Hoea te Waka, piki te mātau

ĪNANGA IN THE ESTUARY

In this module you will learn about the lifecycle of īnanga (whitebait) and the importance of the estuary where freshwater and saltwater meet. Reflect on the water health survey in the previous module and with your new knowledge, take a fresh look at your local estuary and think about how it supports īnanga.

This module includes:

- Īnanga lifecycle - background reading
- The meeting of waitai and wai Māori - what does it mean for īnanga - activity

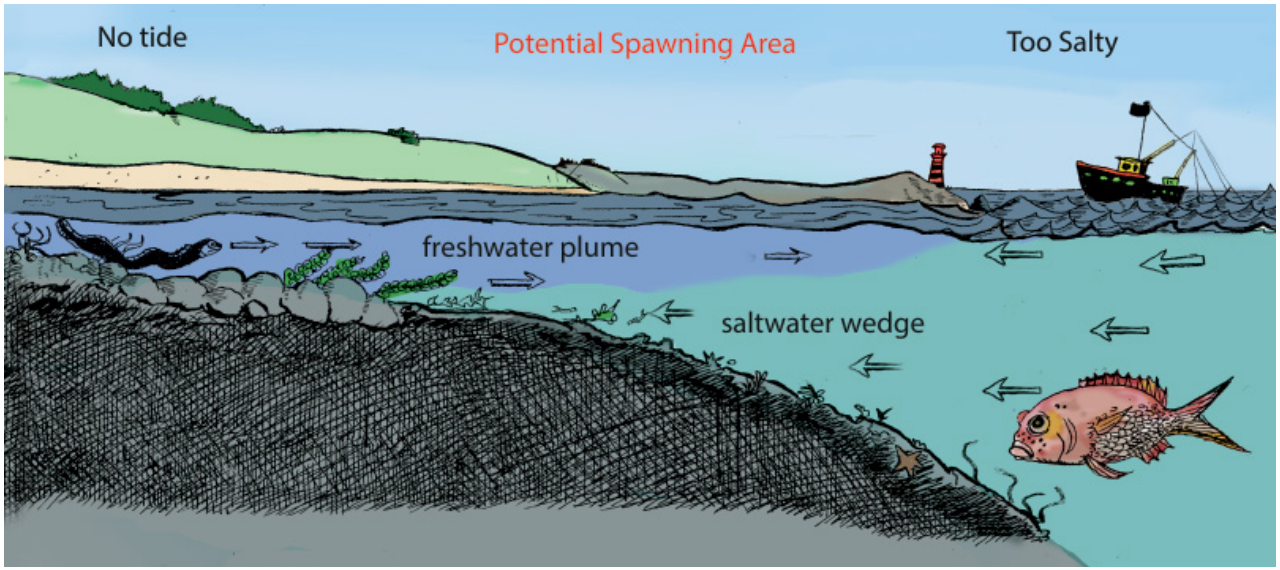
The meeting of waitai and wai Māori: What does it mean for īnanga? - background reading

Whitebait (īnanga or *Galaxias maculatus*) are really tasty. Is that why there are less of them now? Whitebait fritters have been a kiwi delicacy for years. In older times our Māori people dried the fish to preserve them and savour the taste for up to a couple of months. They were a highly prized food source due to their oil content - Māori even named a type of light green Pounamu (greenstone) after them!

Study the diagram on the next page to see how these fish move between fresh water and the sea at different times in their lifecycle.

The estuary is very important for īnanga as the adults spawn in the salt wedge. The ''salt wedge'' is the tidal zone where 100% saltwater (ie water with salinity of 35 parts per thousand, known as 35ppt) changes to 100% freshwater (0 ppt).

Īnanga lay their eggs on the riverbanks at the base of grass stems on very high spring tides, so when the tide drops back to normal the eggs are sticking out of the water. It is the loss of this spawning habitat that has decreased īnanga population.



