

Inanga/Whitebait

What • Where • Why • How



WHAT are inanga:

'Whitebait' is a collective term for the juvenile stage of the five New Zealand species of the fish family Galaxiidae. **'Inanga'** is the name for the adult stage of one of these five whitebait species – *Galaxias maculatus*.

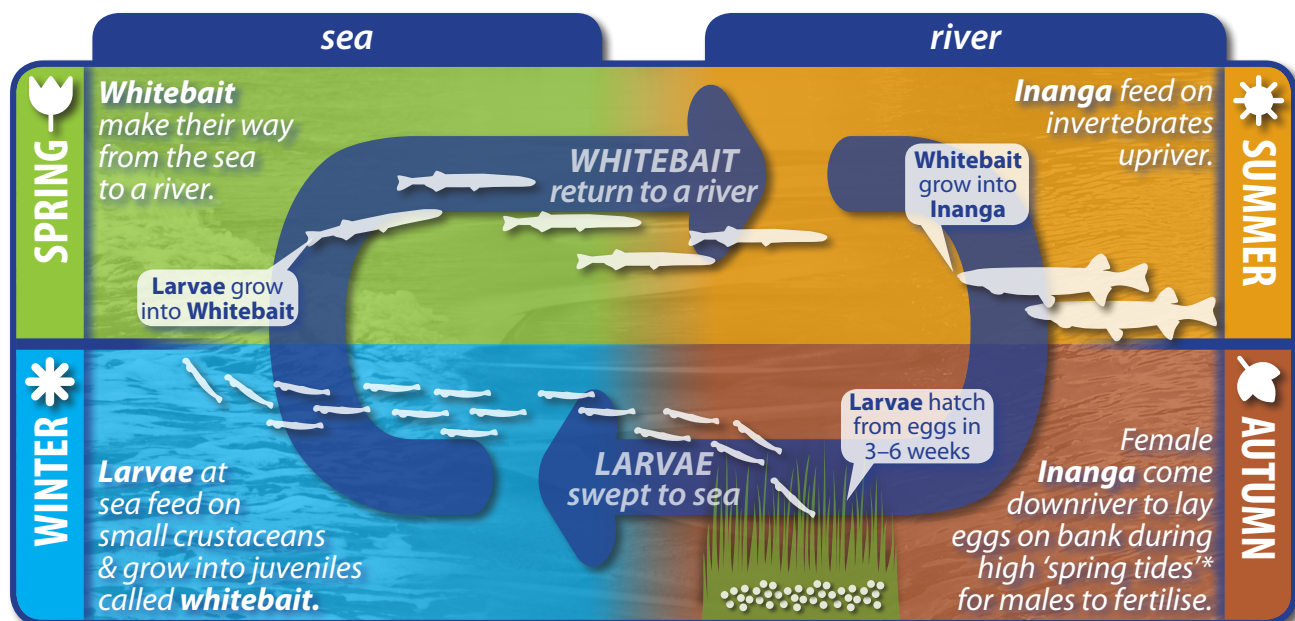
Inanga is the smallest of our whitebait species, growing no longer than 110 mm.

It's the only species that can't climb barriers – which means it has a unique set of requirements for survival.

They are diadromous – meaning they live in marine and freshwater environments.



Inanga lifecycle



* SPRING TIDE – a tide just after a new or full moon, when there is the greatest difference between high & low water

During their spawning season in late summer/autumn female inanga will lay 1,500–3,000 eggs. They are tiny – each egg being just 0.8–1.25 mm in size.

After a month they will hatch into 7 mm long larvae. For the first week they feed on their attached yolk sac, then they start to feed on small plants and animals. They head out to sea for up to six months. Having lots of larvae and sending them out to sea is the inanga version of "not putting all your eggs in one basket" i.e., if bad things happen then they won't all be lost.

