limits) because.....



Valuing Fish



Tasmanian Fisheries Production 2007–2008

Fish	Catch (T)	Value \$
Australian Salmon	104	198 000
Cod	6	22 000
Garfish	49	473 000
Morwong, Banded	7	118 000
Morwong, Jackass	5	14 000
Elephant fish	2	5 000
Trumpeter, Bastard	21	93 000
Trumpeter, Striped	16	179 000
Whiting, School	60	181 000
Wrasse	104	1 138 000
Other Scalefish	276	734 000
Shark	24	167 000
Other	739	1 054 000
Total Fish	1 137	3 642 000
Crustaceans		
Rock Lobster	1 444	58 161 000
Giant Crab	60	1 889 000
Other		
Total Crustaceans	1 504	60 050 000
Molluscs		
Abalone	2 317	88 764 000
Octopus	110	234 000
Scallops (s)	1 461	2 600 000
Other	221	1 343 000
Total Molluscs	4 109	92 942 000
Grand Total	6 750	1 56 634 000

Activities

Use the results in the table to calculate the answers to the following questions.

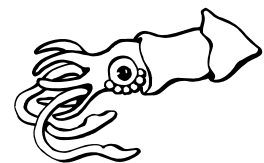
- Calculate the total value of the fish, crustaceans and molluscs caught in the 2007–2008 period and place it in the table.
- Calculate the total catch in tonnes for molluscs caught and place it in the table.
- Which two species brought in the most money for Tasmanian commercial fishers?
- Which species brought in the least?
- How many kilograms of cod were caught?
- By weight, what percentage of the fish catch was Australian Salmon?

Source

Data from Scalefish Section, DPIPWE.
Source: ABARE Australian Fisheries Statistics 2008

7. What was the price per tonne of Elephantfish?

- What was the price of Abalone per tonne?
 - What is the price of Abalone per kilogram?
 - The price of lean beef mince is about \$15.00 per kilogram. What is the price difference between lean beef and Abalone?
- What was the combined value of Abalone and Rock Lobster?
 - The value of Abalone and Rock Lobster is what percentage of the total value?
 - Abalone and Rock Lobster fishers pay large sums of money to obtain commercial licences. Why do you think Tasmanian Police charge people that take Abalone or Rock Lobster without a licence or exceed their possession limits?



Match Making

Match each of the ten statements in Section One with the best answer in Section Two.

Section One

- 1 I change from female to male during my life.
- 2 Recreational fishers require licences if they are going to fish for us.
- 3 Recreational fishers require licences if they are going to use this particular piece of fishing gear.
- 4 We are prohibited species and must be carefully returned to the water if caught.
- 5 What recreational fishers cannot do with their catch.
- 6 The amount of money commercial wild fishing brings to Tasmania each year.
- 7 Size limit for flathead.
- 8 The personal possession limit for all scale fish caught by recreational fishers varies but generally it is.....
- 9 When handling fish it is very important to remember to.....
- 10 When catching a tagged fish you should.....

Section Two

- A Sell their catch.
- B
 - Return the fish to the water.
 - Contact the agency responsible for the tagging – to help with research and because a reward might be offered.
- C 300 mm
- D 15
- E Show care and respect
 - to protect the fish.
 - protect yourself, as many Tasmanian fish have sharp or venomous spines that can harm you.
- F Abalone, scallops and rock lobsters
- G Fishing nets
- H Seahorse, sea dragon, pipehorse, pipefish, handfish, threefin blenny
- I Blue-throat wrasse
- J \$157 million



Answers

- | | | | | |
|--------|--------|--------|--------|---------|
| 1..... | 3..... | 5..... | 7..... | 9..... |
| 2..... | 4..... | 6..... | 8..... | 10..... |

MARINE Reserves

MARINE Links



Tinderbox

Marine Nature Reserve

... bigger and better

Unit 4: Marine Reserves

Activities in this Unit:

*Students are provided with the opportunity to investigate the reasons for creating marine reserves in Tasmanian waters. The location, distribution and management of Tasmania's current marine reserves will be covered. Students will also examine, through role play, the different community viewpoints about the creation of future reserves. Key assessment activities are in **bold**.*

1.1 Marine Reserves Worksheet

1.2 New Marine Reserve Role Play

Resources for Marine Reserves

Texts and Teaching Aids

An Introduction to Marine Studies, Moffat B et al

Wilderness Under the Waves CD

Fish Display Posters

Recreational Sea Fishing Guide – shows maps of current marine reserves

Web Links

Tasmanian Marine Reserves

www.fishing.tas.gov.au > [Fishing](#) > [Recreational Fishing](#) > [Seasons, Limits and Restrictions](#) > [Reserves and Research Areas](#)

Follow links to:

- **Governor Island**
- **Maria Island**
- **Ninepin Point**
- **Tinderbox**
- **Macquarie Island**
- **Port Davey/Bathurst Harbour**
- **Kent Group**

Parks and Wildlife Marine Reserve Information

www.parks.tas.gov.au/index.aspx?base=397

Dive Tas underwater images

www.parks.tas.gov.au/podcasts/DiveTasmaniaPodcast.mp4

www.parks.tas.gov.au/podcasts/marine.mp4

Port Davey Marine Reserve Podcast

www.parks.tas.gov.au/file.aspx?id=16333

www.parks.tas.gov.au/file.aspx?id=16334

Commonwealth Marine Protected Areas

www.environment.gov.au/coasts/mpa/

Curriculum Links

Science

Working Scientifically

Life and Living

Earth and Beyond

SOSE

Natural and Social Systems

Place and Space

Culture

Resources

Investigation, Communication and Participation

English

Speaking and Listening

Reading and Viewing

Writing

Technology

Information

Background Notes

A marine reserve or MPA (marine protected area) is a protected area of the marine and coastal environment, similar to a national park. A marine protected area is defined as:

“an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, and managed through legal or other effective means.”

