



Whitebait Connection Canterbury

Whaka Inaka – A science programme incorporating community engagement



Whaka Inaka : Causing Whitebait | © EOS Ecology

Whaka Inaka Pest Monitoring Module – getting 16 schools involved



Whitebait Connection Schools Causing Whitebait | © EOS Ecology

Environment Investigators – all about inanga



Environment Investigators | © EOS Ecology



Environment Investigators | © EOS Ecology

Report card - results

PESTS & POOP
School Pest Monitoring Module REPORT CARD for 2016

The School Pest Monitoring Module was developed by EOS Ecology as part of the Whaka Inaka - Causing Whitebait project - which provided temporary straw bank spawning habitat for inanga/whitebait on the Opaheke/Heathcote River and Rasmussen Stream. With limited funds, the scientific team needed help continuously checking traps & signage condition at the project sites...16 local schools to the rescue!

The schools monitored for 35 weeks on a rotation to suit their individual requirements. The schools: 1) installed pest detector traps, 2) checked to see if traps had been active, 3) identified active pests (rat, hedgehog, mouse), 4) replaced ground detector cards with fresh ones, 5) checked to see if any dog poo was present around the traps, 6) checked the bank signage was in good condition...and, 7) digitally recorded all this data.

This was important data to collect as it will help influence future public policies on how these invasive habitats are maintained - providing a better habitat to ensure the survival of inanga.

The feedback from teachers and students has been overwhelmingly positive, and the input from schools has been invaluable to the Whaka Inaka project.

STUDENT BENEFITS

- raised awareness of pests & their means
- sense of guardianship
- families involved
- learn scientific methods
- effective experimental learning
- engaged local river & environment

OUTCOME/ACTION

- raising inanga numbers
- taking ownership of their monitoring site
- extensive data sets collected
- river cleanup days
- stop pest traps and posted to local interceptors about importance of cleaning up after dogs
- students presented at Council meeting to share their findings & concerns
- creating action plans
- planning future river restoration projects

OVERALL pest data results:

pests were detected on **66%** of all site visits

- 14% Hedgehog
- 35% Mouse
- 49% Rat

Quadrants with detector cards containing Irretrievable ground detector cards found at all sites.



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Whaka Inaka – A science programme incorporating community engagement



439
community
volunteer
hours

Whaka Inaka : Causing Whitebait | © EOS Ecology

Whaka Inaka Pest Monitoring – getting 16 schools involved



650
students

Whitebait Connection: Causing Whitebait | © EOS Ecology

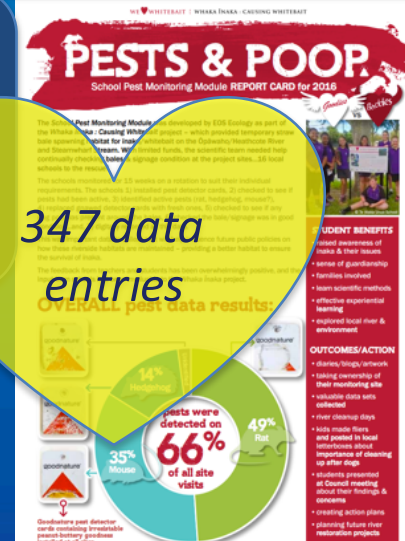
Environment Investigators – all about inanga



1,150
students

Environment Investigators | © EOS Ecology

Report
card -
results



NISP resources



Inanga/Whitebait spawning natural spawning sites

WHEN TO LOOK:
Inanga spawn mainly from late January–early June (peak levels in April). Eggs are laid over several days just after the new or full moon (sometimes both). The tides are higher than normal at these times (they're called spring tides) and spawning occurs 2–3 days after the highest spring tides. You can use a moon phase calendar and local tide tables to determine when spawning should occur. Before you start looking for eggs, it's best to visit a stream during a spring high tide to mark the high tide water level on the river banks (it's often much higher than you imagine!) – look for eggs at low tide.

WHERE TO LOOK:
1. Distance from the sea
Inanga spawning often occurs close to the upstream limit of saltwater penetration – this is usually quite different to the limit of the tide's influence. This can be determined by testing the bottom water in the deepest part of the stream channel at high tide with a salinity meter. Be aware that the extent of saltwater penetration can vary hugely from day to day, the bigger the tide, the further upriver the saltwater will go.

