Enviroteach

Environmental Education Resource for Teachers

Wonderful Whitebait

Restoring the Waihopai

From the Editor

Kia ora

The new year has begun and our teachers' magazine, previously called "The Squawk", has a brand new name! This edition focuses on whitebait and is crammed full of information about these fascinating creatures, plus lots of lots of ideas for teaching and learning about whitebait both in the classroom and on field trips. I hope you enjoy it.

Did you know that you can request Environment Southland's Environmental Educators to assist you, at no cost, with environmental learning at your school? We offer a range of services, including: stream studies, Bruce C Gull's club and magazine, the Enviroschools Programme and workshops for school caretakers. If booked well in advance, we may also be able to assist with field trips, talks at your school and environmental projects. To contact us, phone 0800 76 88 45 or email education@es.govt.nz.

You'll find an Environmental Education Calendar for 2014 enclosed with this magazine. Please display it prominently on your staff room / classroom wall and be sure to take advantage of the opportunities being offered by Environment Southland in the year ahead.

Best wishes for 2014

Pat Hoffmann
Environmental Education Officer

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Inside this issue

Wonderful Whitebait

New Zealand whitebait

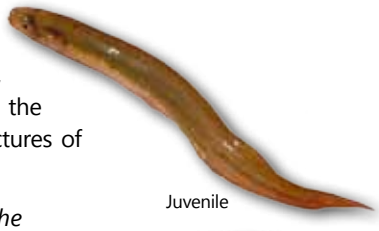
In New Zealand, the word whitebait refers to the juveniles of five different species of native fish:

- īnanga
- giant kokōpu
- kōaro
- banded kōkopu
- short-jawed kōkopu

The species that is most commonly caught by whitebaiters in New Zealand is īnanga. Smelt are also caught, occasionally, along with the young of other fish such as eels, bullies and trout. In other countries, whitebait belong to completely different species.

What do adult whitebait look like?

While the juveniles can be quite difficult to tell apart, adult whitebait differ markedly in size, colouring and habitat. Refer to the poster on pages 4 and 5 for pictures of the adult fish.



Juvenile

Īnanga adults are barely twice the size of the juveniles.

Adult

The giant kōkopu can grow to half a metre in length!

Where do whitebait live?

Īnanga and giant kōkopu are found in lowland marshes and slow-moving water, while kōaro, banded kōkopu and shortjaw kōkopu prefer forest streams at higher altitudes.

Whitebait lifecycle

All whitebait species spend part of their life in fresh water and part in the sea. The cycle begins in late autumn to winter, when tiny fish hatch from their eggs. They are carried downstream by rivers and swept out to sea. Over the winter to spring they remain out at the sea, feeding on small crustaceans and growing. In late winter to summer, whitebait migrate back up rivers and streams.

How do whitebait breed?

Of the five whitebait species, the spawning habits of īnanga are best understood. The other four species remain a bit of a mystery!

Īnanga spawn during late summer and autumn. The most important months for spawning are February to May, but in the South Island, spawning can occur as early as in January.

The females lay their eggs in vegetation growing near the high-water mark during a very high tide (known as a spring tide), usually near the upper limit of the saltwater wedge that pushes upriver from the sea. They prefer to lay their eggs in long vegetation which will give their eggs good protection from drying out. Adult males fertilise the eggs by releasing milt (sperm) over them. Most adults die after spawning.

As the high tide retreats, the eggs are left high and dry above the waterline. They remain exposed for a number of weeks, but are kept moist by the dense vegetation. The hatchlings spend the winter out at sea, feeding on small crustaceans and growing.

In spring, the young fish make their way upriver, eventually settling in bush-covered streams and swamps. Providing upstream access is an important means of increasing habitat for adult īnanga, as they have little climbing ability. Poorly designed culverts and weirs can prevent them from migrating upstream. They prefer areas with good vegetation cover and overhanging vegetation.

Whitebait patties – a Southland favourite!

Over summer, the fish grow and mature. Īnanga feed on a wide range of aquatic organisms as well as on terrestrial animals (beetles, wetas, spiders, etc.) that fall into the water. They stay together in shoals and may be found in the pools, backwaters, streams and lagoons connected to rivers.

By late summer/autumn, the mature fish are ready to swim back downriver to spawn in the estuaries.

What can be done to protect īnanga spawning grounds?

- Inform the local councils of your findings. Activities such as weed spraying, grazing, mowing of riparian margins, placement of culverts, dams etc. can all severely impact on spawning grounds and īnanga habitat.
- Talk with local landowners and inform them of your findings – they may not be aware. Landowners may be pleased to hear that whitebait are spawning on their river banks and could be persuaded to protect these areas.
- Keep stock out. Exclude stock from spawning grounds, particularly during the spawning season (January to May).
- Plant suitable vegetation associated with īnanga spawning.
- Build walkways to protect spawning grounds.
- Involve other people in the community by sharing your information with schools, SIT, landcare groups, the environment centres and more. Encourage people to take notice and take action.

Top – Environment Southland staff search for whitebait eggs along Kingswell Creek in Invercargill.

Middle – Whitebait eggs. Photo – Sjaan Chateris, DOC

Bottom – When the next spring tide reaches the eggs, the larvae hatch and the tide carries them out to sea.