Depending on where they are located, marine protected areas in Australia may be managed by State, Territory or Commonwealth governments or a combination of these.

Marine protected areas have a range of protection levels that allow different activities depending on the reasons for protection. For example, in certain zones of a ‘multiple use’ marine park low level and low impact fishing, such as taking fish by line may be allowed. In areas that are classed as ‘no-take’ or sanctuary zones, you are not allowed to go fishing or collect living or dead material or harm animals or plants.



In Tasmania, 21 marine reserves have been declared in State waters, including one at subantarctic Macquarie Island. Of these, seven are Marine Nature Reserves, all of which contain no-take areas. The remaining 14 reserves are Marine Conservation Areas in the south-east of the State which currently allow fishing. Other activities which don’t damage the marine nature reserves are allowed including swimming, boating, kayaking, snorkelling and SCUBA diving. Tasmania’s seven marine nature reserves are listed in the table below:

Marine Reserve	Location	Size (ha)
Governor Island	Bicheno, East Coast	60
Maria Island	Orford, East Coast	1500
Ninepin Point	Verona Sands, south of Hobart	732
Tinderbox	Tinderbox, south of Hobart	144
Macquarie Island	Macquarie Island	74 715
Port Davey Bathurst Harbour	South West Coast	17 000
Kent Group	Eastern Bass Strait	29 000

The total no-take areas in Tasmania is small, representing only 1% of State Coastal waters (excluding Macquarie Island) in comparison to our terrestrial national parks, which make up over 1.4 million hectares, or about 20% of the state.

Marine reserves have been declared for a variety of reasons:

- Protection of unique habitats
- Protection of culturally significant areas
- Species biodiversity, reproduction and protection
- Scientific research
- Recreation and tourism

I. Activities

I.1 TASMANIAN MARINE RESERVES WORKSHEET

- Explain to students that a marine nature reserve is a ‘wet national park’, that is, a protected area of the marine and coastal environment. Distribute the **Exercise Sheet for I.1 - Tasmanian Marine Reserves**. Read and discuss. Use the **Recreational Sea Fishing Guide** in the *Marine Links* Resource Kit to assist students. Information on each of the Tasmanian Marine Nature Reserves and Marine Protected Areas are available for download from www.parks.tas.gov.au/index.aspx?base=397
- Invite a Discovery Ranger from Parks and Wildlife to talk to the class about the purpose of marine reserves and how they benefit our community.



Tinderbox Marine Nature Reserve, Southern Tasmania

I.2 NEW MARINE RESERVE ROLE PLAY

- The purpose of the role play is for students to understand that within any community there is a range of viewpoints, some conflicting, and others complementary, on the management of marine and coastal natural resources. Students will develop an understanding of democratic processes (e.g. how a public meeting works) and develop skills in giving well reasoned and logical opinions, asking questions, finding relevant examples and learning how to reach consensus.

Beginning the Role Play:

- Explain to students that a role play is an opportunity to “step into someone else’s shoes.” A role play has three stages – preparing to be in role, in role and class debrief. Students will need to stay “in role” for the duration of the second stage and at all times make a positive contribution.

The Scenario:

- The State Government has just announced that a new marine reserve, “New” Reserve, is to be declared in Tasmania. The government has also announced that a public meeting will be held in the town nearest to the proposed reserve to give local citizens the opportunity to have their say.

Preparing to be in Role:

- Explain to students that after the announcement of the proposed new marine reserve, the local newspaper had received a number of letters to the editor, both for and against the reserve, from local citizens and other interested parties.
- Distribute copies of **Exercise Sheet for 1.2a - Letters to the Editor** to students. In groups, students are to read each letter extract and decide if it is “for” or “against” the proposed marine reserve.
- The town mayor has decided to call a public meeting so that local citizens have the opportunity to voice their views about the proposed marine reserve. The State Environment Minister, the representative responsible for declaring new reserves, has agreed to attend the meeting.
- Distribute **Exercise Sheet for 1.2b - Notice of Meeting** to students and explain the purpose and operation of a public meeting using a current example, if possible. Some points to mention:
 - It is one way that citizens can have a say in our democracy in Australia.
 - It can be held to rally citizens, show support, share information or to hear and question our elected representatives.
 - People can have the opportunity to vote by show of hands.
 - One person will usually act as chairperson.
- Allocate the roles to students. The division of roles in the table below is only a suggestion; it would be beneficial to allocate the roles through class discussion.
- Display a sheet of paper (A3 or larger) in the classroom and develop a geographical map of the community. Some possible things to locate: local council chambers, dive charter business, charter fishing business, jetty etc. A name for the community is also needed. Democratic processes should be modelled.
- Students then work with a partner or in a group of three to develop a short persuasive speech that gives a reasoned viewpoint “for” or “against” the proposed new reserve. Encourage students to develop well-reasoned and coherent arguments using examples from their previous work and from other sources. They could also develop a list of questions to ask the Town Mayor and/or the State Environment Minister. Explain to students that they are allowed to change their minds about their position on the reserve during the meeting.
- Students could wear costumes to assist the development of their role if appropriate.