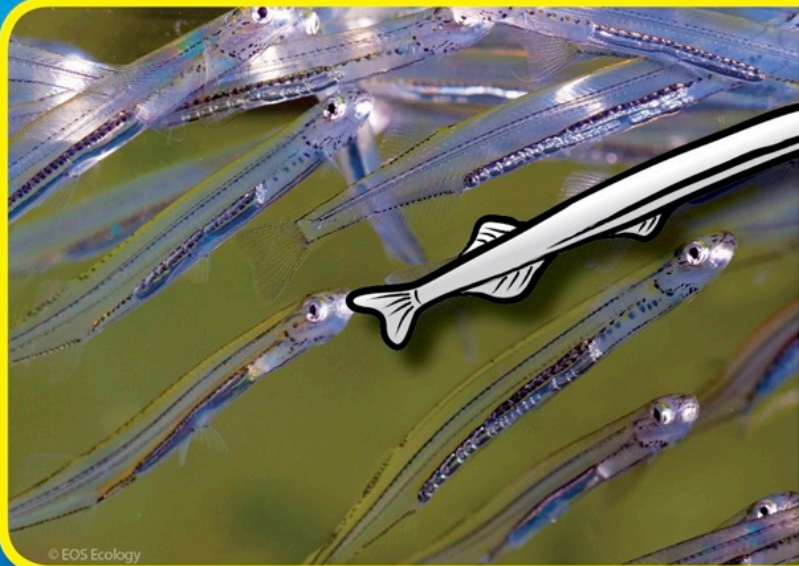
Inanga/Whitebait maintain/care for a spawning site

a specific combination of conditions to create good spawning habitat for inanga. Once these conditions have been established it's important we can keep them. A change or reduction in any of the individual factors will mean reduced or absent spawning and egg survival.

WHAT HARMS SPAWNING SITES?

Livestock grazing
If they have access, livestock will preferentially graze on riparian vegetation because it has a higher moisture content than their paddock feed. This leads to:

- **thinning and shortening of riparian vegetation** which exposes the aerial roots causing them to die-back
- **pugging and compaction** – cattle weigh 400–500 kg, in wet soils their hooves remould the surface soil (pugging) and tear/bury riparian vegetation



© EOS Ecology



Inanga Whitebait

Presented by:



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

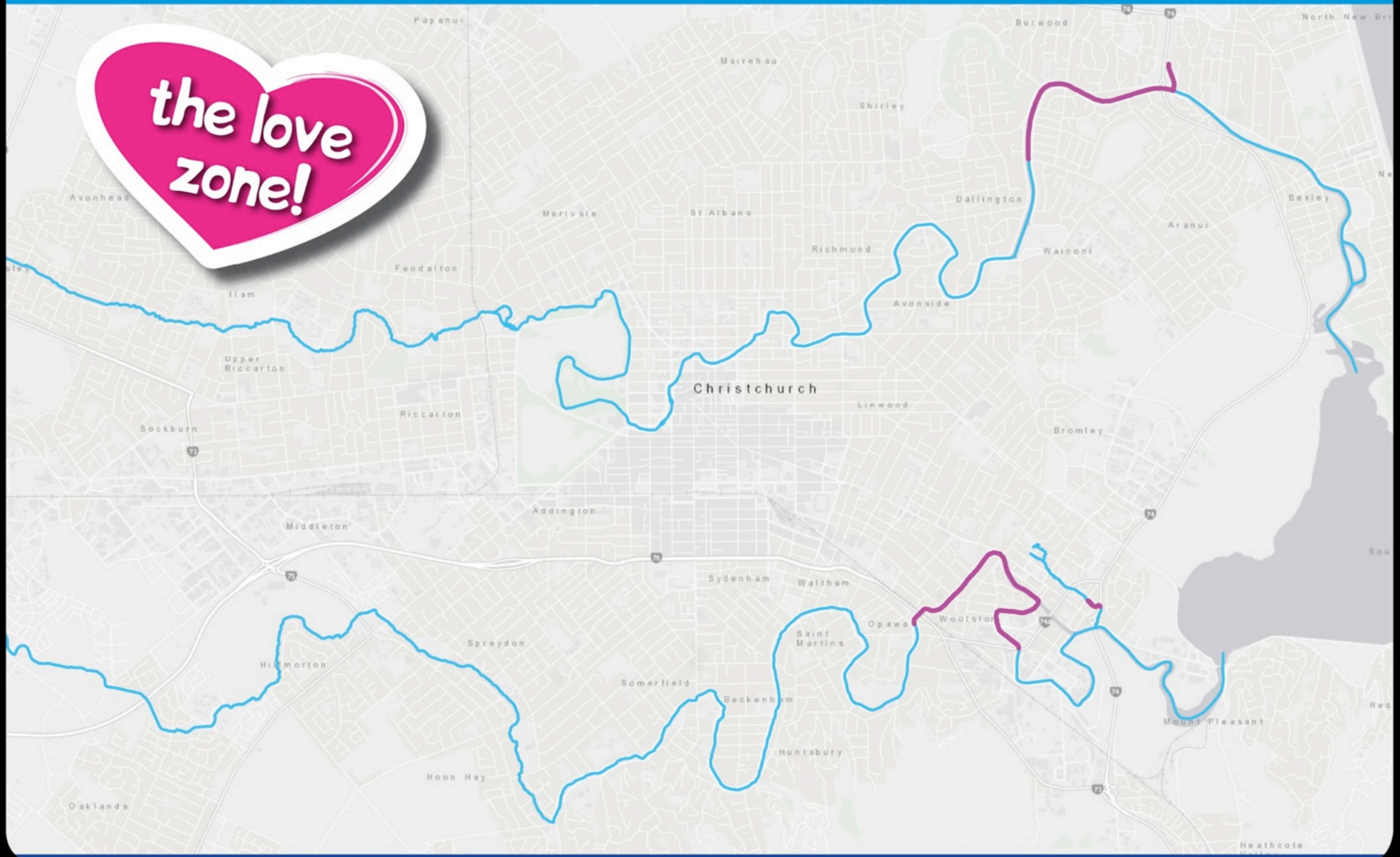


AQUATIC SCIENCE & VISUAL COMMUNICATION



Christchurch 'love zones'

National Inanga Spawning Education Programme





The Whitebait Connection Framework



PHASE 1: Teacher planning session

0.5 hour meeting with teachers and Whitebait Connection Co-ordinator to discuss the implementation of the whole programme.



PHASE 2: Classroom introduction

1 hour classroom session with students where the Whitebait Connection Co-ordinator introduces the programmes concepts to the class.



PHASE 3: The Inanga Experience

Depending on student ages classes get EITHER:

- A) a class riverside field trip for up to 2 hours with Whitebait Connection Co-ordinator/s where students do their own spawning habitat assessment.,or,
- B) an in-class fish tank exhibit for a term where they will learn how to care for inanga and experience their development, includes up to 2 hours with Whitebait Connection Co-ordinator/s in-class to provide extra learning opportunities.



PHASE 4: Develop an Action Plan

Whitebait Connection Co-ordinators will provide teachers with resources for them to guide a classroom session where students develop their own Action Plan to ensure a happier future for their local inanga population.