Freshwater Fish in Southland

Migratory galaxias

The whitebait species

Inanga

Banded kōkopu

Koaro

Shortjaw kōkopu

Giant kōkopu (taiwharu)

The 'bullies'

Upland bully

Bluegill bully

Giant bully (kōkopu/hawai)

Common bully

Redfin bully

Non-migratory galaxias

Alpine galaxias

Gollum galaxias

Southern flathead galaxias

Eels (tuna) and lamprey (kanakana)

Longfin eel (tuna)

Lamprey (kanakana)

Shortfin eel (tuna)

Black flounder

Torrentfish (piripiripohatu)

Common smelt (paraki/ngaiore)

Pressures on our fish

Many pressures affect Southland's freshwater fish. These can include:

- Poor water quality – high levels of sediment and nutrients and reduced clarity can stress fish or be toxic and can reduce spawning success
- Over fishing – which can deplete breeding stock
- Water quantity – low flows and taking too much water can stress or kill fish
- Habitat removal/destruction – reduces the area that fish can live in
- Wetland removal and drainage – reduces the area that fish can live in
- Dams/obstacles, like hanging culverts – prevent fish from migrating, which is an important part of their life cycle

What can you do?

- Improve water quality and stream environments by planting and fencing riparian margins
- Obey fishing laws and only take what you need
- Respect wet areas as important habitat for fish
- Remove obstacles like hanging culverts or dams, or provide fish passage over these barriers

Fish not to scale

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Te Taiao Tonga

Restoring the Waihopai

The Waihopai River is home to many species of fish, including eels, bullies, flounder and whitebait. Migratory galaxiids (whitebait) lay their eggs in the long grass along the stream banks between Queens Drive and Stead St in Invercargill. Protecting these sites and restoring the catchment upstream will help to improve the health of the river and the fish that live in it.

Over the next few years, schools and community groups will be helping Environment Southland to restore a stream alongside the Waihopai Walkway, between just downstream from the dam on the Waihopai River. ***Would you like to be a part of this exciting project?***

Come and do a stream study with us to learn about water quality (1½ hours), then put your muscles to work and plant a section of stream bank (1½ hours).

Environment Southland will supply plants and spades, and our staff will give instructions and supervise the planting. We can take a maximum of 40 people per 1½ hour planting session. We'll even put the name of your group on a signboard to acknowledge your contribution to the restoration of this stream.

Planting will be done in autumn and spring (Terms 1, 3 and 4). Sessions run from 9.30am to 12.30pm – please choose one of the following dates:

- ***Term 1:*** 24 March & 14 April
- ***Term 3:*** 1 September & 22 September
- ***Term 4***: 3 November & 24 November

Book your place before 10 February – contact our Environmental Educators via email: education@es.govt.nz or phone 0800 76 88 45.

Students from Verdon College (top) and Woodlands Primary School (bottom) planting along the Waihopai River.

Classroom Activities

Learning about whitebait

- Look at the pictures of whitebait and bullies on the poster. Now look at a picture of a tadpole. Compare and describe the differences.
- Who has seen whitebait before? Where did you see them? How did you know they were whitebait?
- Describe an experience you have had with whitebait.
- Find out what whitebait eat. What / who eats whitebait?
- What do whitebait need to survive? Do all whitebait survive? What problems do whitebait face as they try to survive in their environment?
- What else do you know about whitebait?
- How do people catch whitebait? Interview one or two whitebaiters. Find out how they catch the little fish and what they do with them. Share what you learned with your class.

Learning about īnanga

- There are different kinds of whitebait with different habitats. Look at the pictures of whitebait in the poster on pages 4 & 5. How can you distinguish īnanga from the other species?
- Make a model of an īnanga out of playdough.
- Where do īnanga live? Find out what an estuary is, and what a saltwedge is.
- Investigate the lifecycle of īnanga
- Find out where īnanga lay their eggs. What kinds of plants provide a good habitat for īnanga?
- Make a model showing an ideal īnanga habitat.

Using language

- Make a list of words that rhyme with whitebait: e.g.: date, gate, late, wait, eight, great, plate, state, weight, straight, debate, locate, schoolmate, calculate, celebrate, estimate, fascinate, hesitate, illustrate, isolate, appreciate, exaggerate, investigate, negotiate
- Make up a story using the word whitebait and as many of these rhyming words as possible. See if you can use ALL of them!
- Write a poem about whitebait.

Something to investigate

Find out the meaning of these words:

- Anadromous
- Catadromous
- Diadromous
- Amphidromous
- Potadromous
- Oceanodromous
- Land-locked: (Clue: some whitebait populations become 'landlocked' and do not spend any time in the sea. Instead, they complete their life cycle using freshwater lakes as their surrogate sea. This happens in places like Wakatipu and Te Anau, but also in systems like Waituna Lagoon (when the lagoon is closed) and probably Lake George).

Classroom Activities

Field trip

- Plan a class field trip to a stream to look for whitebait habitats.
- Discuss what you want to see and find out during your whitebait adventure.
- Brainstorm all the things you would need to take with you.
- Ask one of Environment Southland's Environmental Educators to accompany you on your field trip.
- Explore the stream, look for whitebait habitats, measure things like pH, temperature, velocity and depth, collect invertebrates and assess the health of the stream.

Special environmental day

Celebrate these special environmental days with your class at the start or the conclusion of an enquiry or a programme of learning focused on whitebait:

- **2 February – World Wetlands Day**
  www.wetlandtrust.org.nz/wwday
- **24 May – World Migratory Fish Day**
  www.worldfishmigrationday.com

Further reading

Visit these websites to learn more about whitebait in New Zealand.

- **Whitebait connection**
  www.whitebaitconnection.co.nz
- **Whitebait identification guide**
  www.whitebaitconnection.co.nz/uploads/file/DOC_whitebait_ID_guide_simple.pdf
- **Te Ara**
  www.teara.govt.nz (type 'whitebait' in the search option)
- **TerraNature Trust**
  www.terranature.org/fishNativeGalaxias.

Andy Hicks (top) from Environment Southland in typical whitebait habitat along the banks of Kingswell Creek in Invercargill.