Chairperson

- A student, or the teacher, is to act as the chairperson for the meeting. Their role is to begin the meeting, introduce each speaker, manage questions from the audience and, at the conclusion, provide a summary of the views presented.

FOR	AGAINST
* State Environment Minister	*Local Member of Parliament
* Marine Scientists	*Managers, Local Fish Processing Factory
* Local Recreational Fishers (1)	* Local Recreational Fishers (2)
* Local Commercial Fishers (1)	* Local Commercial Fishers (2)
* Tasmanian Aboriginals	* Town Mayor
* Dive Charter Operators	* Charter Fishing Business Representatives
* Local Residents	* Fishing Tackle Shop Owners

In Role:

- Once the students have **thoroughly prepared for the role play**, the “in role” stage can begin.
- Set up the classroom with three seats at the front facing rows of chairs for the audience. The Town Mayor, chairperson and State Environment Minister are seated at the front. Have the map of the community on display for speakers to refer to.
- The chairperson begins the role play by welcoming the audience, introducing the official speakers and outlining the purpose for the meeting. He/she then invites each of the official speakers to speak in turn.
- Questions and comments from the audience can then be taken.
- Once every person has spoken, the chairperson sums up what has been said and puts the following vote to the meeting: ***All those in favour of the declaration of the New Marine Reserve please raise your hand***, counts the votes and declares if the vote was lost or carried.



Class Debrief:

- No role play is complete without a class debriefing and discussion. Some questions for debriefing and discussion:
 - What were the most persuasive arguments, both for and against, presented at the meeting?
 - What makes an argument persuasive?
 - Did you change your mind during the course of the meeting? Why? Why not?
 - If you were not happy with the outcome of the meeting, what else could you do to have your say? Can you suggest a compromise eg. will the values of an area be maintained if it became a multiple use marine protected area with a smaller area declared a marine reserve where no fishing is allowed?
 - Do **you** think more marine reserves should be declared in Tasmania? Explain your reasons? Are there any particular places where you would like to see marine reserves created in Tasmania?
 - In what ways could the role play be improved?

TASMANIAN MARINE RESERVES

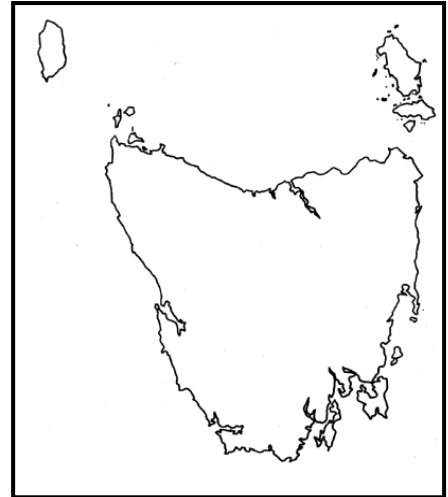
What is a marine reserve?

A marine reserve is a “wet national park”. That is, an area of the marine and coastal environment that is under special protection.

Where are Tasmania’s marine nature reserves?

Tasmania marine nature reserves are listed below. They are:

1. Governor Island
2. Maria Island
3. Ninepin Point
4. Tinderbox
5. Port Davey/Bathurst Harbour
6. Kent Group
7. Macquarie Island



Why do we have marine reserves in Tasmania?

Marine Reserves have been declared in Tasmania:

- To protect special habitats (e.g. kelp forests)
- For scientific study
- For tourism (e.g. a snorkelling tour)
- For recreation (e.g. swimming, boating)
- To protect culturally important areas (e.g. a shipwreck)
- To provide a safe place for plants and animals to reproduce and stock other areas.

What are you allowed to do in a marine reserve?

Different reserves have different rules. In Tasmania, many of our marine reserves have ‘no-take’ areas where **you are NOT ALLOWED to fish; remove, collect or harm anything**. In no-take areas you can participate in activities that don’t harm the reserve, for example, swimming, boating and diving.

Remember, in no-take areas: “LOOK, BUT DON’T TAKE”

Activities

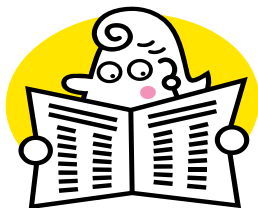
1. Mark on the map with numbers (1-7) the location of Tasmania’s Marine Nature Reserves.
2. Read the following list and decide which activities would be allowed in a Tasmanian marine reserve and why or why not. Present your work in a table like the one below.
 - Motorised boating
 - Fishing for flathead
 - Collecting shells
 - Collecting driftwood
 - Underwater photography
 - Swimming
 - Anchoring a vessel
 - Removing rubbish

Activity	Allowed (YES/NO)	Reason

LETTERS TO THE EDITOR

(Please note the letter extracts are statements of opinion and do not represent the views of the author).

