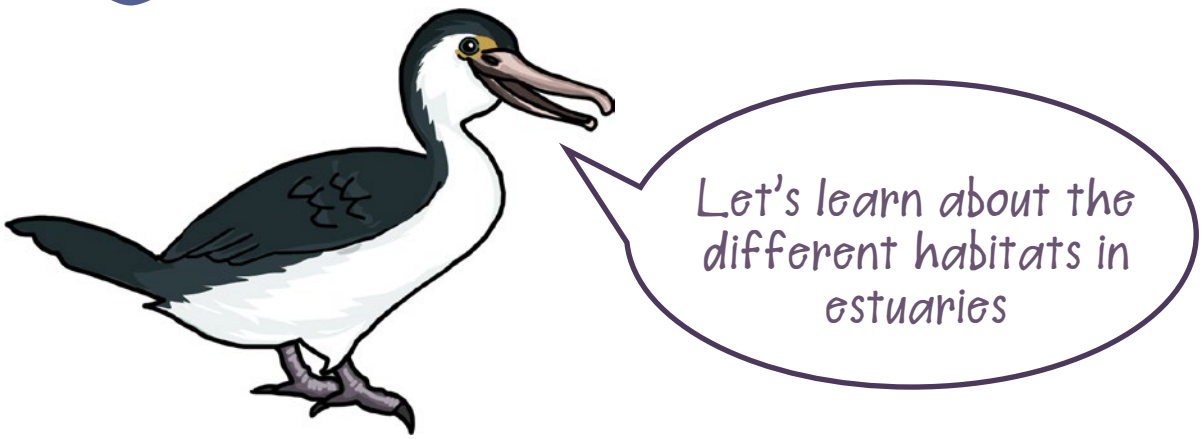
Activity 3: Estuaries as habitats



CURRICULUM LINKS

Learning areas	Learning intentions	Success criteria
Science: Levels 1–4 ▪ Living world: Ecology. ▪ Nature of Science: Investigating in science. **Science capabilities** ▪ Gather and interpret data. ▪ Engage with science. **Te Marautanga o Aotearoa** **Pūtaiao:** The natural world. **Other curriculum links: English** ▪ Listening, reading, and viewing.	**Students are learning to:** ▪ understand that New Zealand estuaries are made up of a variety of different habitats ▪ investigate how animals are suited to their estuarine habitats.	**Students can:** ▪ describe some estuarine habitats, eg mud flats, sand flats, mangrove forests, saltmarshes ▪ describe how an animal is suited to its estuarine habitat.

CONTENTS

BACKGROUND NOTES

WHICH HABITATS CAN BE FOUND IN ESTUARIES?

Estuaries are important living, breeding and feeding habitats for many animals, including a wide range of fishes, birds, shellfish and other wildlife.

Estuaries contain a variety of different habitats depending on their location, geology, climate and conditions. While each habitat has its own features, they all contain a mix of fresh water (near the river) and salt water (towards the sea) and are changeable environments, with tides, the weather, seasons and human impacts all affecting how these habitats provide for the animals that live there.

Mangrove forests

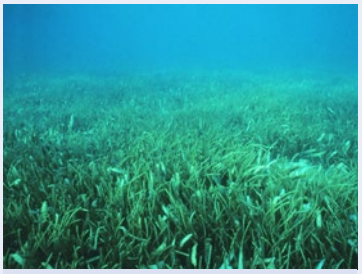
Mangrove forests are found only in northern New Zealand, from north of Ohiwa Harbour (in the Bay of Plenty) and Kawhia Harbour (Waikato).

Mangroves are the only New Zealand trees that can grow in saltwater environments. They provide food and shelter for animals such as worms/toke moana, eels/tuna, snapper/tāmure, pied shags/kāruhiruhi and mudflat snails/whētiko.

Orewa mangroves. *Photo: Shan Walker, EfS Initiatives*

Seagrass meadows

Seagrass/karepō is the only flowering plant (angiosperm) that grows in the sea. Seagrass grows on the intertidal mud flats and sub-tidal sea floor and is home to young fish, bubble shells, crabs and the New Zealand pipefish.



Seagrass meadow.
Photo: Heather Dine, NOAA

Saltmarshes

Saltmarshes occur in the upper intertidal zone and are home to plants that can tolerate water with a high salt content (eg rushes). Saltmarshes are usually found between mangroves or seagrass meadows and the land.

Saltmarsh at Mangawhai Estuary.
Photo: Peter Anderson

Beaches/shores

Estuaries can contain muddy or sandy beach habitats, which are covered with water when the tide is in and exposed when the tide goes out.