+

*classroom
resources*

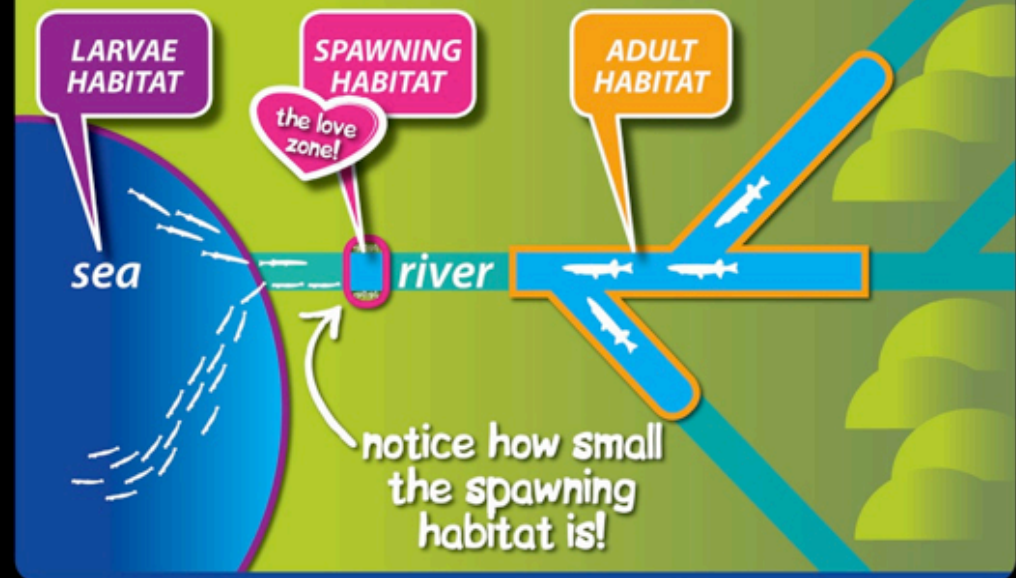
Phase 2: classroom intro

National Inanga Spawning Education Programme



WHERE inanga live

National Inanga Spawning Education Programme



Classroom resources

National Inanga Spawning Education Programme



welcome to ENVIRONMENT INVESTIGATORS!

Whitebait Connection and EOS Ecology bring you a programme to immerse your students in their local freshwater environment – with a focus on inanga. The aim is to increase their understanding, awareness, classroom presentations and support from regional co-ordinators. This resource pack has been developed especially for 'Environment Investigators' to build on existing knowledge/classroom learning, and provide specific activities relating to inanga and our local environment.

your resource pack

Download your resource pack from Dropbox: www.dropbox.com/sh/s4qkz37hpbz3q/AAAkwiCIVQVUeJL8H5Ppu?dl=0

Your resource pack is divided into the following grouping folders. These are in an order that is a logical progression of information/learning, but feel free to use them in whatever order you prefer.

- Part 1 – Freshwater ecosystems: Part 1a – Freshwater learning about the plants and animals that live within a freshwater system. Part 1b – Biodiversity: learning about the plants and animals that live within a freshwater system.
- Part 2 – Inanga: Part 2a – Inanga life cycle: understanding the different stages of the inanga life cycle. Part 2b – Inanga habitats: understanding the requirements and threats to inanga habitats.
- Part 3 – Action: What to do to communicate your knowledge and how to improve protection of freshwater environments.

Within each of these grouping folders there is:

- A Reference Sheet for Teachers: This is an index of the provided resources in that folder. It provides summary information on each resource, the recommended age group, and any web links to additional information (if relevant).
- A numbered set of resources for you to download.

We hope you find these resources helpful for the Environment Investigators programme!

Kirsty & the Whitebait Connection Canterbury team

Reference Sheet for Teachers Part 2a - Inanga Life Cycle

resource name & description to be downloaded from Dropbox	activity	age group
1 - What is whitebait? After you can print out that describes the five species of galatids.	discussion	all ages
2 - Where Who When What Why How Stories all about inanga.	discussion	all ages
3 - Inanga life cycle The cut out of the inanga life cycle. Students can work in teams to complete the life cycle. A brainstorming activity could be added where students think about information each stage including habitat requirements, natural predators and threats.	game/activity	all ages
4 - Where do whitebait come from? Animation showing the spawning stage of the inanga life cycle.	video/audio	all ages
5 - Whitebait research videos (website) Website containing information about inanga and whitebait research in New Zealand.	video/audio	all ages
6 - NZ whitebait fishing Understand the rules and regulations when whitebait fishing and discuss different fishing methods.	investigate	older
7 - Wairau whitebait spawning 2016 Inanga spawning event in Wairau. Watch as inanga swim through the long grasses to spawn.	video/audio	all ages
8 - Whitebait run To help students understand the life cycle of whitebait and how threats in our catchments affect them. To be played after explaining the life cycle of whitebait and the threats that they face in the catchment today.	game/activity	all ages

INANGA WORD HUNT

RESTORATION IWL B
ISLADFGCVHINMBA
WIARHWHITEBAITU
GRHLKAOWYUINIFA
CIVBNTNMQAUGIRU
IVSPAWNINGIATIR
AESDROOTSTGYUTO
WRERROTFGHEJKGLR
ABHSDFGXASIRIOSA
PAAYQFGHJKAWLISA
ANBDFGHCOSYSTEMR
AKIYEPREDATORSDDV
ZBTPROMOUSASDGA
IHTETSPRINGTIDE

inanga habitat roots larvae eggs ecosystem whitebait riverbank spring tide spawning predators fritters restoration diadromous saltwater wedge

Look for these words

www.whitebaitconnection.co.nz

- Compiled existing resources that relate to inanga (DOC, regional councils, WBC etc)
- Created some new resources

Phase 3: inanga experience: assessing 'the love zone'



HABITAT ASSESSMENT continued... Tick ONE score per line item i.e., either 0, 5 or 10 points – then write the score in the righthand column!

