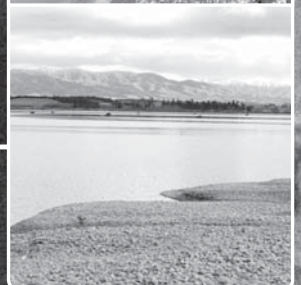


C A N T E R B U R Y ' S

Spectacular Coast

COASTAL WETLANDS



Contents

Lesson Plan: Coastal Wetlands

1 . Pre-visit activities

- 1a. Drawing finger frame sketches
- 1b. 20 questions
- 1c. Enviro-bingo
- 1d. Food web of life game

2. Environment Canterbury Educator Lesson

- 2a. Definitions of different wetland environments
- 2b. Outline map activity
- 2c. Local coastal wetland features
- 2d. Ecosystems and biodiversity of the local wetland
- 2e. Human impacts on this system

3. Post Educator Visit Activities

- 3a. Salt water lab experiment
- 3b. Warm vs cold water lab experiment

4. Field trip

Seaweed Activities – *not included in this resource will be taken by Educators*

- Walk and talk (human impacts)
 - Bird spotting
 - Water monitoring
 - Rock pool exploration
- 4a. Preparing for a field trip
 - 4b. Finger frame sketch
 - 4c. Hoop study
 - 4d. Ecological transect
 - 4e. Enviro- I –Spy
 - 4f. Texture Touch
 - 4g. Enviro-bingo

5. Post Field trip Activities

- 5a. Collation and analysis of hoop and/or ecological transect
- 5b. Action Plan for improving the environment at the wetland – with ongoing discussion and monitoring of goals outlined on this plan
- 5c. Diorama construction
- 5d. Build a wetland model
- 5e. Ecosystems poster
- 5f. Evaluation and feedback form

Black Masters

- No. 1 Finger frame Sketch
- No. 2 Coastal Wetlands Elements - Plants and Birds
- No. 3 Enviro-bingo Sheet
- No. 4 Location of mid and south Canterbury Wetlands
- No. 5 Images of Coastal Wetlands
- No. 6 Compare salt water to fresh water
- No. 7 Comparing warm water to cold water
- No.8 Preparing for a field trip to the coast
- No.9 Hoop study
- No.10 Ecological Transect
- No.11 Enviro-I-Spy Sheet
- No.12 Plant identification Sheet
- No.13 Bird Identification Sheet

Additional Information

Food webs
Coastal profiles
Human impact on marine animals
Maori terms

LESSON: *Coastal Lagoons & Wetlands* LEVELS: 1-4 TEACHING TIME: 2 weeks

PROGRAMME DESCRIPTION *(focus of programme)*

To review the past, gather information from the present and therefore develop a potential future vision for a local coastal wetland environment

Essential Learning Area: Science

Level	Strand	Achievement Aim	Achievement Objective
1	Living World	Structure and function interdependence of living organisms	Observe and identify parts of common animals
2	Living World	Structure and function interdependence of living organisms	Investigate the responses of animals, including people, to environmental changes in their habitats
3	Living World	Structure and function interdependence of living organisms	Investigate special features of common animals and describe how these help them to stay alive
4	Living World	Structure and function interdependence of living organisms	Use simple food chains to explain the feeding relationships of familiar animals and plants, and investigate effect of human intervention on these relationships

Essential Learning Area: Social Studies

Level	Strand	Achievement Objectives	Achievement Indicators
3	Resources & Economic Activities	How and why people manage resources	Describe ways people attempt to conserve resources Explain consequences of depletion of resources
4	Resources & Economic Activities	How and why people view and use resources differently and the consequences of this	Identify different values people may attach to a resource Explain why people's views about a resource and their uses of it may change over time Explain how opportunities and limitations may arise when resources are viewed or used in new and different ways

A selection of possible curriculum links. Teachers are most welcome to alter any of the following to suit their programme.

Pick and choose what fits with your class and develop a sequence that fits your teaching style!

This unit could link to the resources from the Ministry of Education (2002), published by Learning Media Limited, Wellington

- Building Science Concepts – Life Between the Tides – Sandy shores, Mudflats, and Rocky shores. Level 1 & 2
- Building Science Concepts - Tidal Communities Interdependence and the Effects of Change. Level 3 & 4

Other useful teacher resources include:

- Information included in Sea Chest – A Coastal Resource For Teachers
- Editions from Environment Canterbury EBox – e.g. The Canterbury Coastline and Wild, Wonderful Wetlands
- Interactive wetlands activity on the ECan website www.ecan.govt.nz/wetlands/

ECan resources are available online www.ecan.govt.nz/e4s or email education@ecan.govt.nz for free hard copies

1. PRE-FIELD TRIP (AND PRIOR TO THE ENVIRONMENT CANTERBURY EDUCATOR VISIT)

PURPOSE:

TO BECOME FAMILIAR WITH THE ELEMENTS OF A WETLAND ENVIRONMENT

TO PRACTICE SKILLS THAT MAY BE USEFUL IF AN EDUCATOR VISITS AND WHEN STUDENTS GO ON A FIELD TRIP

Instructions and black master included for the following

- 1a. Drawing finger frame sketches
- 1b. 20 questions
- 1c. Enviro-bingo
- 1d. Food web of life game

Teachers - please choose activities that are at an appropriate level for the class to achieve the purpose

1a. Drawing a finger frame sketch (blackmaster No. 1)

You need: Finger Frame Record Sheet and a pencil

How to: Hold your arms out straight in front of you to make a finger frame (join tips of thumbs and tips of pointing fingers to make a triangle shape) to look through

- Activities:**
- 1. Line up an interesting object. Keeping your arms still, list eight things you can see within your frame.
 - 2. Line up the same object as a friend and see who can list the most objects within one minute.

1b. Quick questions quiz (blackmaster No. 2)

You need: An assortment of pictures including flora and fauna from the coastal wetland area and an equivalent number of clothes pegs

The game: Peg one card on each player's back collar. Decide on a time limit.
When the teacher says "Go!" players try to identify themselves, moving amongst the other players, asking closed questions.

The answers can only be "yes" or "no". Only one question should initially be asked of each player.
When a player guesses their identity they can peg their card to their front.

1 c. Enviro-bingo (blackmaster No. 3).

Teachers need to fill in the appropriate objects relating to their wetland or resources available before photocopying class set!

You need: Enviro-bingo record sheet, pencil, sticky tape.

Your task: To look for objects around you or in magazines that match the words listed on your record sheet.
Draw, list or tape objects you choose onto the matching spaces provided on your record sheet.
Compare your work with a friend.

Your teacher will help you develop categories so you can then place objects in the correct category.

1d. Web of Life - game (blackmaster no. 2)

This activity practically demonstrates the inter-connectedness of ecosystems and, in this case, the wetland ecosystem.

Use the labels from the 20 questions quiz for this game.
Instructions can be found on pg. 9 of Wild, wonderful wetlands Ebox.