Waiwera sandy shore.
Photo: Shan Walker, EfS Initiatives

Mud flats

Mud flats are muddy environments with softer sediments. Animals that can dig into the mud, such as crabs, shellfish and birds, are suited to living here.

Sandy beaches

Areas with stronger water action are covered with sand. Like mud flats, sandy beaches or sand flats are very changeable environments that are altered by the wind, waves, weather and tides, so the animals that live here (eg shorebirds) must also be very adaptable.

Shell banks

Shell banks are areas of the sandy shore that are covered in shell material.

Shallow water and deep open water

Some parts of the estuary are always covered in water at both high and low tide, while other areas never get very deep despite the tidal flow. Deep open water is the area going out towards the ocean.

For more information about how marine and estuary animals are adapted to their habitats, see the Science Learning Hub's *Adapting to marine habitats* article.

Science Learning Hub: Adapting to marine habitats

Orewa Estuary at high tide.
Photo: Shan Walker, EfS Initiatives

LEARNING EXPERIENCE 3:

ESTUARIES AS HABITATS

Resources for this activity

- Student worksheets Habitats in estuaries: pictures and Habitats in estuaries: text (pages 9 and 10).
- New Zealand Marine Studies Centre's *Hide and Seek* video.
  Hide and seek video
- *Waikaraka: Whangarei Terenga Paroa – Whangarei Harbour* poster showing examples of mangrove forest and shallow water habitats.
  Waikaraka Whangarei harbour poster.pdf
- Gulf Journal posters *Tidal Rhythms*, showing shell bank and tidal mud flat habitats, and *Our changing gulf: The Estuaries*, showing mud flat, sand flat, shallow water and saltmarsh habitats.
  Gulf Journal tidal rhythms poster
  Gulf Journal estuaries poster
  Physical hard copies of these posters can also be ordered by emailing GulfPosters@aucklandcouncil.govt.nz.

Vocabulary

Habitat, mangrove forests, seagrass meadows, saltmarshes, beaches, mud flats, shallow water, deep open water.

Links

To open the links throughout this resource without losing your place in the document, follow either of these steps:

- Right click on the link and click **Open Hyperlink**. Now the link will be opened in new tab.
- Hit the **Ctrl** key while you left click the link. This will also force the browser to open the page in a new tab.

Either of these methods will open the link in a new tab leaving the teaching resource open.

INTRODUCING STUDENTS TO HABITATS IN NEW ZEALAND'S ESTUARIES

Note: These learning experiences are suggestions only. Teachers are encouraged to adapt and change the material to suit their students' needs and interests.

Inquiry stage 3: Investigate

Habitats in an estuary

- View the *Waikaraka: Whangarei Terenga Paroa – Whangarei harbour* poster and the Gulf Journal's *Tidal Rhythms* and *Our changing gulf: The estuaries posters.*

  Waikaraka Whangarei harbour poster.pdf

  Gulf Journal tidal rhythms poster

  Gulf Journal estuaries poster

  Students could view and discuss these posters in small groups and then describe the habitats that are illustrated. The posters can also be viewed online using a computer or device.

- Ask your students to identify some of the animals that are described in the posters. Which estuarine habitat(s) are they found in? Why do they live here? *(Animals are suited to the habitat in which they live – see below.)*

Habitat vocabulary

- Revise habitat vocabulary using the posters. Cards with habitat-related vocabulary on them (see the example pictured below) could be used as a prompt for discussion. Students could research and present their ideas about the meaning of one or two of the vocabulary words.

Habitat words. *Image: Shan Walker, EfS Initiatives*

Inquiry stages 4: Extending thinking

How are animals suited to their estuarine habitats?

- View the New Zealand Marine Studies Centre's *Hide and Seek* video and/or *Life and Death on the Mudflat* (Part 2).

  Hide and seek video

  Life and death on the mudflat video

- After watching, discuss how mud crabs and whelks are suited to living on the mud flats. How do they breathe, move and hide from predators? How do their bodies help them to live in this environment? *(Crabs breathe using gills, move using their legs (often sideways), and are camouflaged in the sand and can bury themselves.)*
- Discuss how other animals are suited to an estuarine habitat.

Mud flat snail with a trail of feeding deposits. *Photo: Helen Kettles*

Local estuarine habitats

- View DOC's *Experiencing estuaries* interactive map.

  Experiencing estuaries interactive map

- Can students identify the estuarine habitats they have learnt about in their local area?

  Take photos of local estuarine habitats and display these in your classroom or use them in a presentation. If you live north of Ohiwa Harbour in the Bay of Plenty or Kawhia Harbour in Waikato, you may have mangrove forests within your estuaries. In southern locations, mangroves are replaced by other trees such as ribbonwood/mānatu.