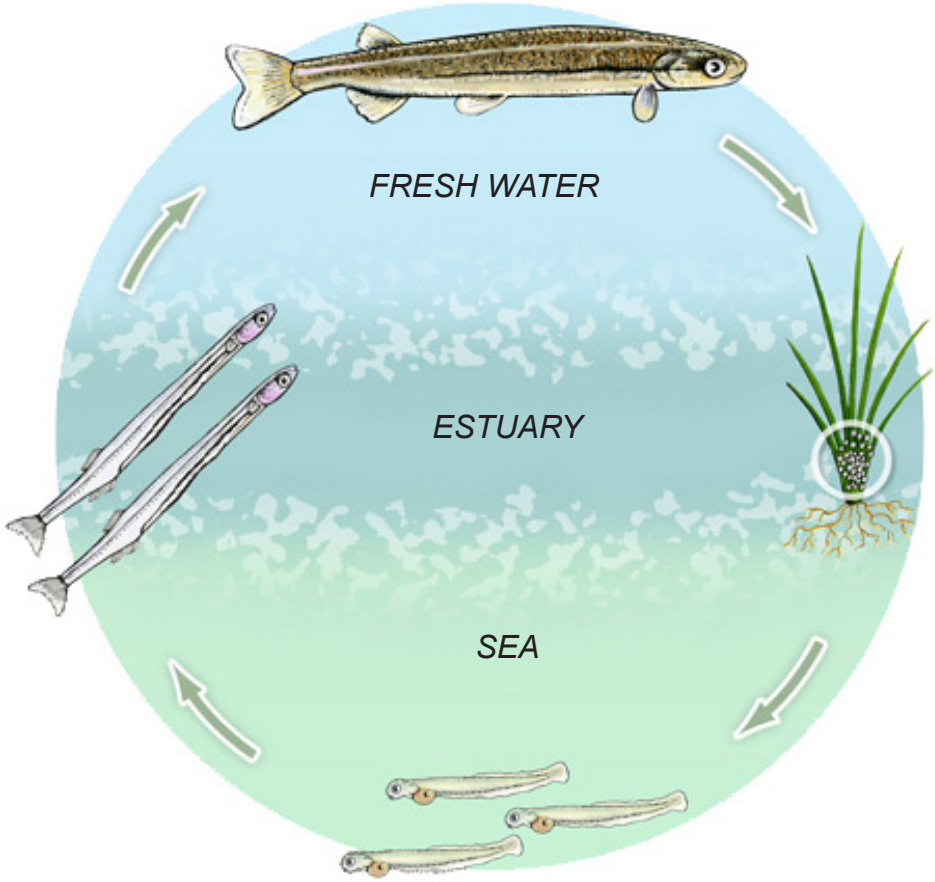
Along many rivers and estuaries today it is harder for the eggs to survive. In some areas there is not enough suitable vegetation for the īnanga to lay their eggs with farm animals trampling and grazing on the grasses.

Other threats to īnanga include contamination that can lead to a lack of oxygen in the water.

Scientists have found that this causes the fish to jump out of the water in order to obtain oxygen by absorbing it through their skin.

Īnanga Life Cycle (They live for about one year)

Adult īnanga - By autumn the mature fish are ready to swim back down river to spawn in the estuaries.



Juvenile īnanga (Whitebait) - In the springtime, the young fish return to the estuary and then make their way upriver to live in freshwater habitats.

Īnanga eggs - Laid on grasses and plants around the high water mark on a very high spring tide. Males fertilise these by releasing sperm into the water, giving it a milky appearance. Most adults die after spawning. The eggs remain above the water for a number of weeks but remain moist among the vegetation on the estary banks .

Diagram taken from Carl Walrond. 'Whitebait and whitebaiting - Whitebait in New Zealand', Te Ara - the Encyclopedia of New Zealand.

Baby īnanga (larvae) - When another spring tide reaches the eggs, the larvae hatch. Then the falling tide carries them out to sea, where the hatchlings spend the winter, feeding on small crustaceans..

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ĪNANGA IN THE ESTUARY

With this knowledge about the lifecycle of īnanga, take a fresh look at your local estuary and think about how it supports īnanga.

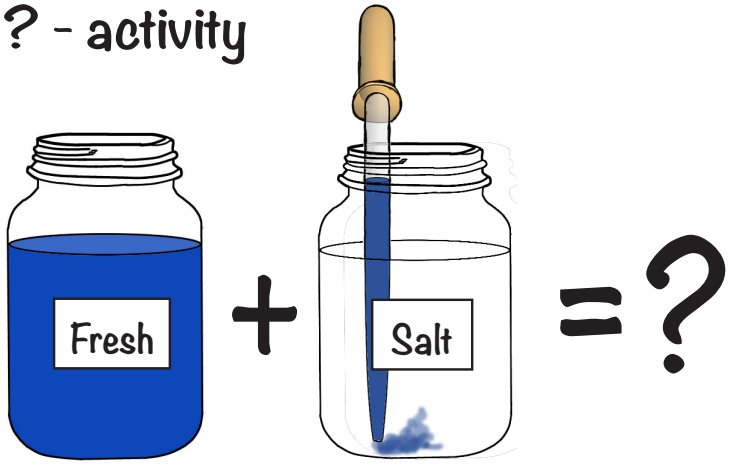
Pātai – Questions to discuss with your group:

- Is there vegetation suitable for īnanga to lay their eggs on
- What might kill the eggs once laid?
- What impact might stock have on īnanga? Or decreased levels of oxygen in the water (hypoxic conditions)
- What feature of the water could we measure to find out where īnanaga might spawn?
- Where is the freshwater (0 ppt salt)? where is the saltwater (35 ppt)? Where is the saltwater and freshwater mixing
- How could we protect the spawning habitat of īnanaga?
- What could be done to make it suitable for īnanga to spawn (if not already?)
- What other things are affecting the īnanga population?

The meeting of waitai and wai Māori: What does it mean for īnanga? - activity

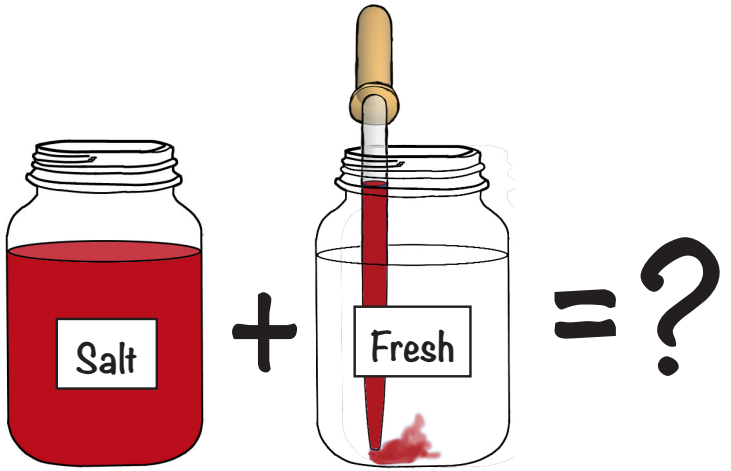
A. Waitai meets Wai Māori in a JAR

1. Add blue food colouring to freshwater (this may already be done for you).
2. Fill a second jar with seawater.
3. Gradually add blue freshwater into the bottom of the seawater jar using a pipette.
4. What happens to the blue water and why?



Repeat but add seawater into freshwater using a pipette:

1. Add red food colouring to seawater (this may already be done for you)
2. Fill a second jar with freshwater.
3. Gradually add red seawater into the bottom of the freshwater jar.
4. What happens to the red water and why?



Discuss what you observe and describe how this relates to the estuary system?

- Will we find the “saltwater wedge” by just sampling the water on top?
- How could we sample the water at depth?

B. Waitai meets Wai Māori in the ESTUARY

1. Find a map or chart of the area (or sketch your own)
2. Guess where the water is freshwater (no salt) and where it is fully salty (35 ppt salt).
3. Choose 3- 4 areas to sample the surface water and think about how salty they will be. Record that on your map.
4. Paddle or walk along the estuary to collect water samples from the different areas and measure the saltiness using a salinity refractometer. Look around your surroundings so that you are able to mark the spot on a map. Also make sure to note the tide and any other interesting observations. (You can buy salinity refractometers online from TradeMe, or from some petshops that have marine aquarium equipment, There are videos of how to use them on YouTube.) Record your results on the chart or in the table.
5. Repeat in one or two areas by taking water samples at the surface and at depth. Are they different?
6. Discuss what you observed?

More questions to kōrero about:

- What other ways could you measure the salinity of the water?
- What other things may change the water salinity?
- How you found where īnanga lay their eggs? What's next?
- Once you know where īnanaga could breed, how could you find out if they are breeding in the area?
- How could YOU help īnanga in the region?
- Salinity wedges – why might these be important for animals in general?

Further information:

http://sciencelearn.org.nz/Contexts/Toku-Awa-Koiora/Sci-Media/Video/Inanga-and-other-whitebait

The meeting of Waitai and Wai Māori

We now know ... ?

Salinity of fresh water = _____

Salinity of salt water = _____

We now want to know ... ?

Name: _____

Date / Time: _____

Time of low tide:_____

Add arrows to show direction of the tide