2. Pre-field work lesson (possibly by an Environment Canterbury educator)

Purpose:

To understand the definition of a wetland and the different features and functions of a variety of wetland types (lagoon, swamp, estuary etc.)
To understand the spatial location and the biodiversity of the ecosystem at a local wetland
To develop an annotated diagram of the elements of the wetland environment

Instructions and black master included for the following

- 2a. Definitions of different wetland environments
- 2b. Where are the wetlands in Canterbury?
- 2c. What's the local coastal wetland like?
- 2d. Ecosystems and biodiversity of the local wetland
- 2e. Human impacts on this system

Teachers - please choose activities that are at an appropriate level for the class to achieve the purpose

2a. Definitions of different wetland environments

Ref: www.ecan.govt.nz/wetlands/ and/or Wonderful, Wild Wetlands EBox

What is an environment?

- Definition: The network of physical, chemical, and living factors that act on, and determine, the form and survival of any organism or community within that network
- Draw them into what a wetland environment would include. Ask them 'When you think about the wetland what do you think about?'

What are wetlands and what are their key functions?

- Ref: an interactive wetland website link www.ecan.govt.nz/wetlands/ and/or Wonderful, Wild Wetlands EBox
 - Definition: Wetlands are 'wet land'! They are areas that are permanently or temporarily wet. The plants and animals that inhabit the wetland are specifically adapted to handle the wet and often changeable conditions of this environment
 - Develop the idea of different names and types and functions of wetlands. Broadly classify them into coastal and inland then define different names e.g. freshwater swamps, lake margins, coastal lagoons, estuaries, salt marshes, bogs etc.
-

2.b. Where are the wetlands in Canterbury?

Utilise the interactive virtual trip of wetlands on www.ecan.govt.nz/wetlands/

For further mapping work or to record the local coastal wetland:

You need: "Location of mid and south Canterbury Coastal Wetlands" outline map (blackmaster No. 4)
or www.doc.govt.nz/upload/documents/about-doc/role/policies-and-plans/cms1-4_6.pdf

Your task: Decide on different categories of wetlands in Canterbury e.g. coastal estuary, lagoon, hapua etc.
Place the name of the wetland into the correct category
Locate and label these wetlands around mid and south Canterbury

Important wetlands in Canterbury: (hard copy case studies in wetlands EBox)

- Conway River Lagoon
- Ashworths Lagoons
- Ashley-Saltwater Creek Estuary
- Brooklands Lagoon
- Avon-Heathcote Ihutai Estuary
- Te Waihora/Lake Ellesmere
- Washdyke/Waitarakao
- Ōpihi
- Wainono
- Waitaki River Delta?

Identify and label the local coastal wetland. What 'type' of wetland is it?

2c. What's the local coastal wetland like?

Map Work

Aerial photos and topographical maps are available online www.ecan.govt.nz – click on the G.I.S Mapping link to find your local wetland

Class activity - Using an enlarged blank outline map of the local coastal wetland: (blackmaster no. 4)

- Ask the class to tell you what they think makes up the local coastal wetland environment include natural and cultural factors
- What plant and animal life (flora and fauna) do you think live within and beside the local coastal wetland environment?
- Does it matter if plants and animals are native or introduced? Why?
- What about the pests?
- Ask students to come up and add these to the local coastal wetland environment outline map
- What is the function of the local wetland?
- How was it formed?

2d. Ecosystems and biodiversity of the local coastal wetland

Individual activity – on a reduced map (A4) of the local coastal wetland with questions written at the bottom

- Students each draw and/or write on the outline map the features that were discussed in the class activity
- Circle the ones that are made by people

Guide a class discussion on:

What is an ecosystem? All plants, animals and other living beings living together and interacting with a certain environment

What is biodiversity? Bio – life of living things; Diversity – lots of different sorts (varied, variety)

At the bottom of the map answer the questions

What is biodiversity?

What is an ecosystem?

How do all these plants and animals live in the same space in a balanced way?

2e. Human impacts on this local wetland system (blackmaster no. 5)

Discuss the impact that people can have on the coastal wetland environment

1. What do we do on and around the wetland?
2. What activities are ok for the wetland?
3. What activities aren't so good for the wetland?
4. How do humans impact on all these plants and animals that can live in the same space in a balanced way?

Instruct students to illustrate the positive and negative impacts of humans on the local wetland environment (possibly carry out a P.M.I)

What did the local coastal wetland look like in the past? Put your time warp binoculars on...

Obtain historic maps and aerial photos of the local wetland environment

Read out a description of the wetland area in the past

Ask the students to sketch the wetland from an historical view

Discuss how this environment has changed due to:

- Fire: where people have cleared the vegetation for farming or other purposes.
- Grazing, particularly by sheep and rabbits
- Building houses and other structures along the coast.
- The introduction of exotic plant and animals.
- Creating tracks and walkways to control where visitors walk
- Other recreational pursuits such as fishing, boating, etc.

3. Post-educator visit

Purpose:

To find out what happens when a little salt water meets lots of fresh water and when a little fresh water meets lots of salt water (eg when an estuary is breached).

To consider the impact of the temperature on a wetland eco-system

Instructions and black master included for the following

3a. Compare salt water to fresh water

3b. Compare warm water to cold water

3c. Check out the Wetlands interactive activity on the ECan website.

Teachers - please choose activities that are at an appropriate level for the class to achieve the purpose

3a. Compare salt water to fresh water (blackmaster No. 6)

Carry out the experiment outlined on blackmaster no. 6.

Sea water is always salty but in some places near the Equator, where it rains a lot, it is less salty than elsewhere

What happens to the salt water when it is added to the fresh water?

What happens to the fresh water when it is added to the salt water?

What do you think happens when fresh water runs into the ocean water? Why?

3b. Comparing warm water to cold water (blackmaster no. 7)

Not all ocean water is at the same temperature. Water near the Arctic and Antarctica is very cold. Water near the Equator is much warmer. This affects the density of the water, which in turn affects how it moves in the ocean. Consider this on a micro scale in the local coastal wetland.

Questions

What happens when cold water is added?

What happens when hot water is added?

What do you think happens when cold water from the ocean meets warmer water in the wetland when the coastal barrier is breached?

3c Check out the Wetlands interactive activity on the ECan website.

www.ecan.govt.nz and click on Environment

4. Field trip

Purpose:

To experience the stimulation and experience of being in the field

To apply/transfer skills and knowledge learned prior to the field trip

To collect information and samples for use back in the classroom

Seaweed Activities – these are not included in this resource as they are taken by educators

- Human impacts on coastal lagoons and wetlands
- Bird observation and survey
- Water monitoring
- Rock pool exploration

Instructions and black master included for the following

4a. Preparing for a field trip (blackmaster No. 8)

4b. Finger frame sketch

4c. Hoop study

4d. Ecological transect

4e. Enviro- I –Spy

4f. Texture Touch

4g. Enviro-bingo

Teachers - please choose activities that are at an appropriate level for the class to achieve the purpose

4b. Finger frame sketch (blackmaster no. 1)

Apply the skills learned in pre-visit work to the local wetland environment

4c. Hoop study (blackmaster no. 9) (#####also put these instructions on the back of the blackmaster#####)

You need: Hoop
Hoop study record sheet
Plant identification sheet (blackmaster no. 12)
Pencil

Your task: To study the life you find on the ground in six different areas

Choose six areas that are very different to each other.