1. "The new reserve will protect fish breeding grounds and therefore lead to improved fish numbers and sizes in nearby commercial fishing areas"
2. "Another marine reserve will put more pressure on the remaining available fishing grounds."
3. "The fisheries that operate in the area already operate sustainably and are no threat to marine and coastal habitats."
4. "There are already 300 marine areas in Tasmania where fishing activities are prohibited or restricted; for example, allowable catches, quotas, gear limits, seasonal closure, size limits etc."
5. "In the past our fish numbers have been extensively exploited, it is about time we set up 'no take' reserves to protect what little we have left. Local fishers cannot be trusted to fish sustainably."
6. "If all of the existing marine protected areas in Tasmania were declared reserves, Tasmania would have more marine reserves than anywhere else in the world."
7. "It would be better to put more effort into reducing land-based pollution into our rivers, streams, bays and lagoons than setting up a new reserve."
8. "The existing marine reserves are good for tourism and recreation but all are too small to make a difference to fish numbers."
9. "Enforcement of marine reserves is too costly and virtually impossible in isolated areas."
10. "Our community depends on income from fishing and aquaculture."
11. "The new reserve will protect endangered marine plants and animals and conserve areas of cultural heritage, for example, shipwrecks and sites of Aboriginal significance."
12. "The new reserve will provide the opportunity for scientific research that could be used to improve recreational and commercial fishing in the future."
13. "We need a highly protected area to allow for regeneration of habitats and to protect them from further damage from fishing (e.g. pollution, anchor damage)."
14. "A marine reserve in New Zealand attracts 200 000 visitors a year, thus providing a livelihood to tourist operators and other related businesses."



NOTICE OF MEETING MARINE RESERVE PROPOSAL

There will be a meeting of all interested members of the community.

When: Tuesday 29th of August

Time: 7:30 pm

Where: Community Centre.

Purpose of the meeting:

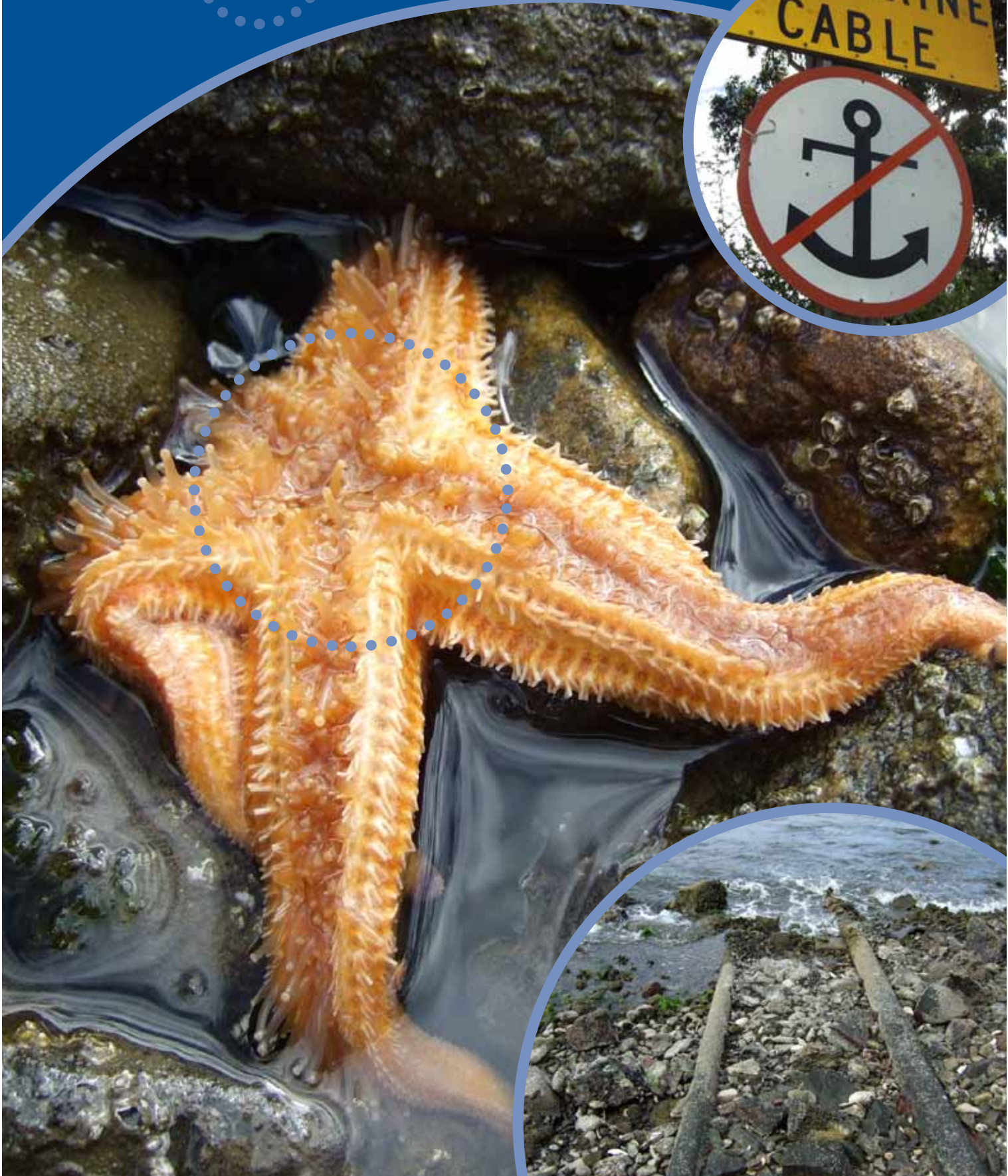
To hear about the proposed new marine reserve, *New Reserve*. The State Environment Minister will be in attendance to present more information about the reserve. There will be an opportunity for interested members of the community to give the Minister the benefit of their local knowledge and experience.