Score: →	0 points = BAD	5 points = OK	10 points = GOOD	Your points: write each attribute points here ↓
Attributes: ↓	no good for spawning, or if spawning occurs none of the eggs will survive	spawning will occur but improvement will increase spawning and egg survival	good spawning and egg survival	
bank material What is the DOMINANT material (inorganic) that forms the bank? Assess this over a 1m band that spans the high spring tide mark.	Continuous bare rocks, rip-rap, gravel, sand, mud, concrete or wood.	Mainly patches of earth/loam (soil) but with other material mixed in.	Continuous earth/loam (soil).	5
vegetation cover How much of the ground is covered by living vegetation. If i.e., how much of the bare ground underneath is hidden by growing plants). Assess this over a 1m band that spans the high spring tide mark.	Less than 50%	Between 50–75%	More than 75%	5
vegetation height Take the average or what is representative of the main DOMINANT vegetation in the area. Ignore any smaller discrete clumps of larger vegetation. Assess this over a 1 m band that spans the high spring tide mark. Measure to where the growth starts to thin out.	less than 10 cm (plants are too short and won't be able to keep the ground moist) more than 50 cm (plants are likely too big to be any good as spawning habitat)	Between 10–20 cm	Between 21–50 cm	5
vegetation type Select the DOMINANT vegetation type in that band. Assess this over a 1m band that spans the high spring tide mark.	Large woody plants (trees, gorse, blackberry, shrubs), yellow-flag iris, herbs.	Raupea, flax, Carex	Pasture grasses/rushes. The better type for spawning are tall sedge, Sphaceloneus phoeniceus, creeping bent (Agrostis stolonifera), and Edgar's rush (Juncus edgarianus).	10
root mat thickness Use your hands to pull apart the vegetation until you can see the ground. How thick are the vegetation and roots at ground-level? Assess this over a 1m band that spans the high spring tide mark.	Vegetation is very easy to pull apart, no roots growing over the ground surface, low density of plant stems, can see bits of the ground even before you start pulling the plants.	When you pull apart the plant stems you can see areas of bare soil. (i.e., little coverage of root mats over the ground surface)	Vegetation is hard to pull apart. Lots of roots/stems at ground level. (i.e., it is hard to get to the soil below the root mats)	5
ground moisture Check the ground at the base of the vegetation to see how damp it is. Assess this over a 1 m band that spans the high spring tide mark.	Very dry and dusty.	Dry in some places.	Damp or wet.	5
cover for fish Adult fish congregates before spawning time and need lots of cover to protect them from natural predators. Look in the area between your 1m band and down into the water at the bank. Is there any vegetation growing there, or are any plants overhanging the banks, or large logs or boulders in the water that might provide cover for adult fish?	No fish cover OR Only ONE of the following: - Tall plants that would be emergent at high tide. - Large plants closely overhanging the water. - Submerged aquatic plants. - Logs or large boulders in the water.	At least two of the following: - Tall plants that would be emergent at high tide. - Large plants closely overhanging the water. - Submerged aquatic plants. - Logs or large boulders in the water.		5
bank maintenance Are the banks mowed regularly so that the grass is always short at your spawning site?	Banks regularly mowed and grass kept short.		Banks rarely mowed, or mowed more than 2 months before the inanga spawning season.	0
livestock protection (for rural areas only) Is your spawning site fenced to prevent livestock access?	No sign of any fence of any type; livestock can readily access the banks. There is sign of recent damage from livestock access.	There is a temporary fence (i.e., an electric wire on temporary stakes) installed, but no permanent one. OR there is a fence but it is damaged (meaning that livestock can get in), or there is an open gate that allows livestock access to the site.	There is a permanent fence that prevents livestock from accessing the site at all times. There is no sign of recent damage from livestock access.	✓

Tally up all your attribute points from both pages here →

65

- A score of 90–120 indicates that the spawning habitat is in good condition for spawning!
- A score of 55–90 indicates that the spawning habitat is OK, but would be better with improvements.
- If you a 0 score for ANY of the attributes then spawning is UNLIKELY to occur – needs improvements.