Lay your hoop down over the first area and look for any insects that may be living there.

Count the number of different plants within your hoop and measure the height of the each variety.

Write your answers for each of the six areas in the spaces on your record sheet.

You will continue with analysis and collation in the classroom...

- Alternatively, develop this into a more precise grid square exercise. Calculate the proportions of vegetation cover and types in a specified grid square.

Alternatively...

4d. Ecological Transect (blackmaster no.10) (also put these instructions on the back of the blackmaster)

You need: Ecological Transect Record sheet

Plant identification sheet (blackmaster no.12)

Several metres of string for each person
Stakes
Pencil

Your task: To stretch the string in a straight line and see how many different objects it touches eg: rocks, vegetation .
Tie the ends of your string to each stake.
Work your way along the string, recording what touches it.
You can write the name of the object along the transect. Then draw it.
Measure the height of the object before drawing it.

You will continue with analysis and collation back in the classroom

Alternatively, as a larger scale sampling exercise, walk between two points, with each step taken reach out one arms length to the left (or right?) and record what is at the end of your hand.

4e. Enviro- I-Spy (black master no. 11)

You need: Enviro-I-Spy Record Sheet
Pencil

Your task: To look for objects around you that each begin with a different letter of the alphabet

Draw each object you find on your Record Sheet in the space that matches the first letter of each

Compare you work with a friend.

4f. Texture Touch

You need: Pencil
Non-transparent bags

Your task: Collect five different non-living objects eg: vegetation, sand, rocks etc.

Put a different object in each bag

Ask a friend to put their hand in the bag without looking and answer the questions on the texture touch record sheet.

(use descriptive words, catagorise and grade according to size and texture etc)

4.g. Enviro-bingo (see 1c. for instructions, use blackmaster no. 3)

5. Post Fieldtrip Activities

Purpose:

To collate and analyse information and data collected on the field trip

To utilise this information to develop an action plan for the local wetland

Feedback to Ecan about this resource and field trip

Instructions and black master included for the following

Teachers - please choose activities that are at an appropriate level for the class to achieve the purpose

5a. Collation and analysis of hoop and/or ecological transect

5b. Action Plan for improving the environment at the wetland – with ongoing discussion and monitoring of goals outlined on this plan

5c. Diorama construction

5d. Build a wetland model

5e. Ecosystems poster

5f. Evaluation and feedback form

5a. Collation and analysis of hoop and/or ecological transect

Provide or brainstorm categories for the data gathered appropriate to class level . Eg. Living, non-living or plant, animal, mineral etc.

Tabulate this information accurately.

Utilise a variety of graphing techniques to display this information. Eg. Pictograph, bar graph, percentage pie chart (density of vegetation) etc.

Use the results to make summaries about such things as: The density and/or popularity of plants, animals and sediment; generalisations relating to the type, variety and interconnectedness of the inhabitants of the eco-system where the study took place.

5b. Action Plan for improving the environment at the wetland – with ongoing discussion and monitoring of goals outlined on this plan (blackmaster No.12)

Once students have established an image/idea of what the coastal wetland looked like in the past, and have collected and analysed information relating to how the wetland looks in the present day, they will be able to decide how the wetland should look in the future.

Ultimately, it might look the same as in the past. However, we must consider the practicality of this and the issue of sharing this area with humans as well as native and introduced animals and plants. How will these issues be approached to reach a goal?

5c. Diorama construction

Develop a diorama - a 3D model of the local coastal wetland environment using a shoe box.

1. Cut and colour background paper - include the sky/ceiling too!
2. Glue in materials to represent the different elements of this environment.
3. Attach objects to the walls and hang more from the ceiling for greater effect.

Discuss the idea of all the elements like soil, climate, vegetation, relief (shape of the land), animals and humans, all interacting together and effecting each other.

5d. Build a wetland model

Develop the diorama idea into a larger model. Parts of the area can be constructed by class members then joined to make one whole local coastal wetland environment.

5e. Ecosystems poster – individual, group or whole class activity

Categorise the elements of the local wetland into the following headings: Vegetation (or flora), Animals (or fauna), Soil, Relief (or landscape), Waterways, Human Activity

List the relevant elements under each heading (write or draw)

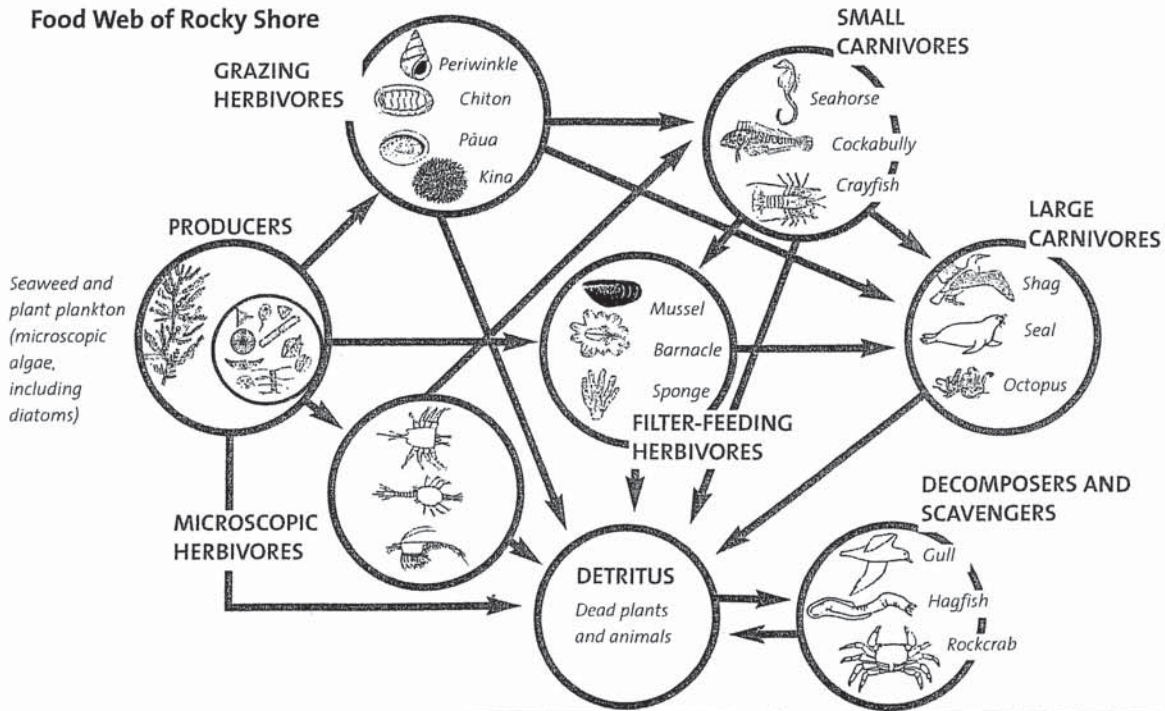
Draw arrows to show which group impacts on another