Signed

Town Mayor

HUMAN Influences

MARINE Links



Unit 5: Human Influences on the Marine and Coastal Environment

Activities in this Unit:

*This unit has been designed for students to investigate the influences of cultural, economic and recreational activities on the Tasmanian marine and coastal environment. Students will investigate the ways in which people and the marine and coastal environments are interdependent, the role of local community groups and the influence of pollution. As a concluding activity, they will plan and undertake civic action for the benefit of their local marine and coastal environment. Key activity assessments are in **bold**.*

1 Introduction

- 1.1 People Hunting (Exercise sheet included)
- 1.2 Think, Pair, Share
- 1.3 Cartoon Analysis

2 Pollution

- 2.1 Investigating Water Pollution
- 2.2 Catchment to Coast Map
- 2.3 Beach Litter Survey (Exercise sheet included)
- 2.4 Oil and Feathers Investigation (Exercise sheet included)

3 Introduced Marine Pests

- 3.1 Background to Marine Pests (Exercise Sheet included)**
- 3.2 Marine Diseases

4 Active Citizens

- 4.1 Scrapbook
- 4.2 Community Groups – Case Study
- 4.3 Community Groups Interview and Poster**
- 4.4 Genre Writing**
- 4.5 Concept Map

4 Taking Action

- 3.1 Charter
- 3.2 Class Group Project

Resources for Human Influences

Texts and Teaching Aids

Between Tasmanian Tidelines: A Field Guide, Tasmanian Marine Naturalists Association, 2000

Australian Marine Life by Graham Edgar

An Introduction to Marine Studies: Moffat B et al

Plastic Fish Models

Web Links

Discovering Democracy website

www.curriculum.edu.au/ddunits/index.htm

Stormwater Teaching Guide

www.epa.nsw.gov.au/stormwater/hsieteachguide/index.htm

Community Groups

Coastcare www.coastcare.com.au

DPIPWE Fishcare Tasmania www.fishing.tas.gov.au/fishcare

Tasmanian Landcare Association www.taslandcare.org.au/

Ocean planet www.oceanplanet.org.au/

Ocean watch www.oceanwatch.org.au/

Clean Up Australia Campaign www.cleanup.com.au/au/

DPIPWE Introduced Species

www.fishing.tas.gov.au > [The Marine Environment](#) > [Marine Pests](#)

Curriculum Links

Science

Working Scientifically
Life and Living

SOSE

Time, Continuity and Change
Natural and Social Systems
Place and Space
Culture
Resources
Investigation, Communicaton
and Participation

English

Speaking and Listening
Reading and Viewing
Writing

Technology

Information

I. Introduction

I.1 PEOPLE HUNTING

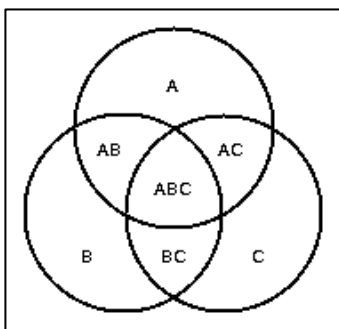
- Distribute **Exercise Sheet for I.1 - Marine and Coastal People Hunting**. The students move around the room seeking an affirmative response for each of the statements. Encourage the students to see the activity as a chance to share their thoughts, feelings and experiences with each other – not as a race to fill the sheet with signatures. Discuss the ways in which students use and depend upon the marine and coastal environment.

I.2 THINK, PAIR, SHARE

- Students individually make a list of all the ways people use and depend upon the marine and coastal environment under the headings:
 - Recreational uses
 - Economic uses
 - Other uses



- Students share their lists with a partner and make necessary additions and deletions. Then ask students to form into larger groups of six or eight and collate their lists under more specific headings. For example, water-skiing, diving and surfing under “water sports” or netting and bait collecting under “fishing”. Display lists in the classroom and encourage students to add to them during the course of their work.



- Alternatively, lists could be displayed in the form of a Venn diagram (see opposite). This would enable students to see that activities such as fishing can be both recreational and commercial, as covered in the Sustainable Fishing unit.

Diagram Source:

www.coe.ilstu.edu/portfolios/students/caheiss/c&i465teach.htm

I.3 SUSTAINABILITY ANALYSIS

- Reintroduce sustainability as a concept. Make a list of activities that may affect the marine environment or the sustainability of fish resources.
- Discuss as a class the following:
 - why might these activities be unsustainable?
 - what evidence is there that these activities impact on the marine environment?
 - what are the solutions?
 - what could you do to help?
 - what do community groups and governments do to help?

2. Pollution

2.1 INVESTIGATING WATER POLLUTION

- Brainstorm and list common water pollutants. Consider cigarette butts, cooking and engine oil, petrol, paint, industrial waste, bilge water, sediment etc.
- Investigate the effects pollutants have on water by filling a number of disposable cups or glass jars with fresh water and adding some of the pollutants from the list. Let the containers stand for a week and observe the changes over time. Students could record results in a written or pictorial form.

2.2 CATCHMENT TO COAST MAP

- Collect maps of the local area. Students chart the course of a local river, stream or creek from its source to the coast.



- Construct a piece of creative writing describing the runoff, litter, contaminants etc. that might enter the waterway along its course to the coast. Consider the uses of the surrounding land, for example, farming land could be associated with runoff containing pesticides and fertilisers whilst urban areas could contribute oil, cigarette butts, litter and sewerage leakage to the waterway.
- Discuss actions the school and local community could take to improve the quality of runoff entering the waterway.