A closer look at estuarine habitats

- Record any questions your students have about the habitats in an estuary.
- Explore the *Habitats in estuaries* student worksheets (pages 9 and 10) with your students. Give groups of students copies of the worksheets and ask them to cut out the pictures and text and match the two using the information provided. Answers are given on page 8.
- Students can also explore Te Ara – The Encyclopedia of New Zealand's interactive diagram showing the changes in water level at high tide and low tide in an estuary.

  Te Ara vegetation profile

REFLECTING ON LEARNING

- Ask your students to share their ideas about one of the habitats they have learned about during this activity to a group or partner.
- To reflect on what has been learned about the habitats in estuaries, try the Socrative quiz.

  Socrative quiz

EXTENDING LEARNING

- View this video clip about mangroves from the New Zealand Marine Studies Centre.

  Surviving the odds: The mangroves of Aotearoa video

  Discuss why mangroves are only found in northern New Zealand.

  (New Zealand's only species of mangrove/mānawa is Avicennia marina *subspecies* australasica*, which is the southernmost mangrove species in the world. It needs relatively warm temperatures to survive, so will only grow north of about latitude 38°S, which is from Kawhia Harbour in the west to Ohiwa Harbour on the east coast.)*

OTHER RESOURCES RELATING TO ESTUARIES AS HABITATS

- Science Learning Hub's *Marine habitats* article:

  Science Learning Hub: Marine habitats

- LEARNZ *Salt Marsh Plants* video:

  LEARNZ Salt marsh plants video

- NIWA's *Estuaries* webpage:

  NIWA estuaries webpage

  Answers to the *Habitats in estuaries worksheet* (pages 9–10):

  Habitat 1: Saltmarsh (image credit: Saltmarsh at Mangawhai Estuary. *Photo: Peter Anderson*)

  Habitat 2: Mangrove forest (image credit: Mud flats, Motueka. *Photo: Ruth Hartnup*)

  Habitat 3: Shallow/deep water (image credit: Orewa Estuary. *Photo: Shan Walker, EfS Initiatives*)

  Habitat 4: Seagrass meadow (image credit: *Photo:Heather Dine, NOAA (CC BY 2.0)*

  Habitat 5: Mud flats/muddy shore (image credit: *Photo: Shan Walker, EfS Initiatives*)

  Habitat 6: Sandy shore/shell bank (image credit: *Photo: Shan Walker, EfS Initiatives*)

Habitats in estuaries: pictures

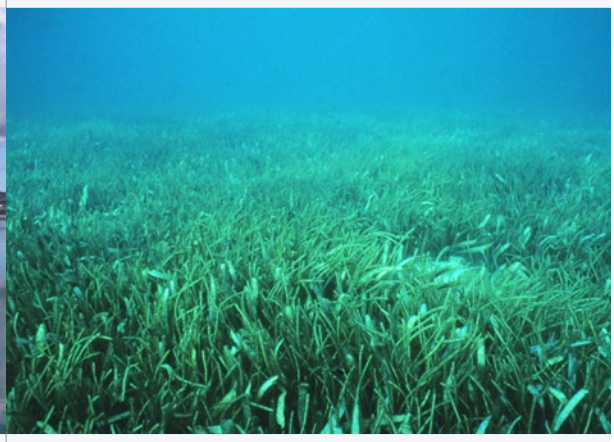
Instructions: Cut out the titles and pictures and match these to the appropriate text in the worksheet on the following page.

Saltmarsh

Mud flats/muddy shore

Shallow or deep water

Seagrass meadow



Mangrove forest

Shell bank or sandy shore

Habitats in estuaries: text

Match each habitat description to the estuarine habitat pictures shown on the previous page.

Habitat 1	Habitat 2
This habitat is in the upper intertidal zone. The plants that are found here can live in very salty water (eg rushes and ribbonwood).	These forests are found north of Kawhia Harbour in the west and Ohiwa Harbour on the east coast. These are the only trees that grow in saltwater environments in New Zealand. They provide habitat for plants and animals such as eels, flounder, crabs and snails.
Habitat 3	**Habitat 4**
These areas are always covered with either deep or shallow water regardless of the tide.	This habitat is home to the only type of flowering plant that can grow in the sea. These plants can grow on intertidal and subtidal (underwater) mud flats and provide habitat for young fishes and other animals.
Habitat 5	**Habitat 6**
This muddy habitat has soft, squishy sediments. Animals that can dig into the mud (such as crabs, shellfish and birds) are suited to living here.	This habitat can have sand or areas of piled up shells. Birds and other animals enjoy this habitat.