Discuss the idea of all the elements interacting together and affecting each other = the interconnectedness of the ecosystem

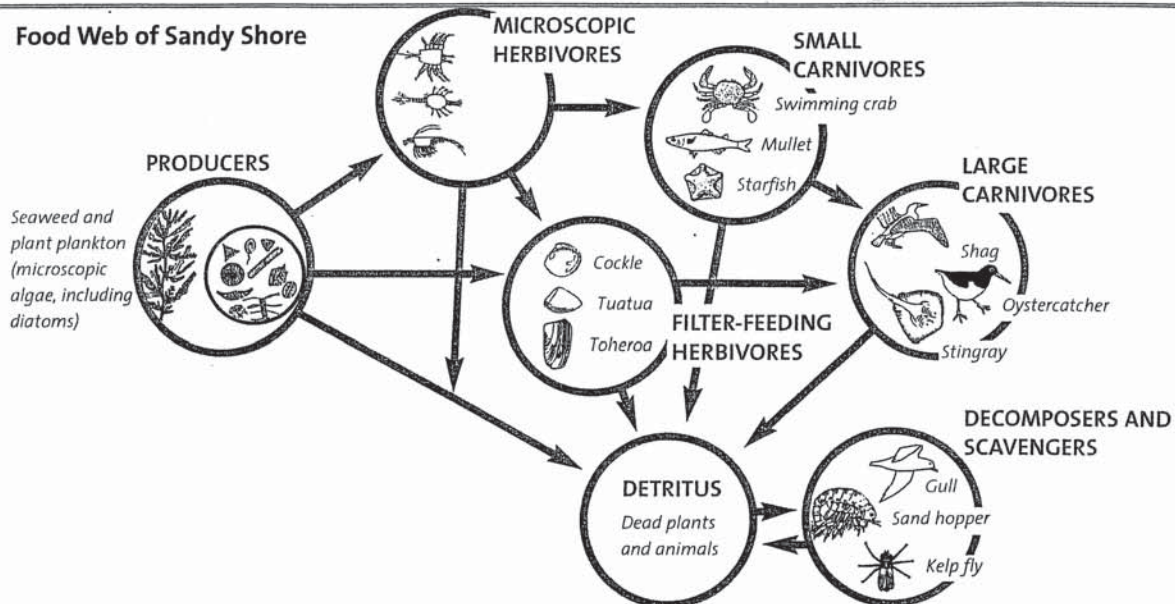
5f. Evaluation and feedback form (blackmaster no. 13)