Phase 3: inanga experience: caring for inanga

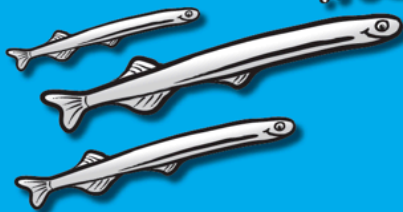
National Inanga Spawning Education Programme



LOOKING AFTER YOUR INANGA

Fish & tank care guide & maintenance logs
by EOS Ecology

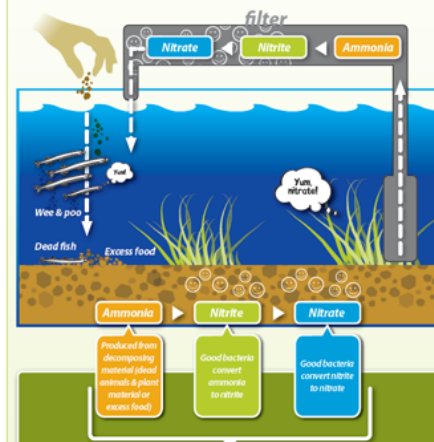
How to keep us happy!



www.whitebaitconnection.co.nz

THE NITROGEN CYCLE

The tank nitrogen cycle is a very important process for the establishment of beneficial bacteria in the tank and filter media. This will help with the conversion of ammonia to nitrite and then the conversion of nitrite to nitrate. An imbalance in the nitrogen cycle can be toxic to fish.



too much of these are **TOXIC**



Environment Investigators | © EOS Ecology



Environment Investigators | © EOS Ecology

Fish & tank maintenance tasks/log

TICK day fish arrived start log from tick	TANK WEEK 3	TANK WEEK 4
Monday	Date _____ °C - AM _____ °C - PM _____ Feeding - bloodworm <input type="checkbox"/> flakes <input type="checkbox"/> Dead fish - No <input type="checkbox"/> YES, number _____	Date _____ °C - AM _____ °C - PM _____ Feeding - bloodworm <input type="checkbox"/> flakes <input type="checkbox"/> Dead fish - No <input type="checkbox"/> YES, number _____ Chemistry recorded on page 21 - pH _____ - ammonia _____ - nitrite _____ - nitrate _____
Tuesday	Date _____ °C - AM _____ °C - PM _____ Feeding - bloodworm <input type="checkbox"/> flakes <input type="checkbox"/> Dead fish - No <input type="checkbox"/> YES, number _____	Date _____ °C - AM _____ °C - PM _____ Feeding - bloodworm <input type="checkbox"/> flakes <input type="checkbox"/> Dead fish - No <input type="checkbox"/> YES, number _____ Tank water changed & logged on page 22 <input type="checkbox"/>

Record additional items on your 'Water chemistry log' on pages 16-21, & 'Water change log' on page 22.

