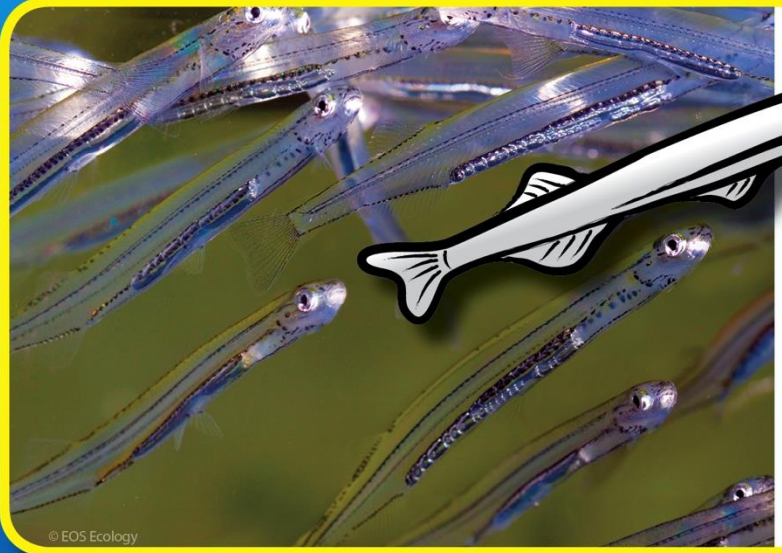
National Inanga Spawning Education Programme



Inanga/Whitebait

What • Where • Why • How

Presented by:

whitebait Connection
Xstream about freshwater life

EOS ECOLOGY

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Mountains To Sea Conservation Trust

CURIOUS MINDS
HE HIHIRI I TE MAHARA

Department of Conservation
Te Papa Atawbai

EOS ECOLOGY
AQUATIC SCIENCE & VISUAL COMMUNICATION

WE ♥ WHITEBAIT
WHAKA INAKA : CAUSING WHITEBAIT

MARINE ECOLOGY RESEARCH GROUP

today we'll discover...

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eos ECOLOGY

WHAT  are whitebait/inanga

WHERE  they live & like to lay their eggs

WHY  numbers are declining

HOW  we can help them

WHAT are whitebait/inanga

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eos ECOLOGY

- 'WHITEBAIT' = collective term for juvenile stage of 5 species of fish (Galaxiidae)
- 'INANGA' = adult stage of 1 of the 5 whitebait species (Galaxias maculatus)
- INANGA are the smallest, growing no longer than 110 mm

our 5 whitebait species

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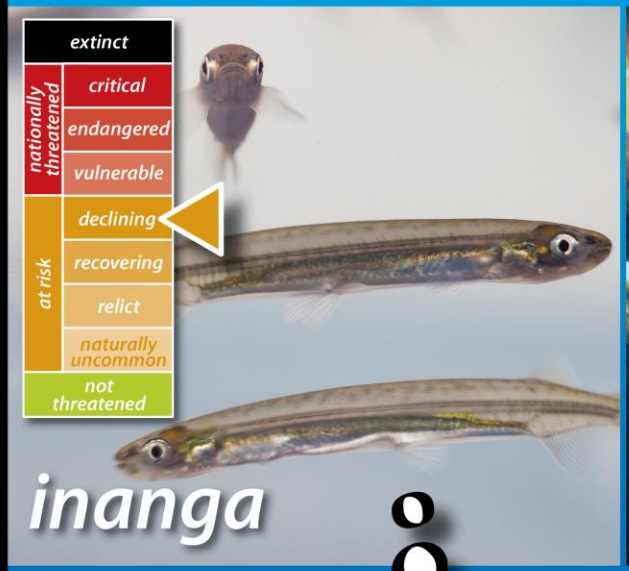
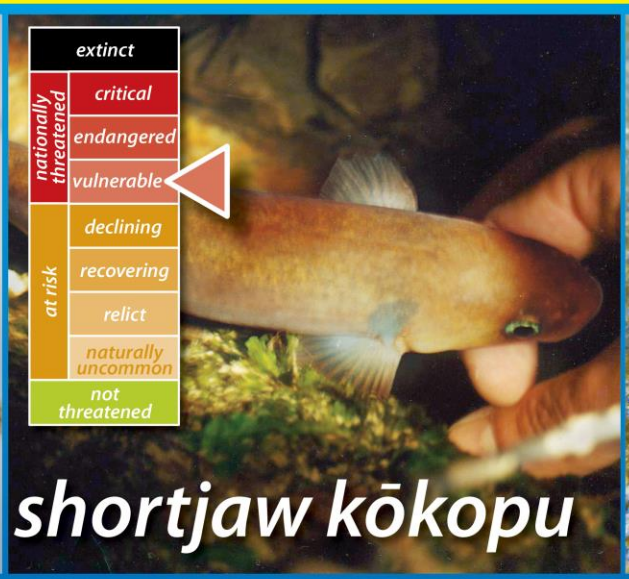
EOS ECOLOGY

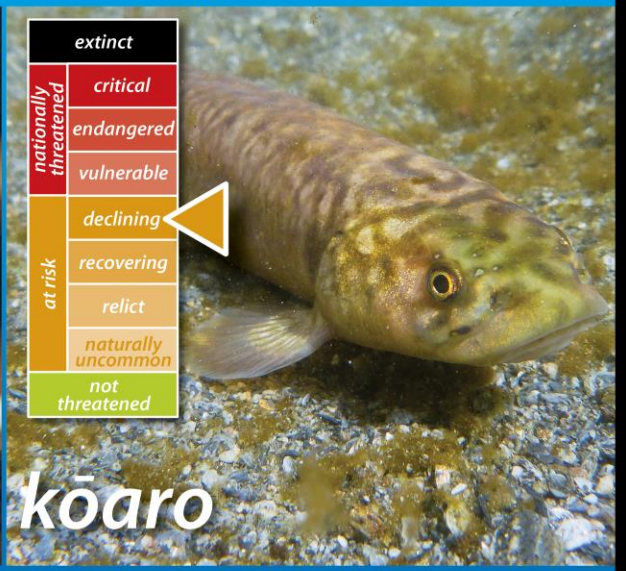


inanga

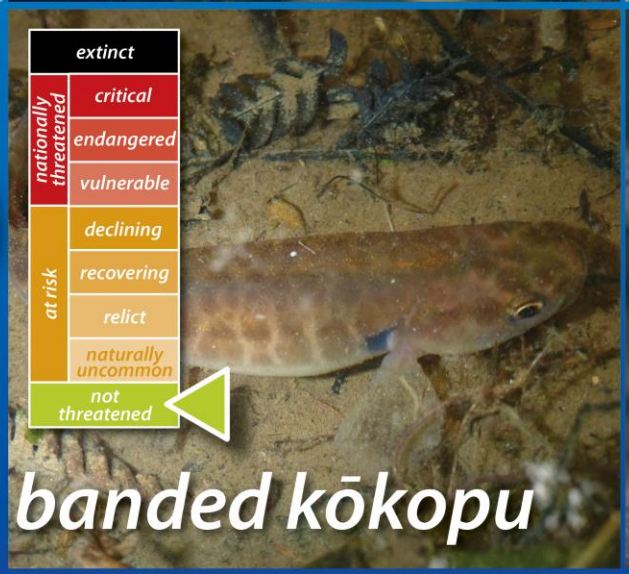
inanga CAN'T climb barriers... unlike the other 4 species