ADDITIONAL INFORMATION: Food Webs

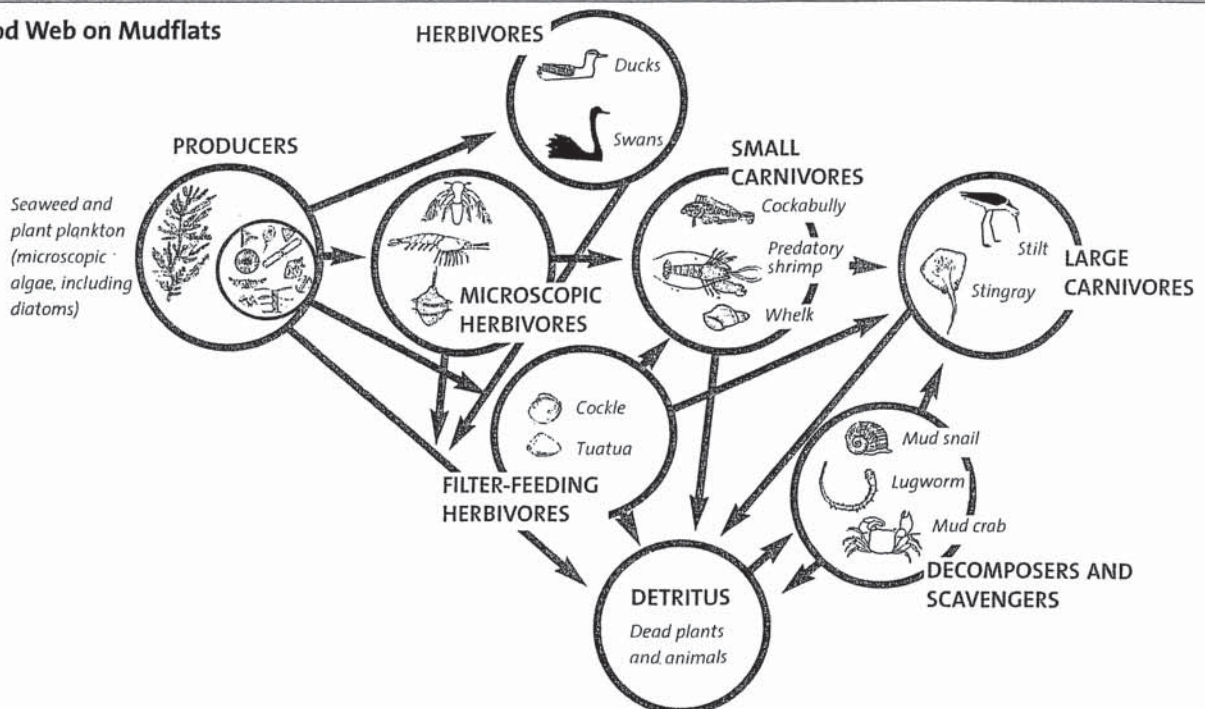
Food Web of Rocky Shore



Food Web of Sandy Shore

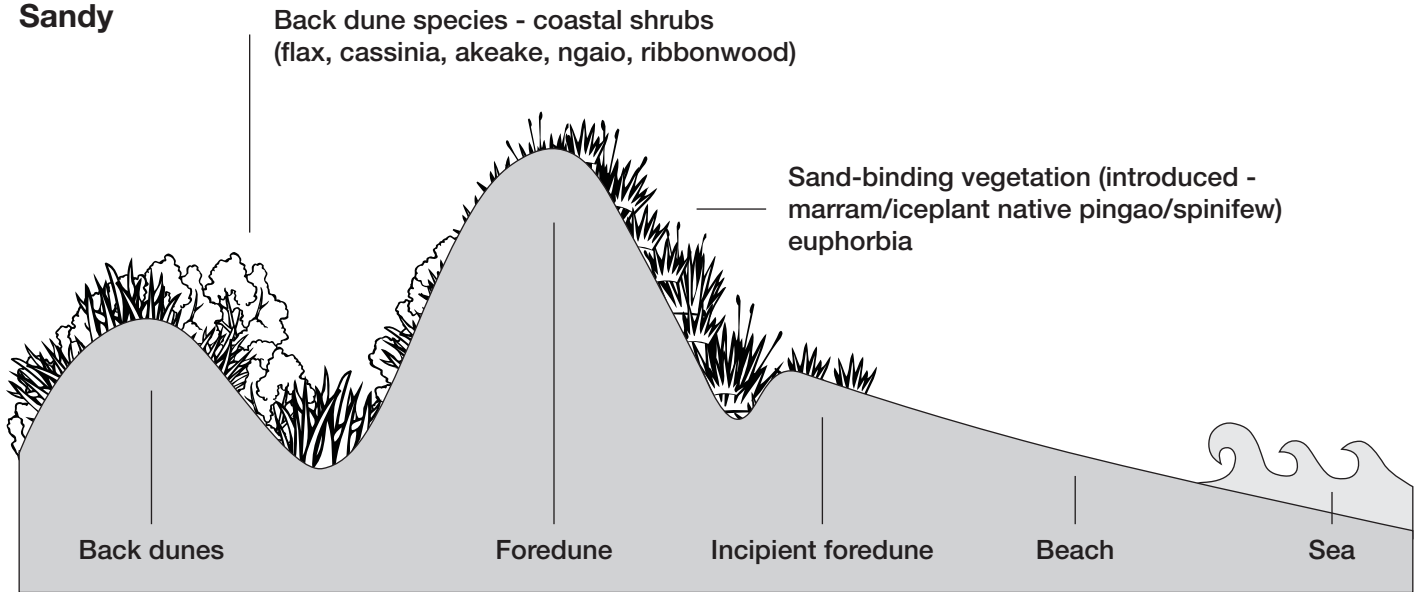


Food Web on Mudflats

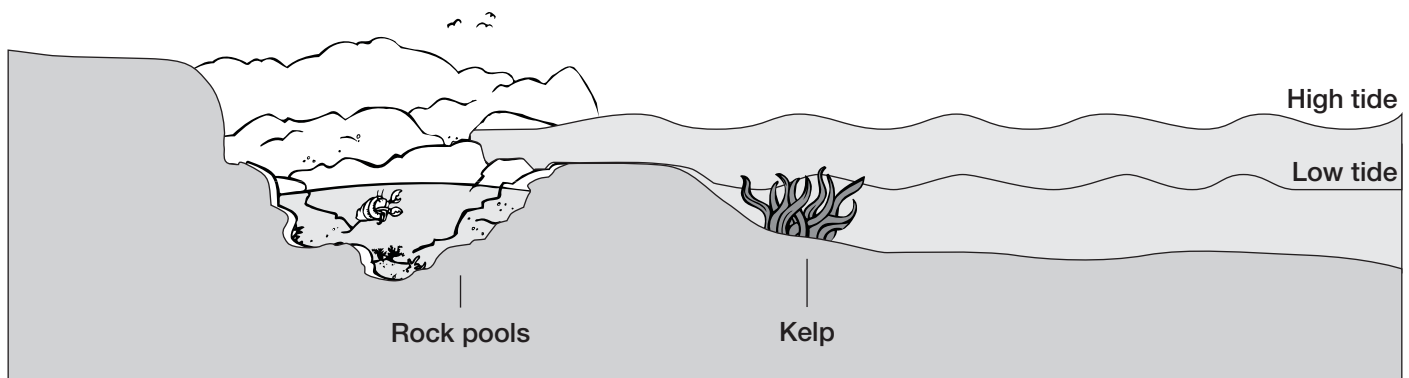


Coastal profiles

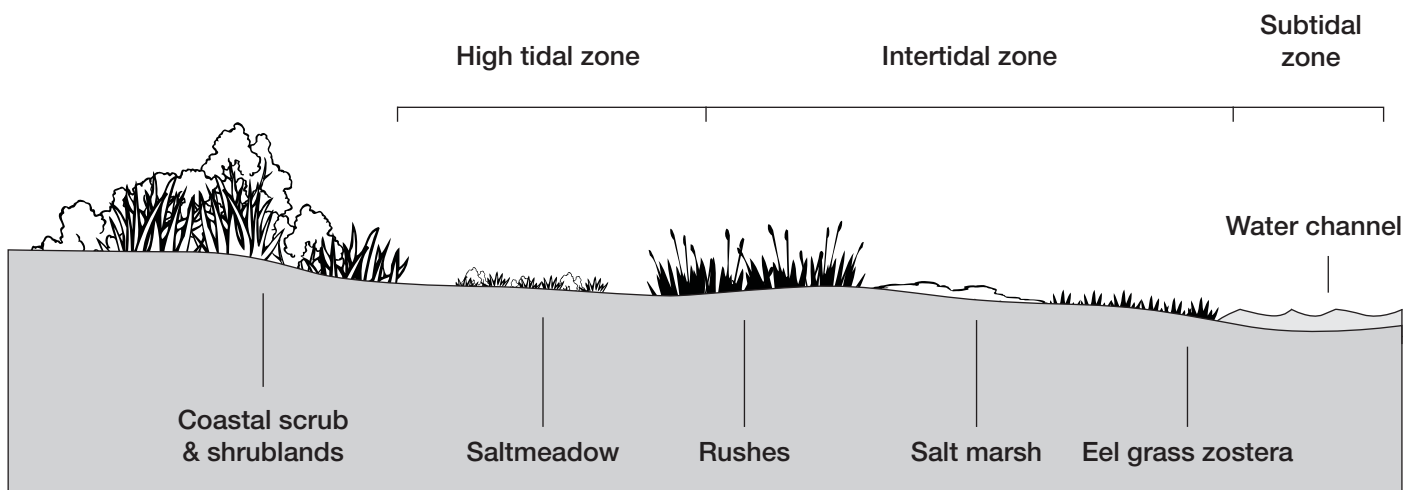
Sandy



Rocky

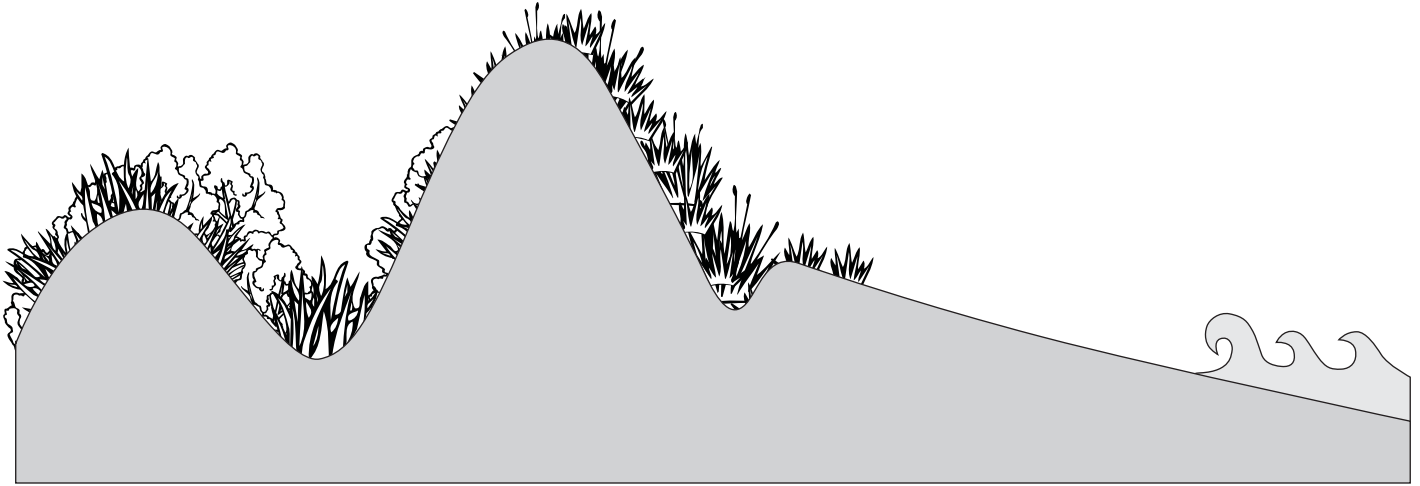


Estuary

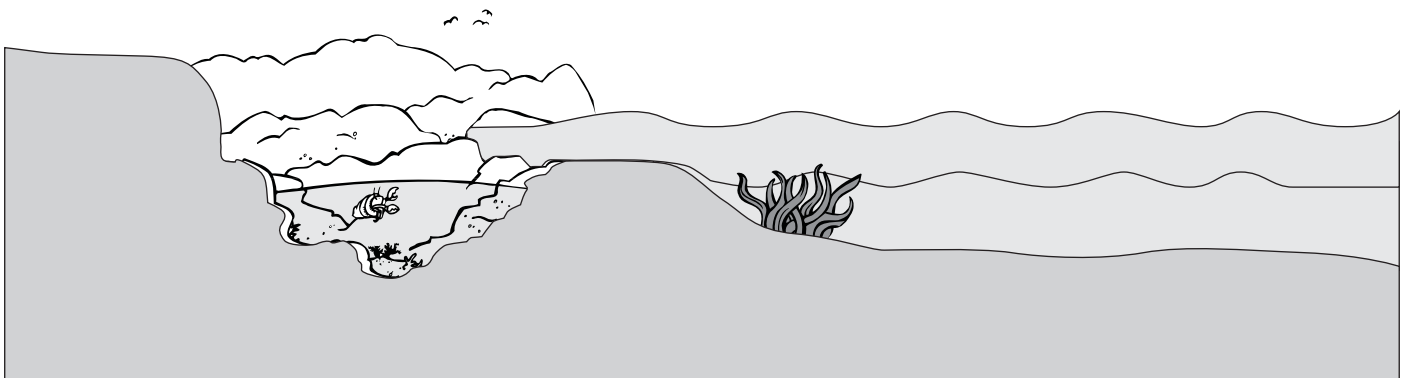


Coastal profiles

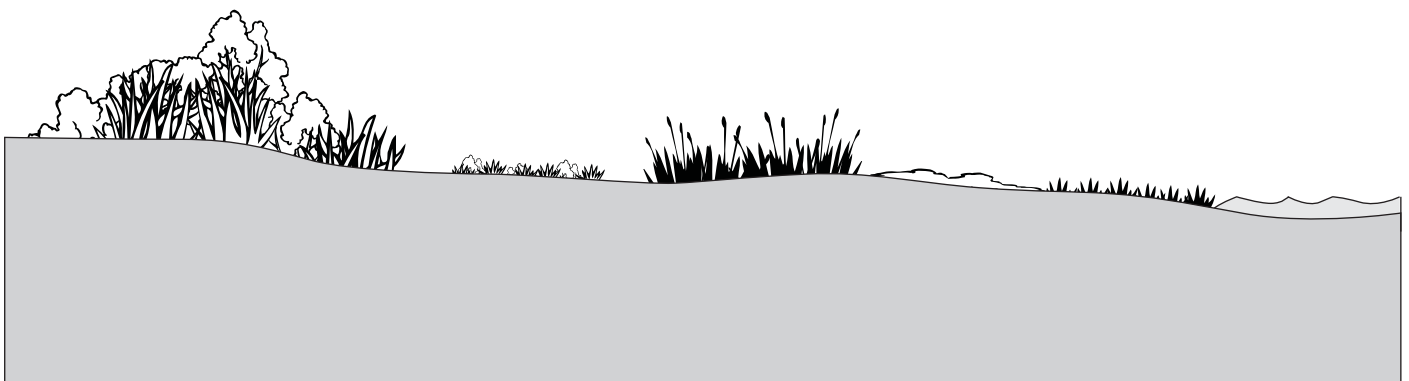
Sandy



Rocky



Estuary



Plants

Flax



**Purple
Loosestrife**



Photo: Christchurch City Council

Gorse



Raupo



**Grey
Willow**



Photo: Christchurch City Council

Tussock



Hemlock



Broom



**Nodding
Thistle**



Photo: Christchurch City Council

**Three
Square**



Birds

Godwit



Pukeko



Male
Paradise
Duck



Female
Paradise
Duck



Heron



Pied
Stilt



Gull



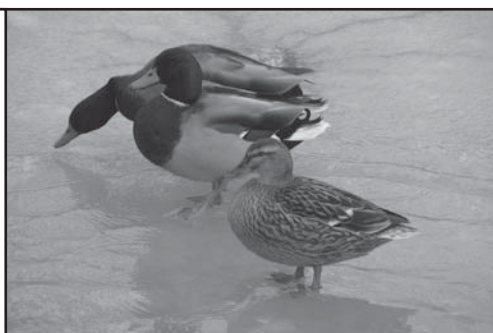
Dotterel



Geese



Mallard
Duck



Finger Frame record sheet

LOCATION

Write down as many words as you can
of things you see through your frame in
one minute.

List or draw
8 of the
objects you
see

Activity: Human impact on marine animals

Aim: To find examples of rubbish and litter on the beach and discuss the impact litter can have on the animal life at the beach.

Equipment: Rubber bands – 1 for each person

- You have one minute to find one thing that would not normally be on the beach.
You must not walk on any plants or harm the beach environment in any way to get your one thing.
- Share with the rest of your group what you have found. What things did you find? How do you think they got to the beach? Is the beach where you normally expect to find them?
- Take a rubber band and pull it behind your thumb and little finger, across the back of your hand.
- Put your other hand behind your back and leave it there.
- Without touching any other part of your body, try to get the rubber band off your hand.

How long did it take you?

Could you do it?

Making the Links

What do you think this is trying to demonstrate in terms of litter and the effect it can have on animals? Which bits of litter do you think could be particularly dangerous for sea animals?

Please put your rubber bands back!

Remember, we don't want to leave anything but our footprints!