2.3 FIELD TRIP – BEACH LITTER SURVEY

- Teacher preparation: heavy duty gloves, sharps container and kitchen tongs, rubbish bags, scales, disposable rubber gloves, clipboards, digital camera, encourage parent assistance and complete an excursion form. Discuss safety issues and minimising risks.
- Prior to the field trip ask students to predict what they will find on the local beach. Estimate the weight and proportions of items in the following categories.
 - *Plastics*: drinking containers, oil containers, lids, cigarette lighters, packets, fishing line, thongs, cartridges etc.
 - *Polystyrene*: buoys, cups, fibreglass, foam etc.
 - *Rubber*: boots, gloves, tyres etc.
 - *Cloth*: clothing, furnishings, string etc.
 - *Metal*: cans, bottle caps, oil drums, wire etc.
 - *Sanitary*: cotton buds, nappies .
 - *Wood*: paint brushes, pallets.
 - *Glass*: bottles, tubes etc.
 - *Ceramics*: pottery etc.
 - *Paper*: bags, cardboard, cigarette packets, newspaper etc.
 - *Medical*: containers, syringes – only to be picked up by the teacher when wearing gloves and placed directly in the sharps container.



Marine debris

- On arrival at the beach allocate students a section of the beach to survey and ask them to complete **Exercise Sheet for 2.3 - Beach Litter Survey**. Remind students about safety: not collecting syringes or any other dangerous object, being aware of the waves and wearing gloves for example.

- Follow up activities:
 - Letter to the local council describing the results from the survey.
 - Visual display in the school foyer or local council chambers.
 - Determine the source of the litter – stormwater drains, local users, shipping etc
 - Article in the school newsletter.

2.4 OIL AND FEATHERS INVESTIGATION

- Discuss students' experiences of oil and water – have they seen oil slicks around wharfs, stormwater drains etc.
- What are potential ways that major and minor oil spills could occur? Can you think of any major ones that you have heard recently?
- Distribute **Exercise Sheet for 2.4 - Oil and Feathers Investigation** and have students follow the investigation procedure. Students will require the equipment listed below.

Equipment

- Bird feathers – collect from a beach or park
- Vegetable oil
- Teaspoons
- Disposable drinking containers
- Dish-washing detergent
- Hot and cold water



- Discuss the results of the investigation, particularly:
 - **The detergent removed the oil from the feather, but it also removed the natural oils, so the feather was no longer waterproof.**
 - What other coastal and marine organisms would be affected by oil spills and slicks?
 - More oil enters the marine environment through 'runoff' from roads than 'oil spills'. What can we do to reduce this?

Oil spills

Australian Maritime Safety Authority Reporting ship sourced pollution
www.amsa.gov.au/Marine_Environment_Protection/Reporting_Ship_Sourced_Pollution/

Australian Maritime Safety Authority MV Iron Baron oil spill
www.amsa.gov.au/Marine_Environment_Protection/Major_Oil_Spills_in_Australia/Iron_Baron/index.asp

3. Introduced Marine Pests

3.1 BACKGROUND TO MARINE PESTS

Aquatic pests and diseases are harmful to our marine environment. Over 250 introduced marine plants and animals have “hitch-hiked” to Australian waters on vessels of all types from yachts to commercial ships. Once established in our waters, pests and diseases can cause a range of environmental impacts and can also damage fishing, aquaculture and tourism industries. Getting rid of them once they are established is virtually impossible. An example is the Northern Pacific Seastar. The Recreational Sea Fishing guide has some basic information about marine pests.

- Hold a class discussion about what students have heard or seen in the media about introduced marine pests in Tasmanian waters. Invite a Fishcare Volunteer to give a presentation on marine pests.
- Construct a definition of an introduced marine pest. It might be interesting to start with the idea that; “a weed is a plant in the wrong place.”
- Distribute to students **Exercise Sheet for 3.1 - Introduced Marine Pests**. They will require access to the internet for the activity.



3.2 MARINE DISEASES

- While animals and diseases may occur locally within a particular environment or ecosystem, the spread of disease outbreaks may threaten Tasmanian fisheries and marine environment. These outbreaks or threats may occur beyond, or within Tasmanian waters. Currents and particular water activities may increase the risks of spreading diseases, depending on the disease, and organisms involved. Procedures have been established to reduce the risks of bringing disease or spreading disease into the relatively pristine Tasmanian marine environment.
- Quarantine laws, such as the prohibition on importing certain marine products, and quarantine procedures, such as cleaning requirements reduce the chance of bringing disease into Tasmania. For example some products are only allowed to be imported when they are cooked. Fishing gear that has been used in Victorian waters may need to be cleaned before bringing into Tasmania.
- There have been disease threats to Tasmania’s marine systems. The most recent is a disease that potentially kills a large proportion of abalone, called Abalone Viral Ganglioneuritis (AVG).
- To reduce the risks of spreading disease fish should not be transferred from one area to another. If fish are filleted and cleaned at sea then dispose of the fish waste in the same area that it is caught.