Phase 3: inanga experience: caring for inanga

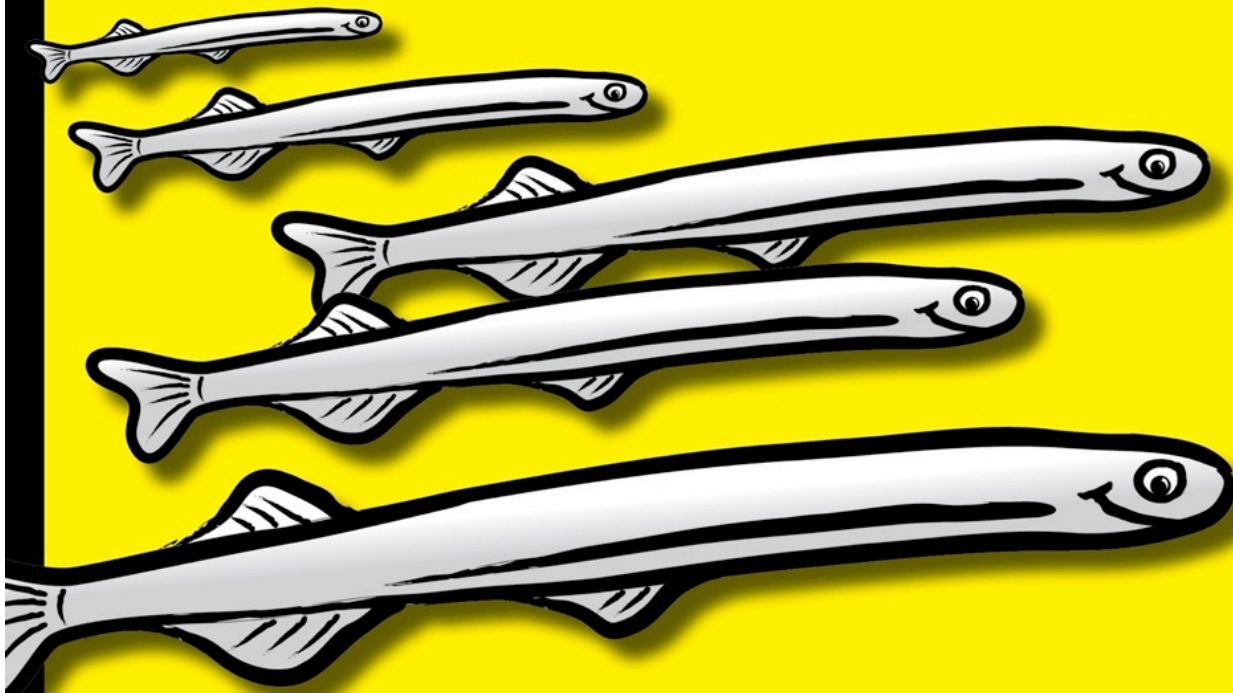
National Inanga Spawning Education Programme



Fish release day



HOW we can help the inanga!



we'd **LOVE**
your help!

Action



Video of Olive (Lyttelton Kidsfirst Kindy) explaining habitats to her friends.

If we want to keep the whitebait from extinction

If we want to eat whitebait in the future

We need to act NOW!

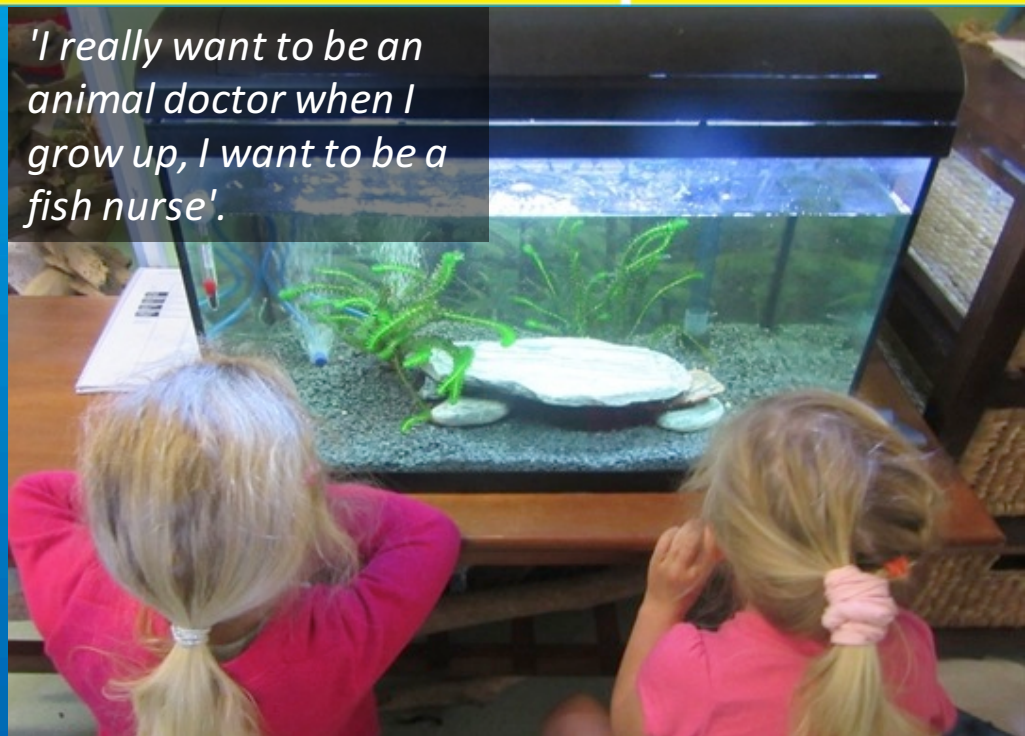
An animation created by St Martin's School students

Action

National Inanga Spawning Education Programme



Why should we improve inaka love zones?