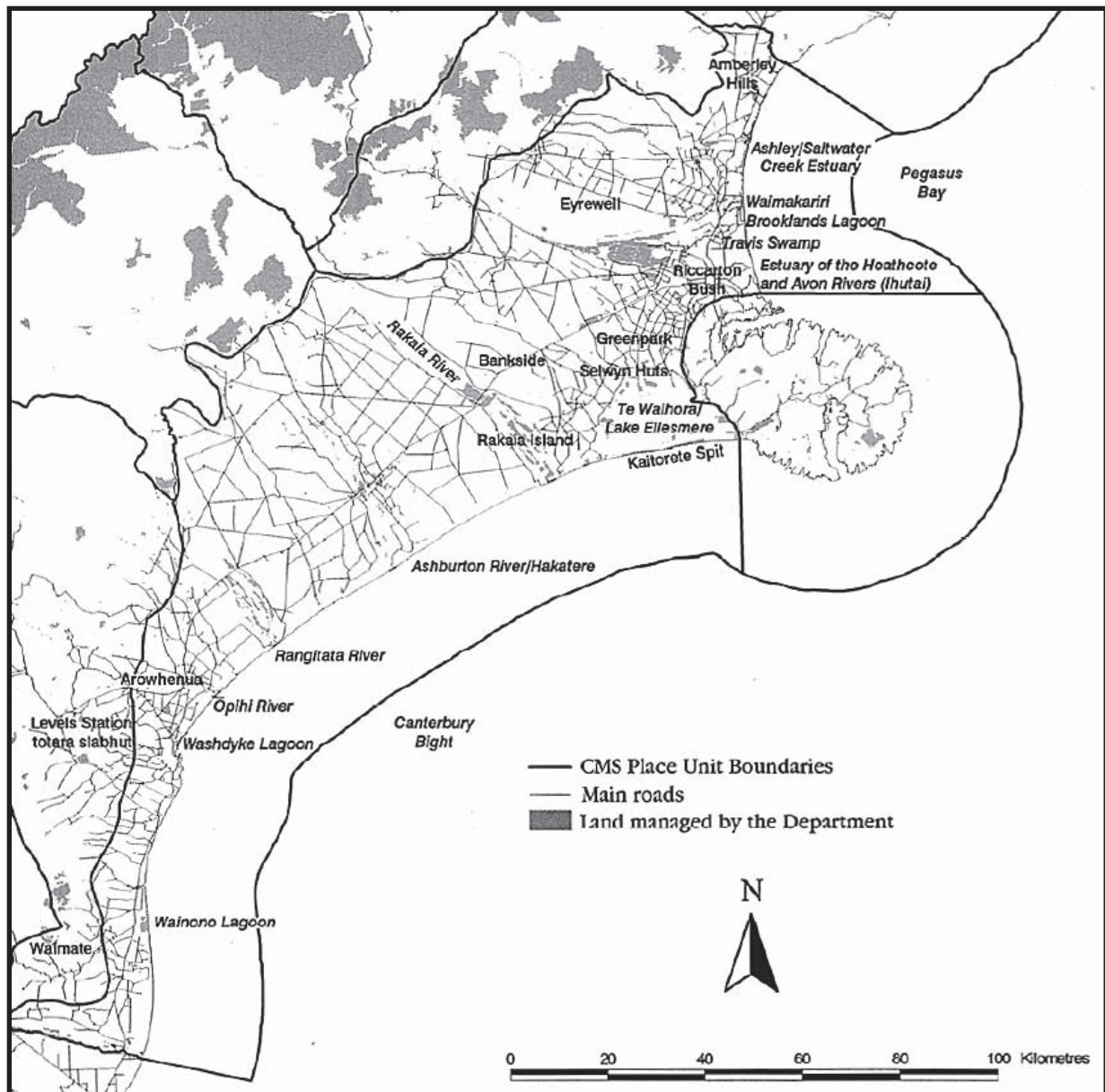
Maori terms for key words

Algae:	<i>Pukohu wai</i>
Barnacle:	<i>Werewere</i>
Beach:	<i>Tatahi</i>
Carnivore:	<i>Kaikiko</i>
Closed season:	<i>Rahui</i>
Crab:	<i>Papaka</i>
Dune:	<i>Tahuahua</i>
Estuary:	<i>Wahapu</i>
Fish:	<i>Ika</i>
Guardianship of the environment:	<i>Kaitiakitanga</i>
Herbivore:	<i>Kaiota</i>
Inter-relatedness:	<i>Whanaungatanga</i>
Jellyfish:	<i>Petipeti</i>
Lagoon:	<i>Hapua</i>
Limpet:	<i>Ngakihi</i>
Mudflat:	<i>Oneparu</i>
Mussel:	<i>Kuku</i>
Oystercatcher:	<i>Tio</i>
Periwinkle:	<i>Ngaeti</i>
Phytoplankton:	<i>Tipurangi</i>
Rock pool:	<i>Haroto</i>
Rocky shore:	<i>Akau</i>
Sandhopper:	<i>Mowhiti</i>
Sandy shore:	<i>Onepu</i>
Sea:	<i>Moana</i>
Sea food:	<i>Kai moana</i>
Seaweed:	<i>Rimurimu</i>
Shag:	<i>Kawau</i>
Shingle shore:	<i>One kirikiri</i>
Shrimp:	<i>Kouraura</i>
Starfish:	<i>Patangatanga</i>
Stilt:	<i>Turituri-pourewa</i>
Tidal zone:	<i>Paetai</i>
Tide:	<i>Pai</i>
Whelk:	<i>Huamutu</i>

Enviro-bingo sheet

OUR COASTAL WETLAND STUDY AREA

Location of mid and south Canterbury Coastal Wetlands



Source: www.doc.govt.nz/upload/documents/about-doc/role/policies-and-plans/cms1-4_6.pdf

Note: Significant coastal wetlands in North Canterbury include: Conway River and Hurunui River mouth (hapua)

People use - recreation



River mouth - Awakino.

Coastal structures



Coast south of Kaiaua.

Cultural use



Collecting kai moana in the Kawhia Harbour.

photos courtesy Environment Waikato

Compare salt water to fresh water

Sea water is always salty but in some places near the Equator, where it rains a lot, it is less salty than elsewhere. Find out what happens when a little salt water meets lots of fresh water and when a little fresh water meets lots of salt water. (eg when an estuary is breached)

You need:

Salt

Water

Green and blue food colouring

Two clear 30 ml containers

Two droppers

Two clear 250ml containers

Procedure

Pour the water into the two large containers until they are half full

Pour a tablespoon of salt into one of the containers and stir until the salt dissolves. Label this container "Salt Water" and the other one "Fresh Water"

Pour some of the salty water into one of the small containers until it is $\frac{3}{4}$ full

Add green colouring to the small cup of salty water until it is dark green. Label this "Salty Water"

Pour fresh water into the other small cup until it is $\frac{3}{4}$ full, colour it light blue and label it "Fresh Water"

Use the dropper to add drops of green salt water to the clear fresh water

Observe and draw what happens. Add drops of blue fresh water to the clear salt water. Observe and draw what happens. Use pencils or felt pens to draw the location of the salt water and the fresh water in your diagrams.

