Inanga habitat is declining

'Whitebait' is not a single species of fish, but is a mixture of the young of five native fish (most of which are inanga). Fewer inanga are found in New Zealand now, partly because the best places for them to live and spawn have become less common: coastal land has been drained, streams modified and livestock allowed to graze on stream banks. To increase inanga numbers, many landowners and communities are now fencing off and replanting areas beside streams with native grasses and trees.

The perfect place to lay eggs

Inanga only lay their eggs in thick vegetation on stream edges, because the larvae inside the eggs need cool, damp and dark conditions to develop. Spawning usually happens where river water and sea water meet during a 'spring' tide (just after a full or new moon) in autumn. Eggs are laid when the water is near its highest level.

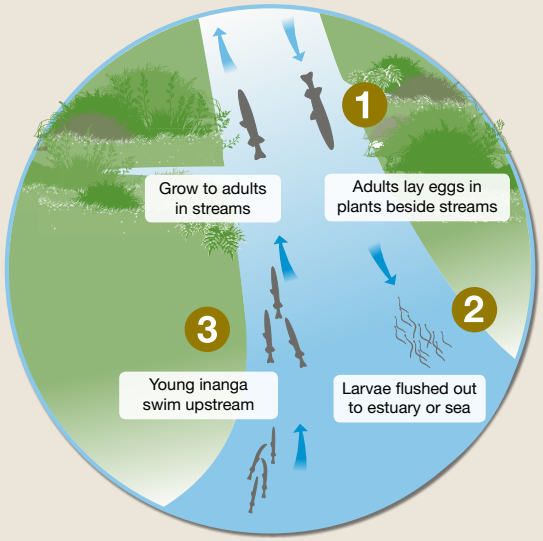
Making new places for inanga eggs

Research shows that straw bales are excellent temporary places for inanga to spawn if their habitat has been damaged or destroyed. Eggs laid on the bales help pinpoint the best spawning sites and, therefore, the best places to replant with native vegetation.

Inanga belong to the galaxiid family (named after the Milky Way galaxy) because of the beautiful star-like spots on their skins.

Fully-grown inanga can reach 10 cm in length. *Photo: Sjaan Bowie*

A JOURNEY TO THE SEA AND BACK AGAIN



1 Autumn
Fully-grown inanga travel downstream until they sense salt water. Females lay their eggs in plants high on the riverbank during a spring tide. Males then fertilise the eggs, which stick to the stems of grasses just above the ground.

2 Late autumn
The tiny larvae (about 7 mm) hatch about 28 days later at the next spring tide, to be carried downstream as the tide goes out. They spend the winter at sea eating tiny plankton.

3 Spring
Now about 5 cm long, the young whitebait travel back upriver. Some are caught by whitebaiters, but others reach freshwater and grow to about 10 cm during spring and summer. Inanga can live for 3 years but most only live for a year or so.

For more information

- Straw bales, inanga, on DOC website: www.doc.govt.nz/inanga-straw-bales
- Whitebait Connection resources: www.whitebaitconnection.co.nz
- University of Canterbury: www.inangaconservation.nz
- Our Estuaries hub: www.doc.govt.nz/estuaries

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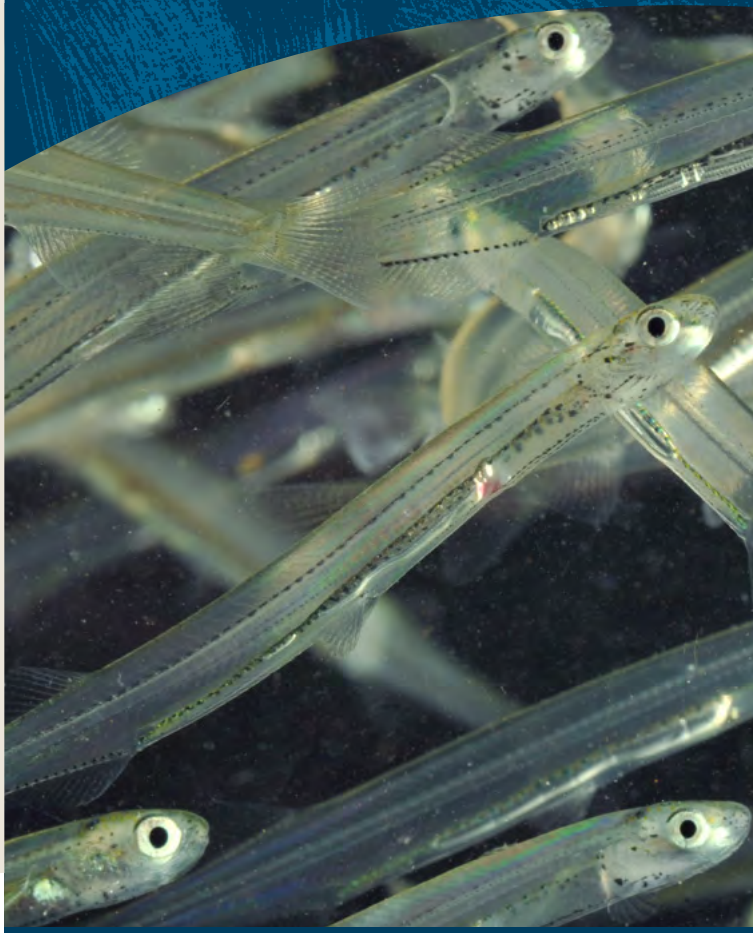
Care for inanga
Te Tiaki inanga