The six-month old juveniles (now called 'whitebait') find their way to rivers in large groups/shoals by smelling the freshwater. They swim upriver, but are weak swimmers and can't climb up barriers e.g., rapids, waterfalls/weirs/culverts etc. Most of the whitebait don't survive this journey as they starve, get eaten by predators or are caught by whitebaiters.

They mature into adults in the river for about six months. They are ready to head back downstream and lay their own eggs (spawn) after a year.

The 5 whitebait species in New Zealand

	extinct
nationally threatened	critical
	endangered
	vulnerable
at risk	declining
	recovering
	relict
	naturally uncommon
	not threatened



inanga **CAN'T** climb barriers... unlike the other 4 species

inanga

	extinct
nationally threatened	critical
	endangered
	vulnerable
at risk	declining
	recovering
	relict
	naturally uncommon
	not threatened



shortjaw kōkopu

	extinct
nationally threatened	critical
	endangered
	vulnerable
at risk	declining
	recovering
	relict
	naturally uncommon
	not threatened



kōaro

	extinct
nationally threatened	critical
	endangered
	vulnerable
at risk	declining
	recovering
	relict
	naturally uncommon
	not threatened



banded kōkopu

	extinct
nationally threatened	critical
	endangered
	vulnerable
at risk	declining
	recovering
	relict
	naturally uncommon
	not threatened



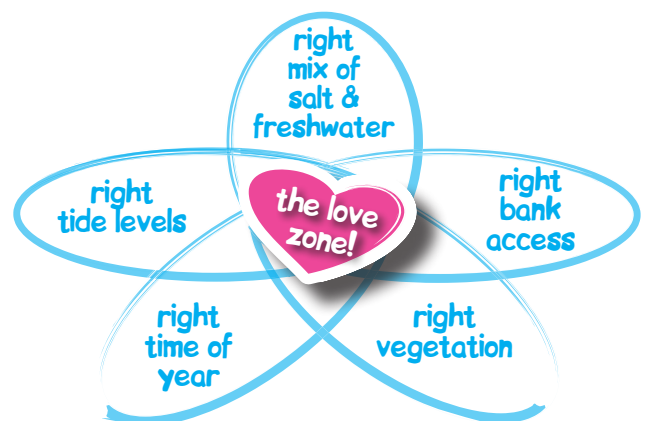
giant kōkopu

WHERE inanga live & like to lay their eggs:



Getting the right spawning habitat – ‘the love zone’ – is a delicate balance of a number of conditions.

Issues include adult inanga being vulnerable to predators when they swim into the shallow water to spawn – so emergent vegetation gives them some protection from hungry eels and wading birds. Inanga eggs need to stay cool and damp while they are out of the water. Canopy and bankside vegetation covering the eggs act like an umbrella during the day and a blanket at night.



IDEAL INANGA SPAWNING HABITAT

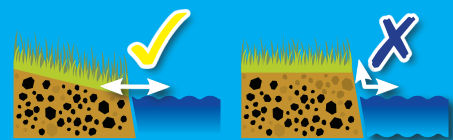
Right distance from estuary/sea



Some stretches of this waterway are optimal for inanga spawning due to their location in relation to the sea. Spawning occurs in areas where high spring tides can reach, but the water isn't too salty. During spring tides inanga can lay their eggs in vegetation high up the riverbanks, above the normal river flow height.

Gently sloping bank

Ideally the riverbank will be a gentle slope rather than a steep edge. This means there is more accessible bank area for inanga to lay their eggs on during the high spring tide.