What happened to the salt water when it was added to the fresh water?

What happened to the fresh water when it was added to the salt water?

What do you think happens when fresh water runs into the ocean water? Why?

Source: Volvo Ocean Adventure New Zealand Teachers Resource p. 51

Comparing warm water to cold water

Not all ocean water is at the same temperature. Water near the Arctic and Antarctica is very cold. Water near the Equator is much warmer. This affects the density of the water which in turn affects how it moves in the ocean.

You need

Iced water

Very hot water

One 250 ml container

Two clear 30 ml containers

Very hot water

Red and blue food colouring

Two droppers

Procedure

Fill the large container $\frac{3}{4}$ full with tap water and let it sit for a while so that it becomes the same temperature as the room.

Pour hot water into one of small containers and iced water into the other until they are both $\frac{1}{2}$ full

Mix drops of red food colouring to the hot water to make it dark red

Mix drops of blue colouring to the cold water to make it dark blue

Use a dropper to add drops of hot (red) water to the water in the large container. Then add drops of cold (blue) water to the same container

Observe and draw what happens. Use red and blue coloured pencils or felt pens to show what happened.

Questions

What happens when cold water is added?

What happens when hot water is added?

What do you think happens when cold water from the Arctic or Antarctic Ocean meets warmer ocean water?

Preparing for a field trip to the coast

Please minimize the disturbance of the seashore community during your study. Make sure your students understand the seashore code before taking them down to the shore.

Useful equipment to take to the coastal wetland:

- Hat/sunglasses/sun block etc
- Drink and food
- Good walking shoes and appropriate clothing
- Spyglass
- Camera
- Rubbish bag to collect shore litter
- Thermometers
- Small aquarium nets
- Magnifying glass
- Binoculars

REMEMBER: *Check the tide tables on the web from Land Information, New Zealand (www.hydro.linz/tides/majports/index.asp).*

Time your visit for around the time of low tide.

The Seashore Code

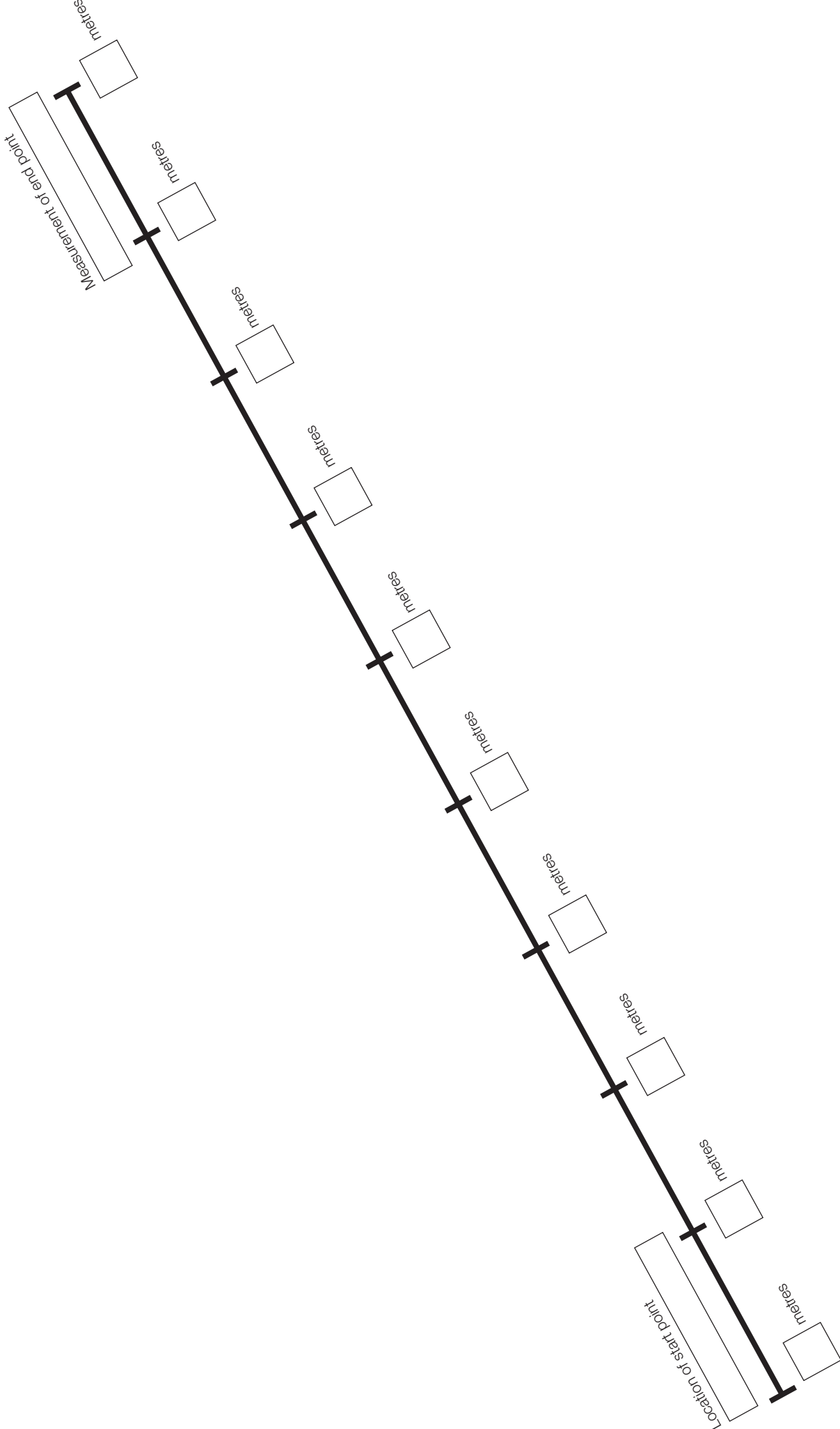
- *Observe marine species where you find them. You may place them in containers in cool sea water for short periods of time only, and then return them to the place of collection.*
- *Make sure you have wet hands when touching marine species. Handle marine species carefully, gently and only when necessary.*
- *Lift rocks rather than roll them to ensure that you don't crush the marine species. Remember to turn rocks back the way you have found them.*
- *Wear appropriate footwear and watch the waves!*
- *Take your rubbish home with you and pick up any left by others.*

Hoop Study

	PLANT		INSECT		
	name	height	number	Name	Number
1 Location _____					
2 Location _____					
3 Location _____					
4 Location _____					
5 Location _____					
6 Location _____					

Ecological Transect record sheet

LOCATION



Enviro-I-Spy Record Sheet

Look for objects around the coastal wetland that start with each letter. Draw or write these objects in.

A	B	C	D	E	
F	G	H	I	J	
K	L	M	N	O	
P	Q	R	S	T	
U	V	W	X	Y	



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