Marine Pests - State site

www.fishing.tas.gov.au > [The Marine Environment](#) > [Marine Pests](#)

Marine Pests - Commonwealth site

www.deh.gov.au/coasts/imps/#links

Keeping Marine Pests out of Australian waters - Commonwealth site

www.marinepests.gov.au/

4. Active Citizens

4.1 SCRAPBOOK

- As a homework activity, students collect news reports, flyers, brochures and any other print material suitable to include in a whole class scrapbook: *Caring for the Tasmanian Marine and Coastal Environment*.

4.2 COMMUNITY GROUPS – CASE STUDY

- Explain to students that effective civic action by community groups like Coastcare and the Clean Up Australia Campaign can make a difference to the state of the Tasmanian marine and coastal environment and can positively influence governments and other citizens.
- Discuss the purpose and operation of a *Clean Up Australia Campaign*:
 - Who participates in *Clean Up Australia*?
 - Have you or you family been involved? Describe where and when.
 - Why has it been so successful?
 - How could we find out more about *Clean up Australia*?
 - How important is it to the Tasmanian marine and coastal environment?
 - How can schools and other groups be involved?



North West Fishcare Volunteers collect marine debris on Clean Up Australia Day

4.3 COMMUNITY GROUPS – INTERVIEW AND POSTER

- Students undertake an interview with a member of one of the community groups listed below using a proforma they have developed. If a face-to-face interview is not possible students could conduct the interview via email or phone.
- Students could present their findings as a poster.

Marine and Coastal Community Groups

www.coastcare.com.au/ (Coastcare)

www.fishing.tas.gov.au/fishcare (DPIPWE - Fishcare Tasmania)

www.oceanplanet.org.au/ (Ocean planet)

www.oceanwatch.org.au/ (Ocean watch)

www.taslandcare.org.au/ (Tasmanian Landcare Association)

www.cleanup.com.au/au/ (Clean Up Australia Campaign)

4.4 GENRE WRITING

- Students choose one of the following options:
 1. **BROCHURE** – create a brochure for 7-8 year olds explaining ways of caring for the coast. Share completed brochures with a younger class.
 2. **GUIDEBOOK** – create a guidebook for tourists interested in visiting and enjoying your local marine and coastal environment. Display your guidebooks in local businesses or in the local council chambers.
 3. **BUMPER STICKER** – create a bumper sticker with a slogan encouraging people to care for coastal and marine environments.
 4. **FABLE** – write a fable, including animal characters, for 7-8 year olds that explains a moral or lesson about caring for marine and coastal environments. Share your fables with a younger class.
 5. **PICTURE BOOK** – create a picture book for 7-8 year olds encouraging them to care for the marine and coastal environment.
 6. **SONG/RAP/POEM** – create and perform a song, rap or poem for an audience of elderly people.
 7. **GHOSTS OF THE COASTS** – imagine you are a whaler, sealer or Tasmanian Aboriginal and write a series of diary entries about your life in the marine and coastal environment.

4.5 CONCEPT MAP

- In small groups, students write some “big ideas” from this unit, on slips of paper. Alternatively, supply the big ideas to the students. Some possibilities include sustainability, introduced species, commercial fishing, marine reserves etc.
- Students arrange the big ideas on a large sheet of paper and draw lines connecting the ideas that are related. Phrases or sentences of explanation are then added on each line. For example: **Fish Poaching**--- *threatens*---**Sustainability**.
- Display concept maps. Discuss the interconnections between different aspects of the marine and coastal environment.

4. Taking Action

4.1 MARINE AND COASTAL CHARTER

- Using the Ocean Charter as a model, students develop their own Marine and Coastal Charter drawing together all of their thoughts and ideas. Hold a signing ceremony at a school assembly.
- An example “My Ocean charter” is found on the following website.

www.gdrc.org/oceans/ocn-charter.html



4.2 CLASS GROUP PROJECT

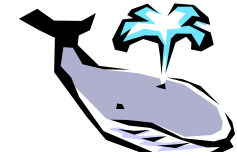
- As a culminating activity, students are to follow the democratic process outlined below in order to take civic action for the benefit of the local marine and coastal environment. The process is from the unit, “Joining in” in the *Discovering Democracy Middle Primary Units*. See website below:**

www.l.curriculum.edu.au/ddunits/units/mp4join-glance.htm

- Decide as a class the most important marine and coastal issue facing the local community.
 - Choose a name for the class group.
 - Draft a letter seeking approval from the Principal.
 - Develop a constitution for the group.
 - Form committees.
 - Select leaders and committee members.
 - Hold a meeting and ratify the constitution.
 - Plan the civic action.
 - Undertake the civic action.
 - Report on outcomes.
 - Evaluate the civic action.



MARINE AND COASTAL People Hunting



Move around the room and find someone who can correctly answer one of the statements below. Ask them to sign their name in the box.
Collect a different signature in each box.