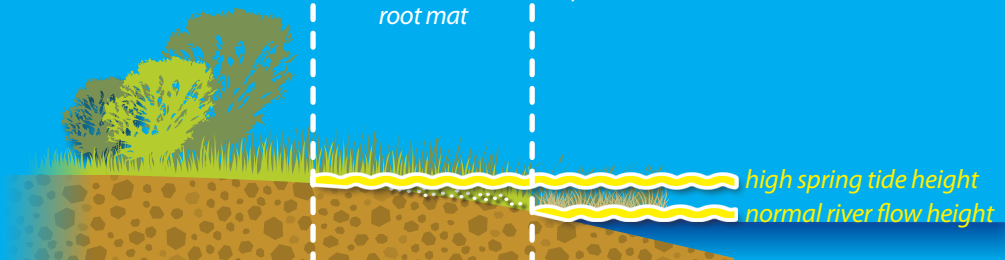


Good bank vegetation

Canopy of native trees/shrubs
– provide shade for eggs while not dropping lots of leaves on them

Tall thick grass
– so inanga eggs can be laid in the root mat

Plants rising from water
– for inanga to hide in until high tide takes them up the bank



WHY inanga numbers are declining, & why we care:

where's everyone gone?



Overall native fish populations in New Zealand are in decline.

Inanga are doing better than most because they are generalists i.e., they are flexible in where they live and what they eat. Part of the problem is the damage we have done to the spawning habitat of the species that makes up over 90% of the whitebait catch.

Unfortunately, the habitat needed for the eggs to survive is often damaged or absent.

Less eggs = less inanga!

Also, introduced predators (particularly trout) eat lots of adults and change their behaviour meaning the inanga are not so successful at foraging for food.

**high biodiversity = healthy ecosystem
...everyone has lots to EAT!**



Damage to inanga habitats include, but are not limited to...

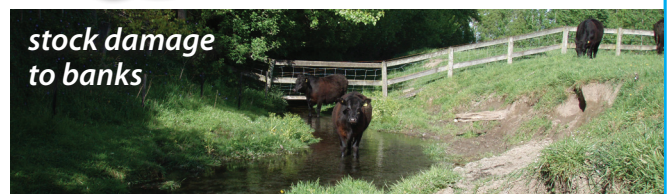
Spawning habitat:

- Farm stock damage.
- Man-made changes to natural bank structures.
- Mowing of the long vegetation on banks during spawning season.
- Excessive sediment on banks, smothering vegetation.
- Construction of barriers that prevent inanga entering spawning areas e.g., tide gates.

Adult habitat:

- Construction of barriers that prevent inanga swimming upriver to feed e.g., tide gates, weirs, culverts etc.

stock damage to banks



man-made changes to natural banks



mowing grass on banks during spawning season



excessive sediment on banks



barriers to inanga entering spawning areas



HOW we can help them:

Riverbank vegetation and inanga spawning habitat can be slow to recover from damage.

Inanga always come back to the same spot in the river to spawn, so they will come back to damaged areas and try to spawn...but their eggs will die. Therefore it is imperative that we look after their remaining good spawning areas, and look to improve/restore those already damaged.

Things we can do to help include...

In the short-term:

- Install temporary straw bale spawning habitat. The moist, cool gap between the bales provides a great temporary place to spawn until longer-term solutions take effect.

In the long-term:

- Fence out stock.
- Implement riparian planting plan.
- Encourage authorities to review maintenance strategies for banks.
- Remove tide gates and other barriers to inanga getting upriver.
- Inanga eggs are very vulnerable. The only protection they have from being eaten by predators is the vegetation they are developing in. Tall, dense, vegetation hides the eggs and makes access difficult for predators. If you can maintain or restore the vegetation then pests will become less of a problem.

FURTHER READING & RESOURCES:

- McDowall, R. M. (1984). *The New Zealand Whitebait Book*. Wellington, Reed.
- Mitchell, C. P. and G. A. Eldon (1991). *How to locate and protect whitebait spawning grounds*. Rotorua, Freshwater Fisheries Centre.
- Richardson, J. and M. J. Taylor (2002). *A guide to restoring inanga habitat*. NIWA Science and Technology Series 50: 1–29.

install
temporary
straw bale
spawning
habitat



looking for
eggs in the
temporary
habitat



eggs in the
temporary
habitat



The National Inanga Spawning Education Programme is supported by...



AQUATIC SCIENCE &
VISUAL COMMUNICATION