Use straw bales to find out where they spawn

Whitebait have long been a delicacy in New Zealand. Māori know them as the children of Tangaroa.



Department of Conservation *Te Papa Atawhai*

Waterways Centre for Freshwater Management

TE WĀNANGA O RAUKAWA e kore au e ngaro, he kākano i ruia mai i Rangiātea

MARINE ECOLOGY RESEARCH GROUP UNIVERSITY OF CANTERBURY, NZ

Instructions

STEP 1: *Before you go out*

Before you visit a river or stream, check who owns the land it runs through and get their permission to go onto the land and put straw bales beside the stream. Environmental groups may already be working in your area – search iNaturalistNZ and the Department of Conservation's Our Estuaries hub to find out. Keep safe when working around rivers and streams.

- Wear the right clothing for the conditions.
- Check the weather forecast and tide times.
- Avoid places with steep banks or fast flowing water. Read safety and permission information and find out about inanga, suitable habitat and spawning sites online (see links on back page).

STEP 2: *Find the right places*

Between late January and early June, straight after a new moon, find the place where the seawater meets the fresh water coming downstream. Here are some clues to help.

- Go to the stream on a high 'spring tide' (look up when these occur in the moon and tide tables); watch how far inland the tide comes and how high the water level rises.
- A salinity meter (which shows where the water changes from salty to fresh) could also help.

STEP 3: *Look for inanga eggs*

At low tide, go back to the shadiest spots at the place you identified in step 2. Kneel down, push apart the grass stems and look carefully at the roots at the high-tide mark. The inanga eggs are tiny transparent balls about a millimetre across.

If you find lots of eggs in the grass, this shows the habitat is already suitable for spawning. Choose nearby areas for the straw bales where the vegetation is sparse and where you find no eggs or only a few eggs.

Flags showing where inanga eggs were found, at 'spring tide' level on the bank.

STEP 4: *Put straw bales beside the river or stream*

Put the bales in sets of two or three, straddling the high-tide mark. Place them loosely together – most of the eggs will be laid in the gap between the bales; a 5-cm gap is ideal. If there are ducks around, cover the bales with shade cloth apart from the side facing the river. Hammer two waratahs through each bale to stop them floating away. Straw bales are safe to use and will not affect life in the stream.

Check the straw bales regularly. Make sure the eggs stay well shaded while you are looking – an umbrella will help. About 2 weeks after the eggs are laid, you will be able to see fish eyes as two black dots inside the eggs. Take photos of the eggs at each stage and note their location on a map or with GPS. Record your findings at iNaturalistNZ.

More eggs will be laid right through autumn. By Matariki (mid-June) most of the eggs will have hatched into fish larvae and left the stream. Now is a good time to remove and compost the straw bales, but save the shade cloth and waratahs for next year.

Eggs laid on the inside face of a straw bale.

Securing the straw bales in place.

We love to eat seeds – so don't use hay or pea straw, or straw bales with seed heads attached. If you do, we will tear the bales apart to find them all!

Easter is a good time to hunt for chocolate eggs – and for inanga eggs!

STEP 5: *Plant for inanga*

You'll probably notice that some straw bales with more eggs than others. These bales are in the perfect place! Make these areas a priority for fencing out grazing animals and replanting with native grasses, flax and rushes.

Fencing off a good site for native planting.

Restored vegetation at the Avon River/Ōtakaro estuary.
Photo: Shane Orchard

Keep yourself safe working around rivers. Wear the right gear and watch the weather and tides.

You will need:

- five or more straw bales
- waratahs (metal stakes)
- shade cloth
- hammer
- map or GPS
- camera
- salinity meter (optional)