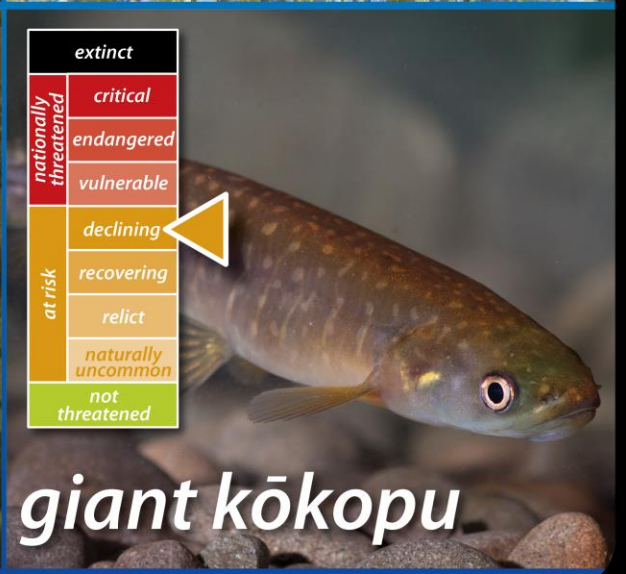
shortjaw kōkopu



kōaro



banded kōkopu



giant kōkopu

life cycle

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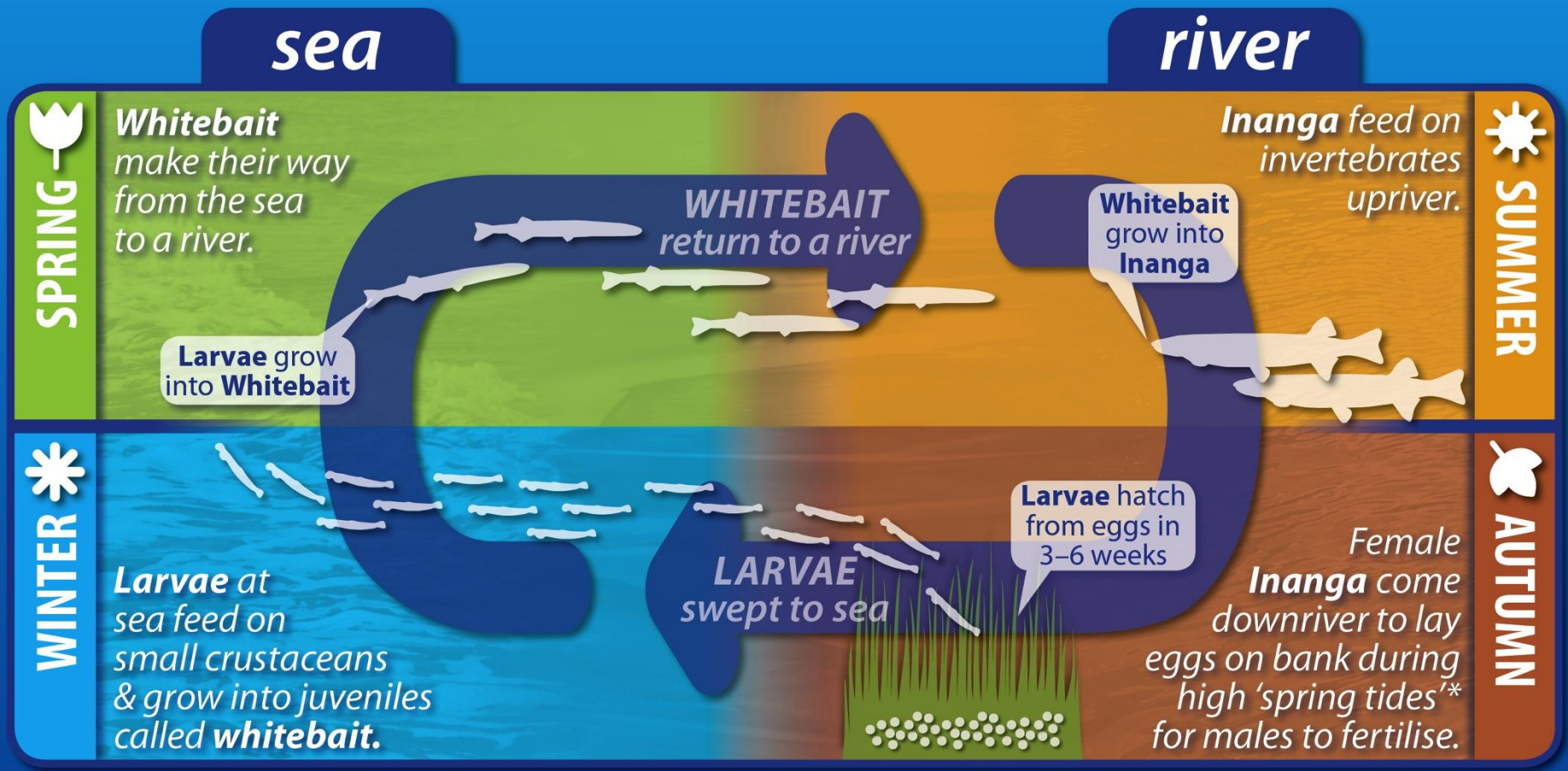
EOS ECOLOGY



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

life cycle

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EOS ECOLOGY

whitebait

inanga

larvae

eggs

egg stage

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EOS ECOLOGY

- lay 1,500–3,000 eggs at a time
- each 0.8–1.25 mm in size
- laid late summer/autumn
- laid during high 'spring tide, safe above normal river flow height
- laid at base of long grass
- hatch after 1 month

larvae stage

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EOS ECOLOGY

- 7 mm long when hatched
- high 'spring tide' currents wash them to sea
- feed on yolk sac for first week
- then feed on small plants & animals (phytoplankton & zooplankton)
- live at sea for up to 6 mths
- most don't survive

larvae natural predators

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eos ECOLOGY

CC Brian Gratwicke

CC Alexander Vasenin

whitebait stage

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eos ECOLOGY

- 6-month old juveniles
- swim in large groups (shoals) & with other species for safety
- find way to rivers by smelling the freshwater
- swim upriver, but weak swimmers – can't climb
- most don't survive

whitebait natural predators

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EOS ECOLOGY

fish

birds

inanga stage

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eos ECOLOGY

- adult of species
- mature in river for about 6 months
- stay in groups
- don't go as far upriver as some species
- ready to spawn –1 year
- most don't survive

inanga natural predators

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inanga spawning

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WHERE inanga like to live & lay their eggs