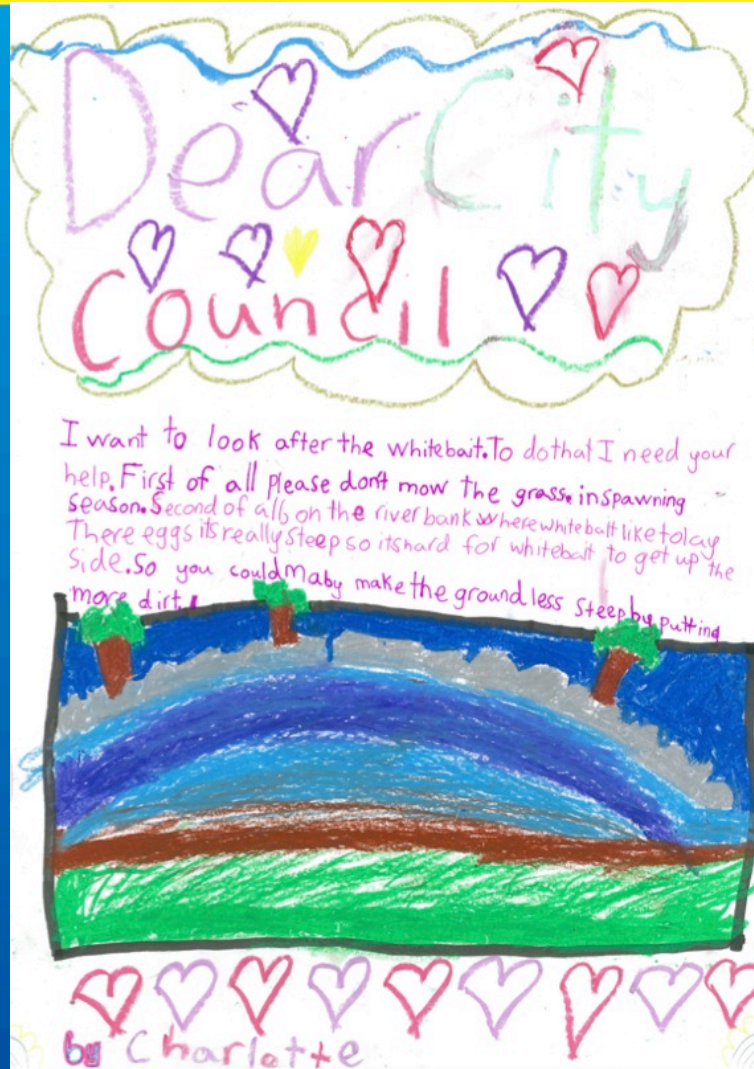
'I really want to be an animal doctor when I grow up, I want to be a fish nurse'.



What have you learnt about the stream?

WHITEBAIT
*Whitebait swim and shine
Hunting for food in the river
They glide and dart so fast
That they are a blur*

Action



One of the letters to the Christchurch City Council asking for improvements to be made to the love zones – Bamford School

What we will do next!



Collate our data.

Try to take ownership of our site.

Create a detailed action plan.

Find and talk to people who can help us take some action.

Do everything we can to make the **LOVE ZONE** great again!

Te Waka Unua's call to action as part of their presentation to the Regional Council Zone Committee



Ōpāwa School's call to action as part of their presentation to the Christchurch City Councillors and Mayor.

Song challenge for 2017

National Inanga Spawning Education Programme



Little Inanga – by Lyttelton Kindy

There's a little inanga, swimming in the water

A little inanga, doing what he ought-a

He swam right past the whitebaiters

Up the river to the long, long grass

There's a little inanga, swimming in the water

Swim. Swim. Swim.



BIG thanks to Kim Jones for the support