<p>Find someone who:</p> <p>enjoys eating fish and chips</p>	<p>Find someone who:</p> <p>has seen a whale, seal or dolphin in the wild</p>	<p>Find someone who:</p> <p>has recently done a marine/coastal recreational activity (eg. swimming, fishing)</p>	<p>Find someone who:</p> <p>knows where a local waterway enters the sea</p>	<p>Find someone who:</p> <p>knows something we can do at home and school to help protect marine and coastal environments</p>
<p>Find someone who:</p> <p>knows one job/career related to the marine/coastal environment</p>	<p>Find someone who:</p> <p>has a favourite marine/coastal place</p>	<p>Find someone who:</p> <p>knows the name of the Federal Minister for the Environment</p>	<p>Find someone who:</p> <p>knows a local marine/coastal issue</p>	<p>Find someone who:</p> <p>has used a marine/coastal resource, other than food, in the last week</p>
<p>Find someone who:</p> <p>knows one law we have to help protect the marine/coastal environment</p>	<p>Find someone who:</p> <p>knows one way the marine/coastal environment was used in the past</p>	<p>Find someone who:</p> <p>has caught a fish in Tasmanian waters</p>	<p>Find someone who:</p> <p>knows the name of a group that helps to look after the marine/coastal environment</p>	<p>Find someone who:</p> <p>knows the name of an introduced pest, or other threat, to the marine/coastal environment</p>

Beach Litter Survey



With gloves on your hands, collect any rubbish you find in your allocated area, sort it and record your findings in the table below. Take a photo if possible.

Beach Name: _____ Suburb: _____

Date: _____ Time: _____ Class Group: _____

Rubbish	Number	Weight (g)	Rubbish	Number	Weight (g)
Plastics			Metal		
			Sanitary		
			Wood		
Polystyrene					
			Glass		
			Ceramics		
Rubber					
			Paper		
Cloth			Medical		
			Other		

- Discuss how this data compares to your estimates.
- Design a graphical way of showing your findings, for example, photos or graphs.



Oil and Feathers Investigation



Briefly answer the following questions.

1. Where have you seen oil mixed with water?

2. What does it look like?

3. Where did the oil come from?

4. What and who would be affected by oil spills in the marine environment?

Carry out the following investigation to examine the effect oil has on bird feathers.

Equipment

- Bird feathers – collected from the beach or park.
- Vegetable oil
- Teaspoons
- Disposable drinking containers
- Dish-washing detergent
- Hot and cold water



Procedure

5. Examine the feathers and name the type of bird they might be from.

6. Why do birds have feathers?

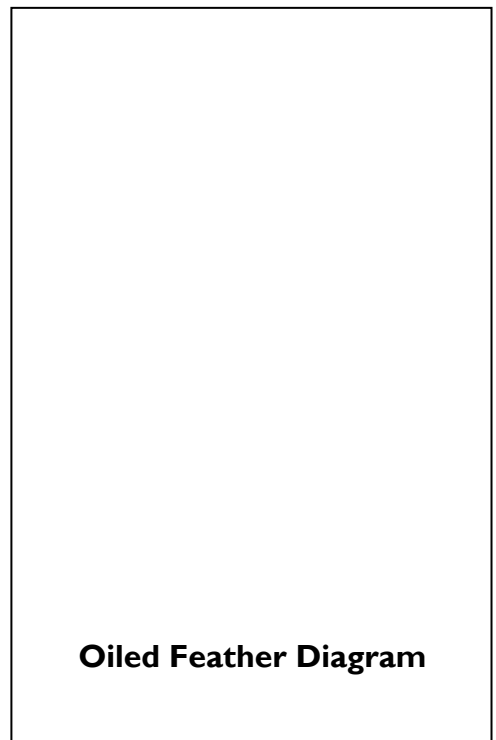
- Fill the drinking containers with water so that the water is about 3 cm from the top of the container.
- Measure one teaspoon of vegetable oil.
- Drip the oil into the drinking container.
- Dip a feather into the oil and water – this is what would happen if a bird landed on a patch of water that was contaminated with oil.
- Remove the feather from the water and examine it closely.
- Dispose of the water and oil by putting it on a compost heap – do not pour it down the sink. Why?

7. What happened to the feather when it came in contact with the oil?

8. Draw a diagram of the oiled feather in the box.

9. How would oily feathers affect penguins and seabirds?

10. Design a method of removing the oil from the feathers of a bird. You may use hot or cold water and some detergent. Outline your method below and then trial it.



11. Was your method successful?

12. Visit the Tasmanian Conservation Trust website and read about the way Australians have assisted fairy penguins that have been affected by oil spills.

www.tct.org.au/jumper.htm#Tasmanian

(a) How many jumpers were knitted? _____

(b) Oil not only affects the insulating and waterproofing capacity of feathers, but it can poison birds. How can the poisoning occur?

Introduced Marine Pests



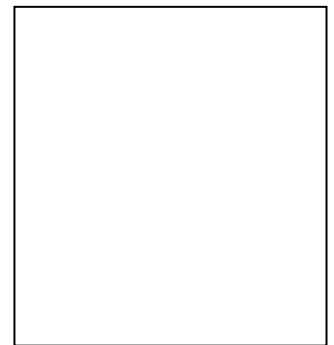
It is important that fishers and boat users do everything they can to reduce the spread of introduced pests.

1. List three things you think fishers and boat owners could do to avoid spreading introduced marine pests.

2. Visit the Department of Primary Industries, Parks, Water and Environment (DPIPWE) pest prevention website www.fishing.tas.gov.au > [The Marine Environment](#) > [Marine Pests](#) > [Prevention](#) to view the steps they suggest fishers and boat users should take. Add any extra solutions to your list.

3. Visit the DPIPWE pest identification website www.fishing.tas.gov.au > [The Marine Environment](#) > [Marine Pests](#) > [Pest Identification](#) and choose one of the marine pests listed. Research the following information.

(a) Briefly describe the appearance of the pest and draw a diagram in the box.



(b) Where did the pest come from?

(c) In what area of Tasmania has it been seen?

(d) What impact could it have on Tasmanian marine habitats, plants and animals?