WHERE inanga live

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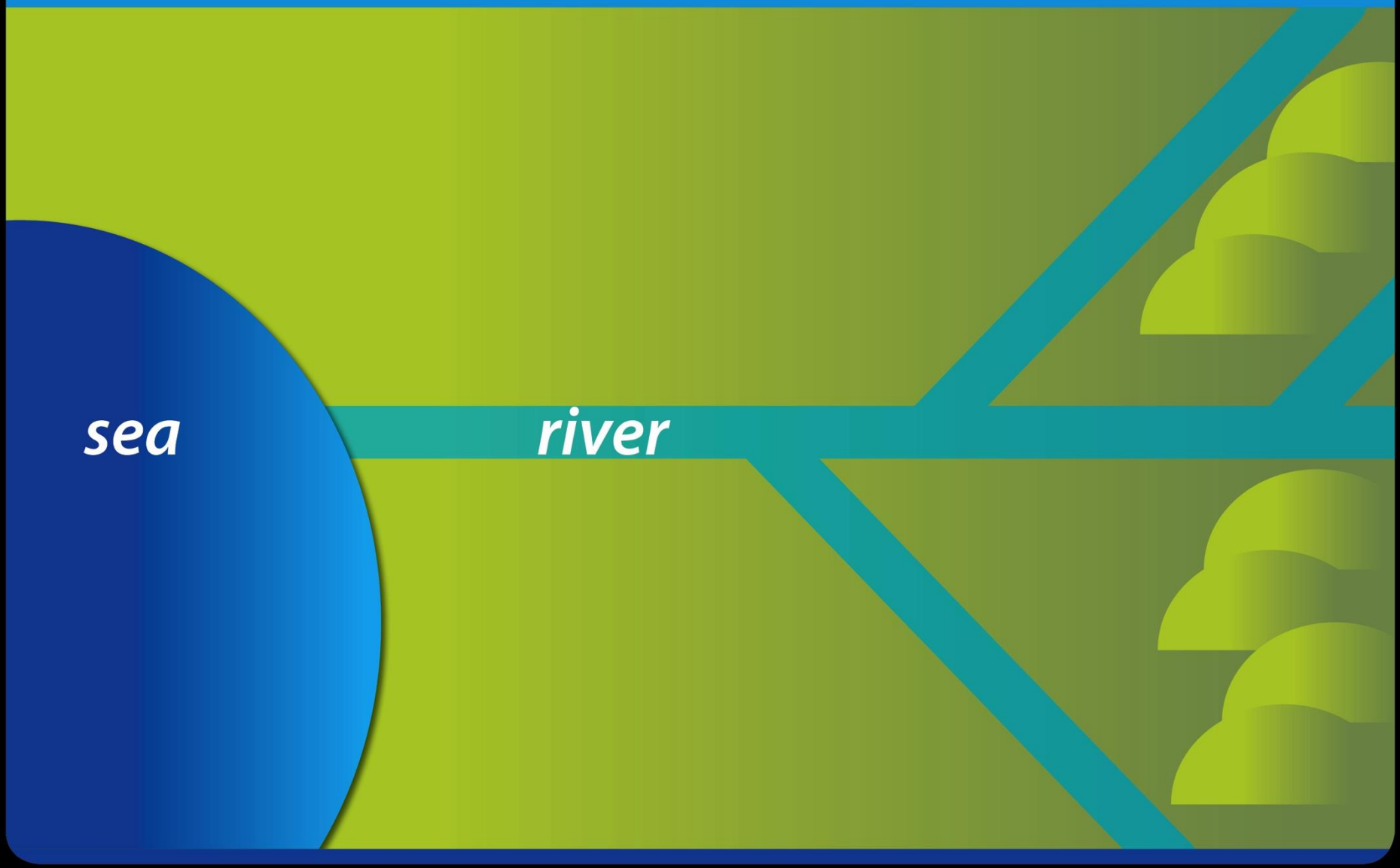
EOS ECOLOGY



WHERE inanga live

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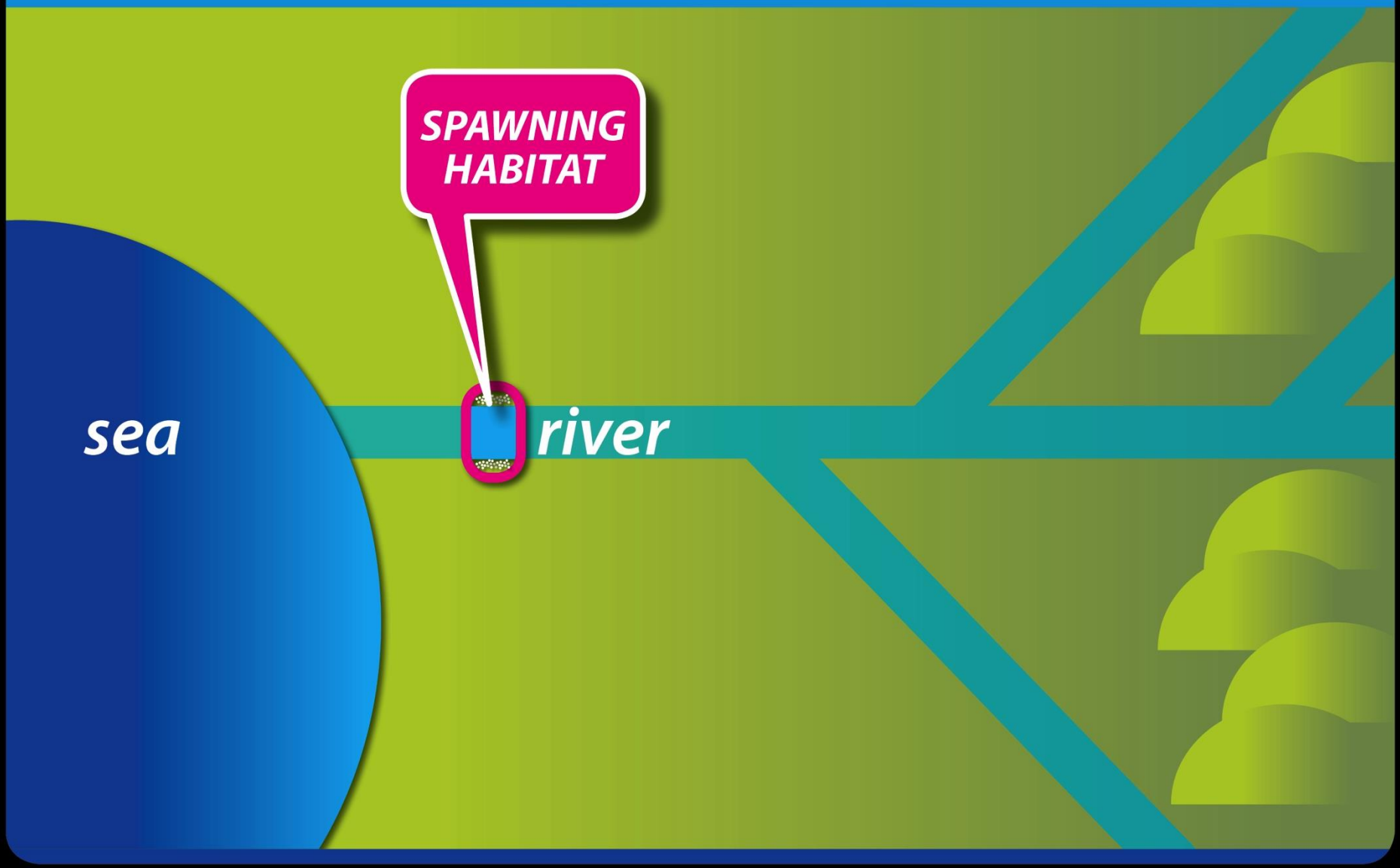

WHERE inanga live

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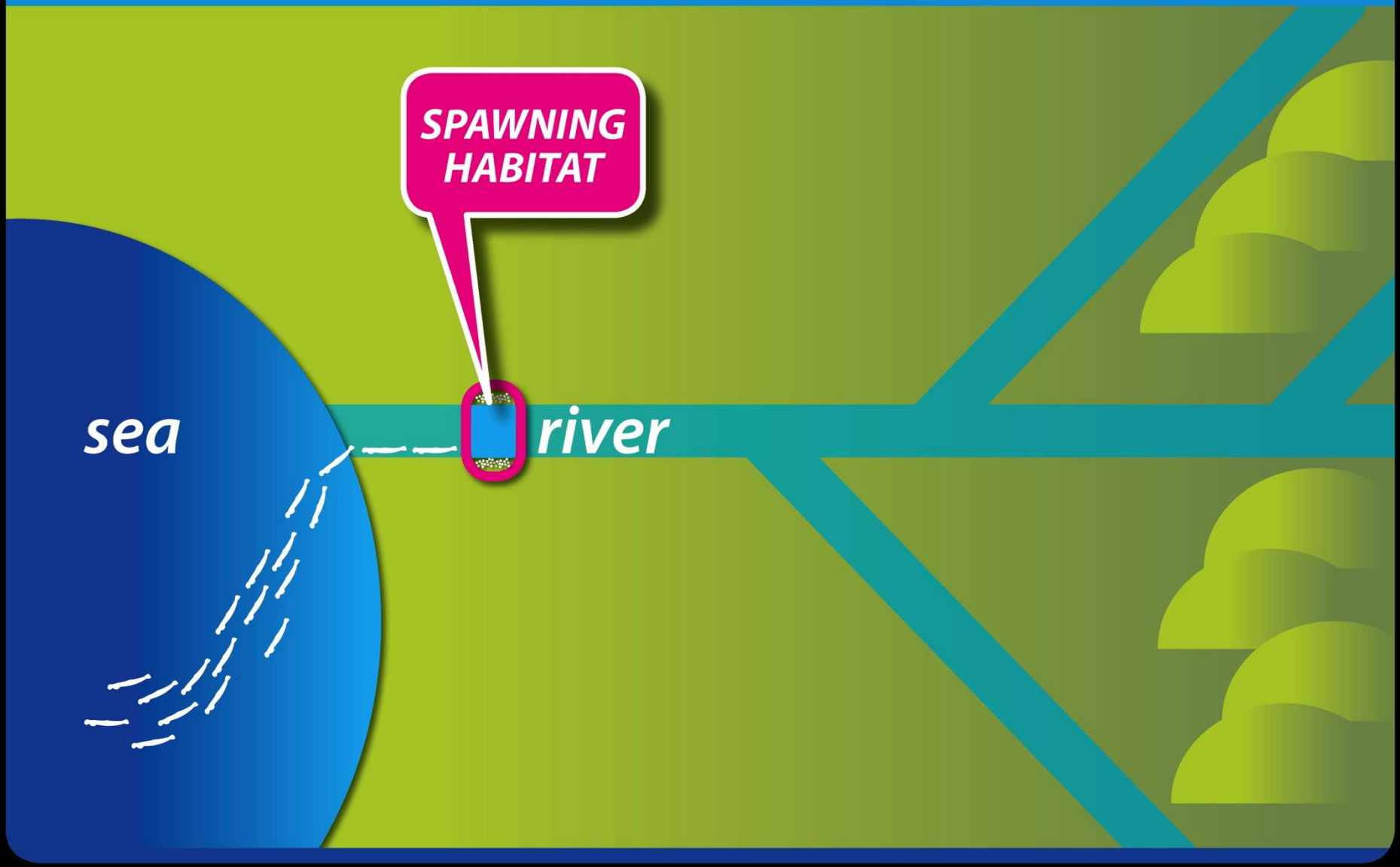

WHERE inanga live

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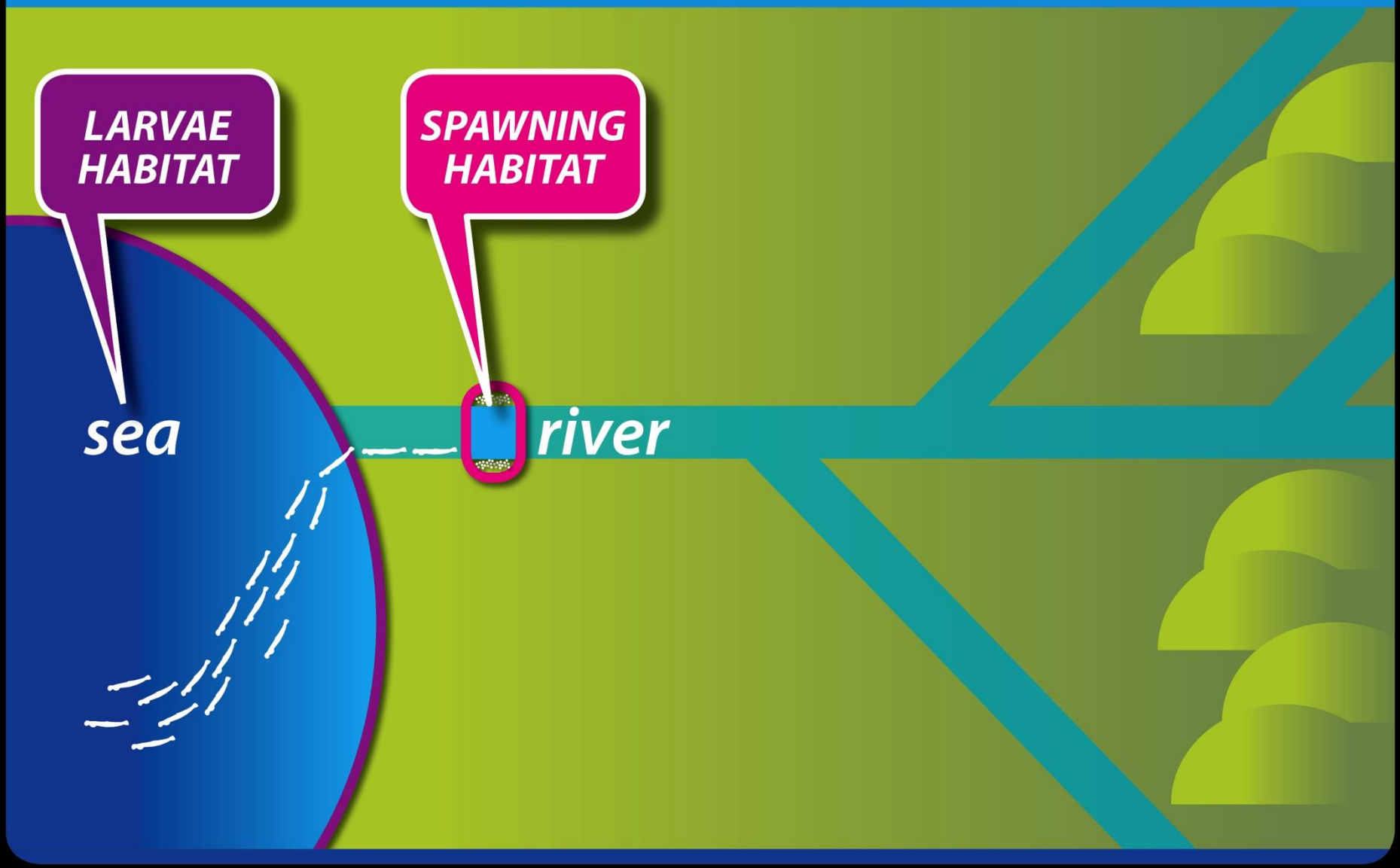

WHERE inanga live

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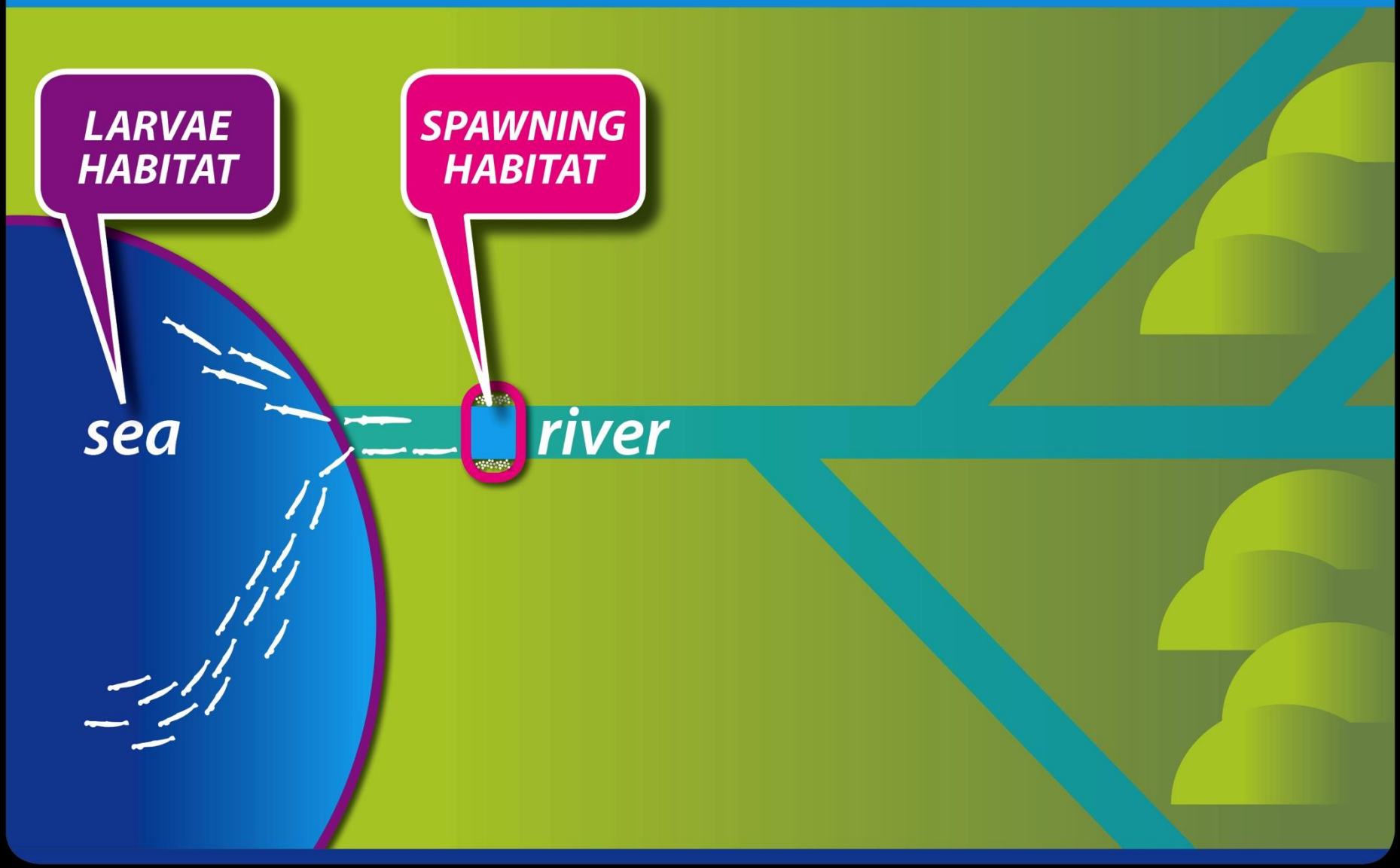
EOS ECOLOGY



WHERE inanga live

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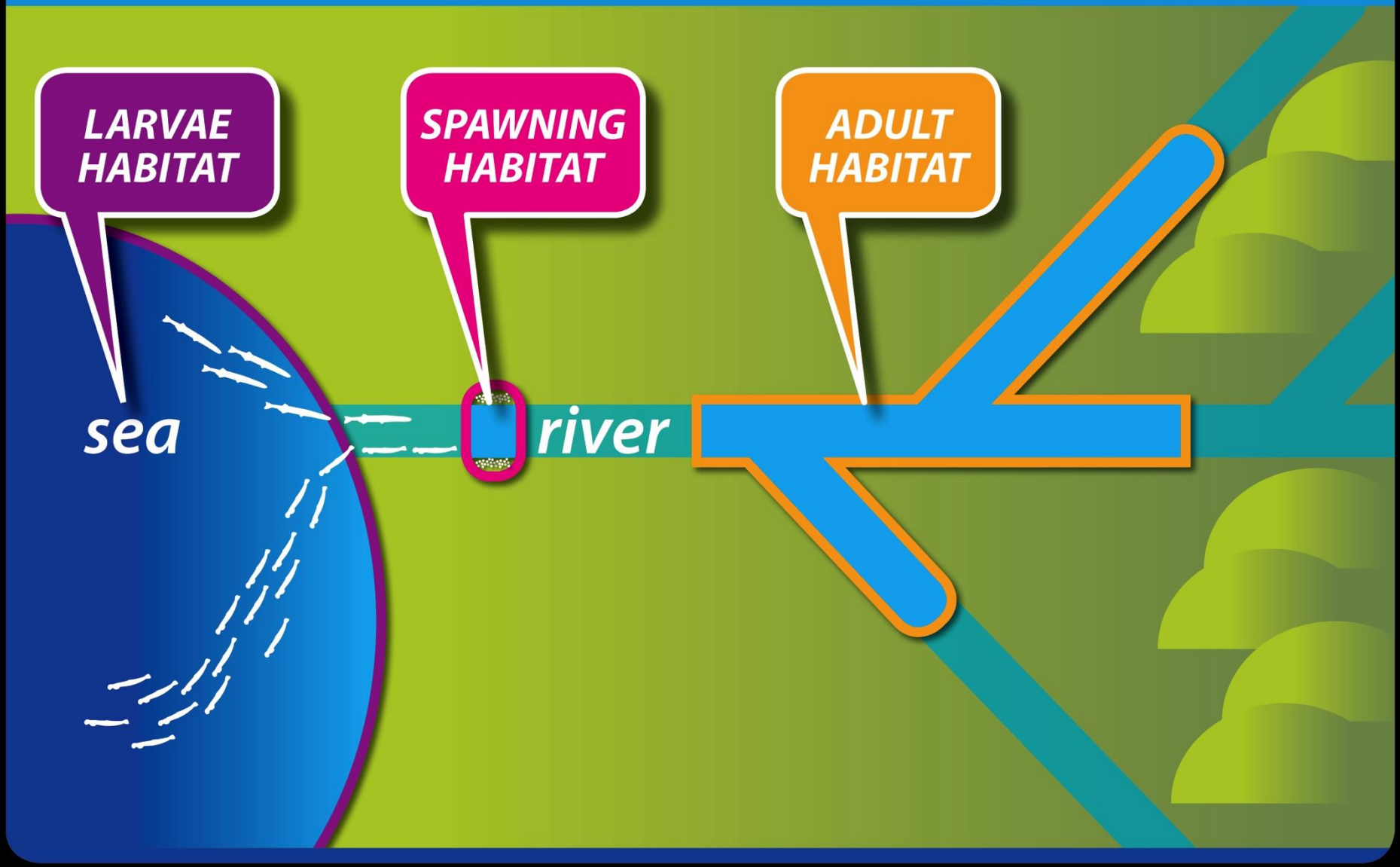

WHERE inanga live

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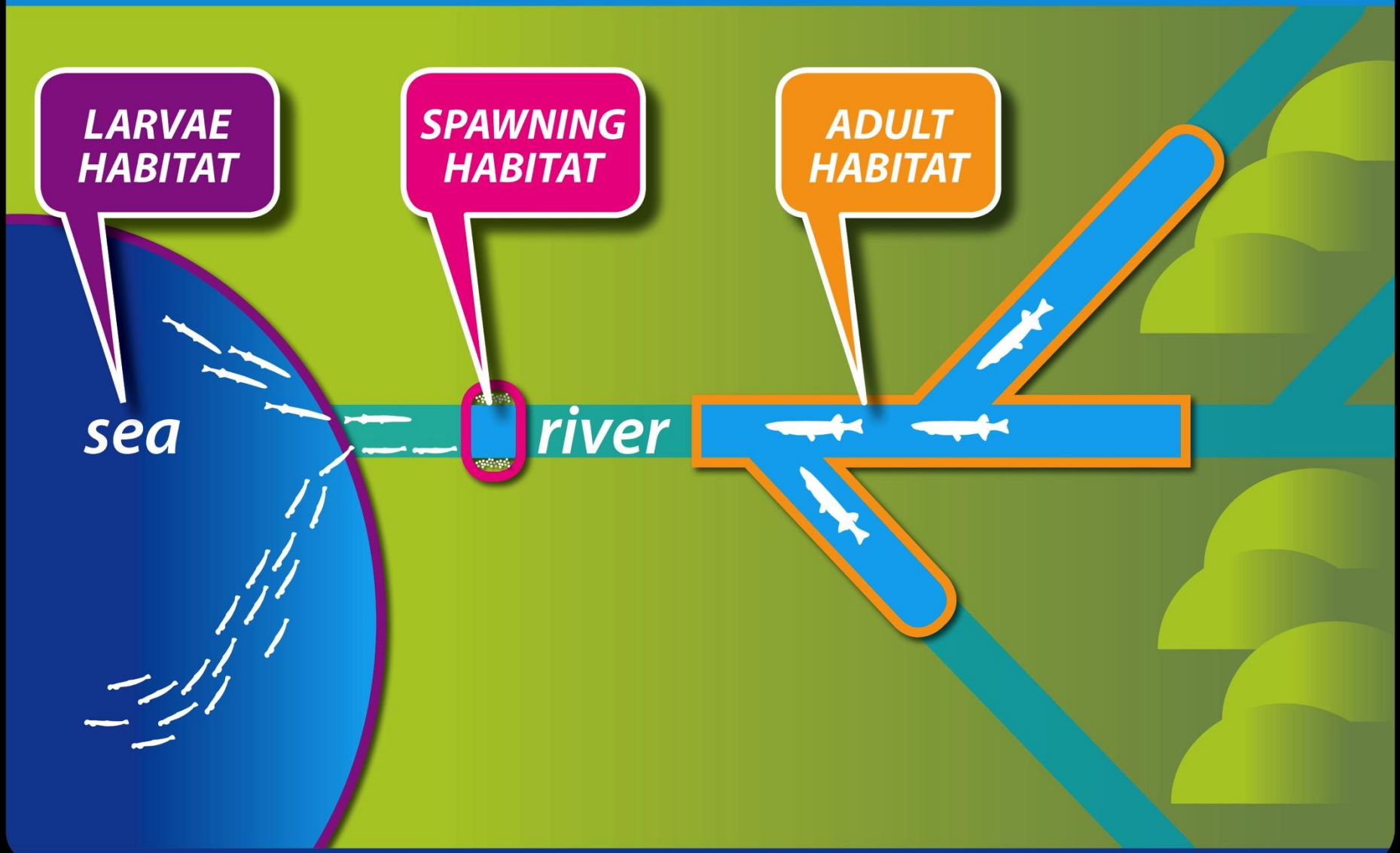
whitebait Connection
Xstream about freshwater life



WHERE inanga live

National Inanga Spawning Education Programme

whitebait Connection
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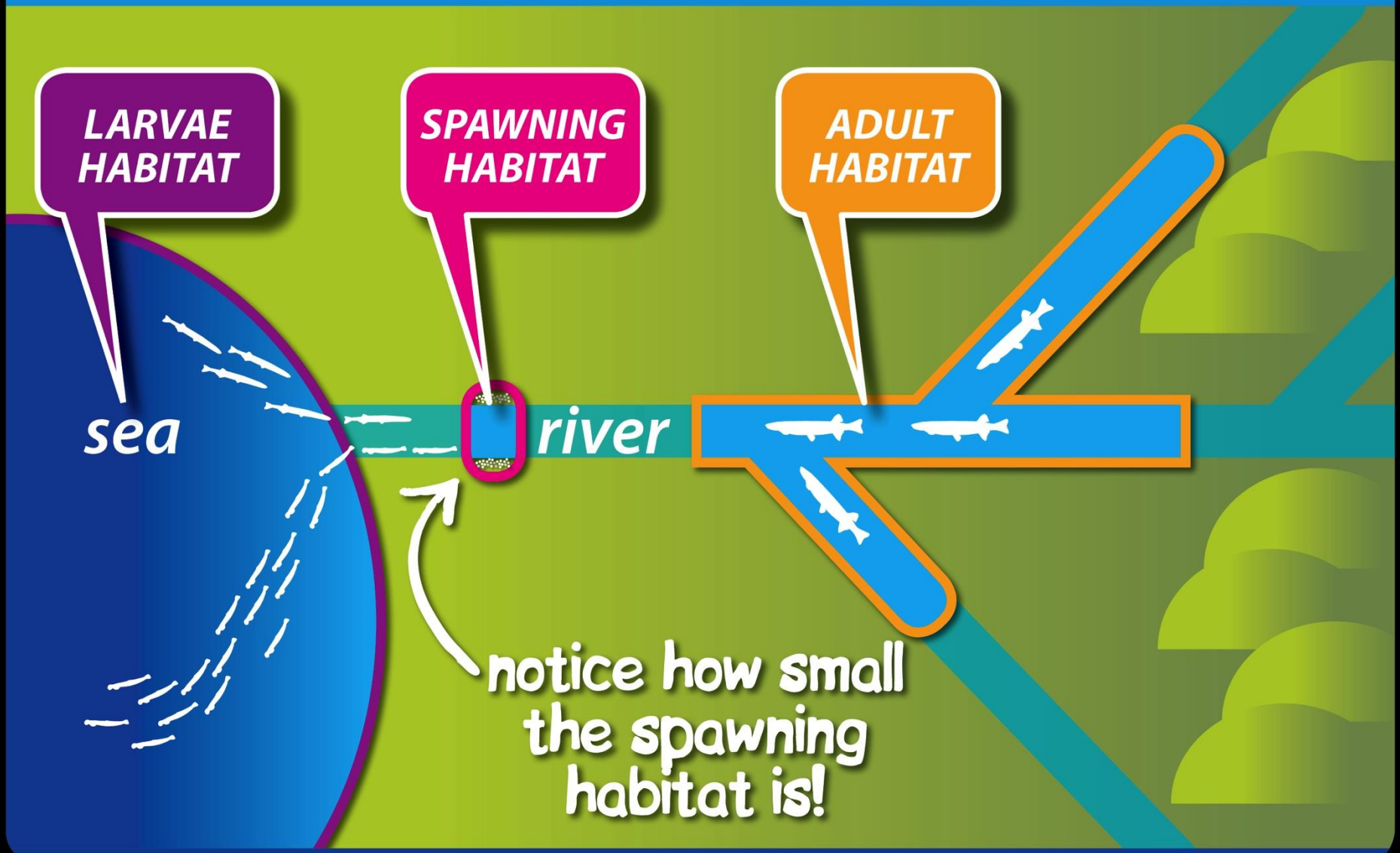
EOS ECOLOGY



WHERE inanga live

National Inanga Spawning Education Programme

whitebait Connection
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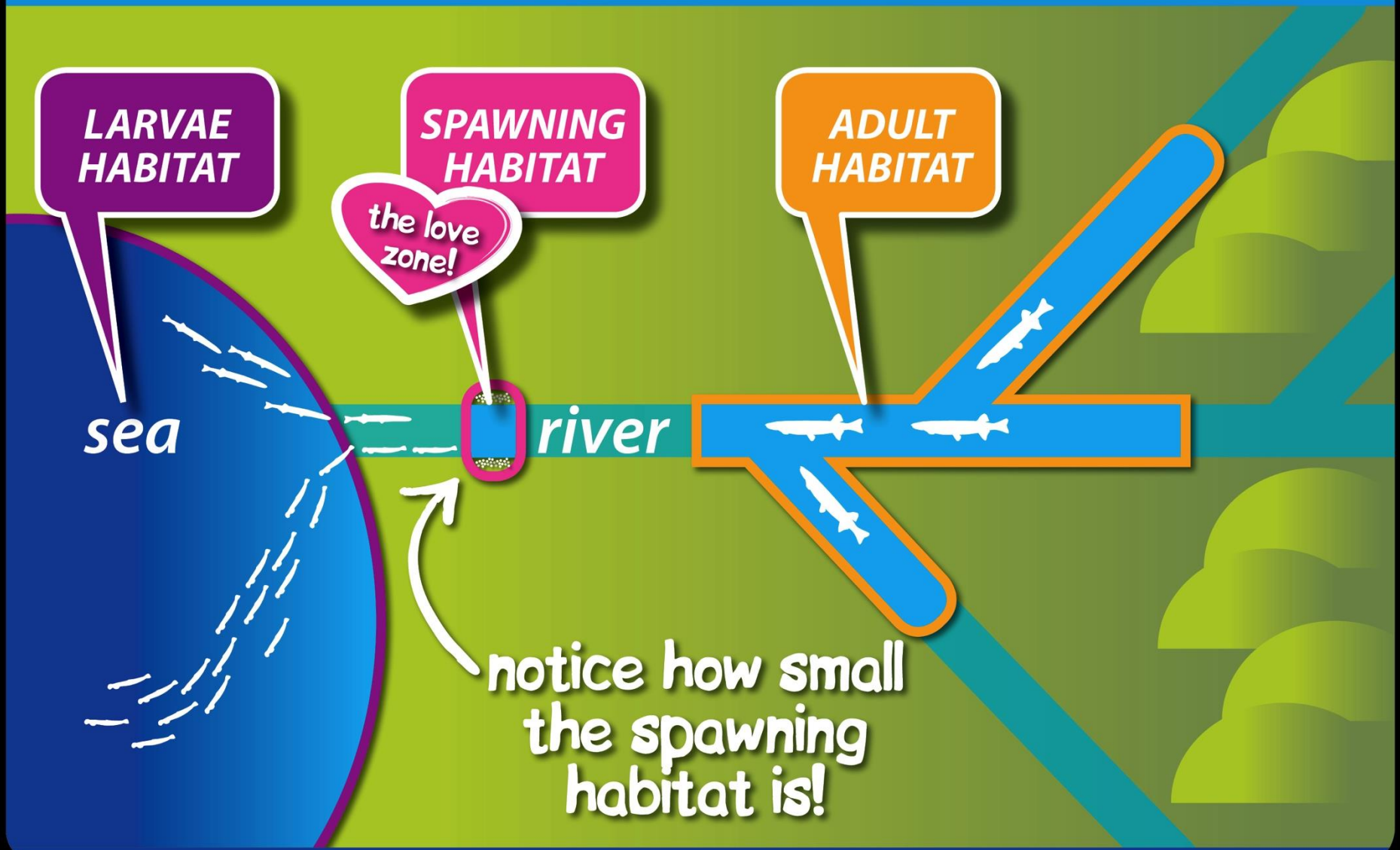

WHERE inanga spawn

National Inanga Spawning Education Programme

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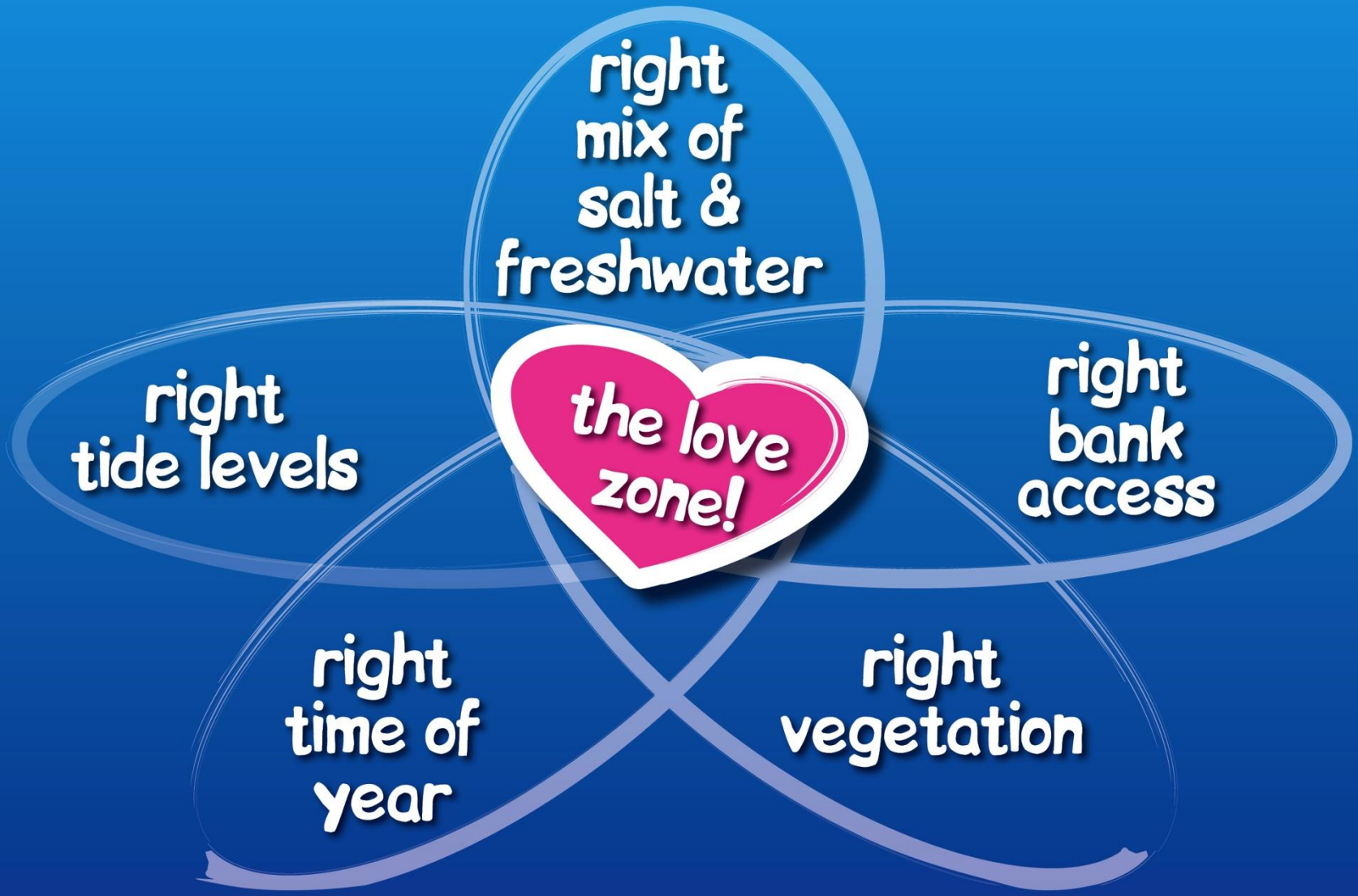

WHERE inanga spawn

National Inanga Spawning Education Programme

whitebait Connection
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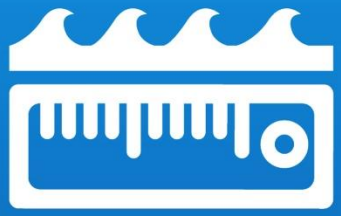
eos ECOLOGY



right distance from the sea:

– where high spring tides reach

– water not too salty

– usually within 200 m from salt water wedge

WHERE inanga spawn

National Inanga Spawning Education Programme

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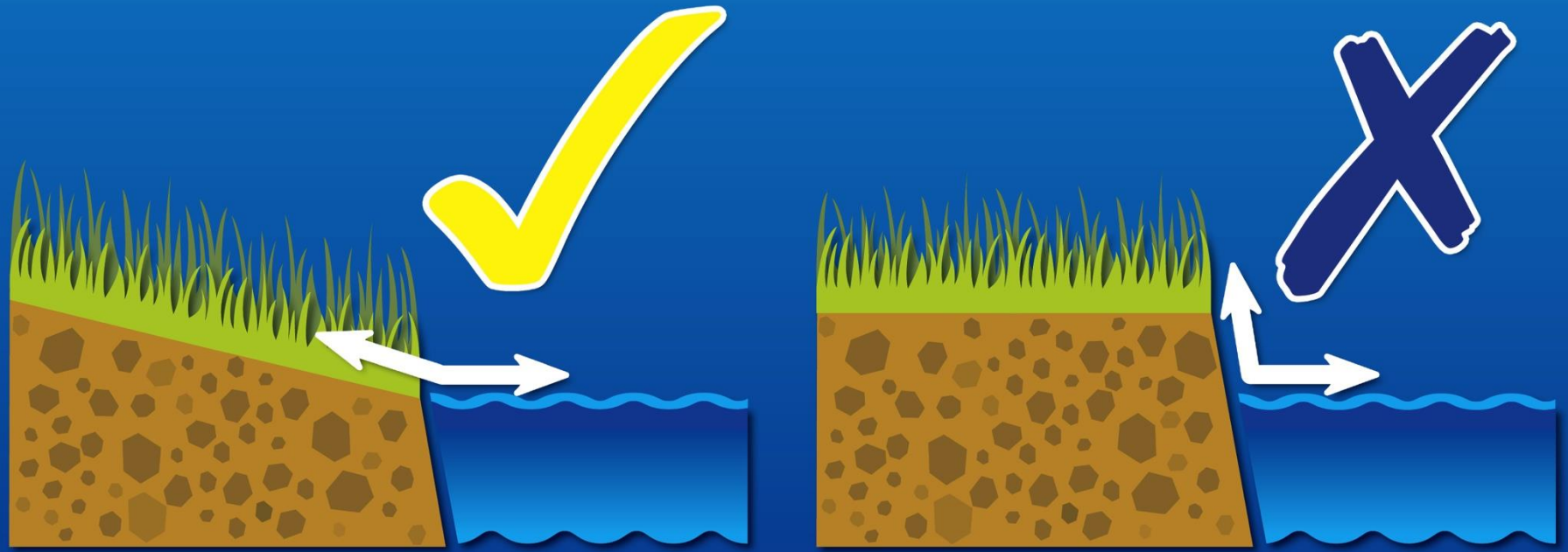
Xstream about freshwater life

eos ECOLOGY

gently sloping bank:

– easily accessible for egg laying



WHERE inanga spawn

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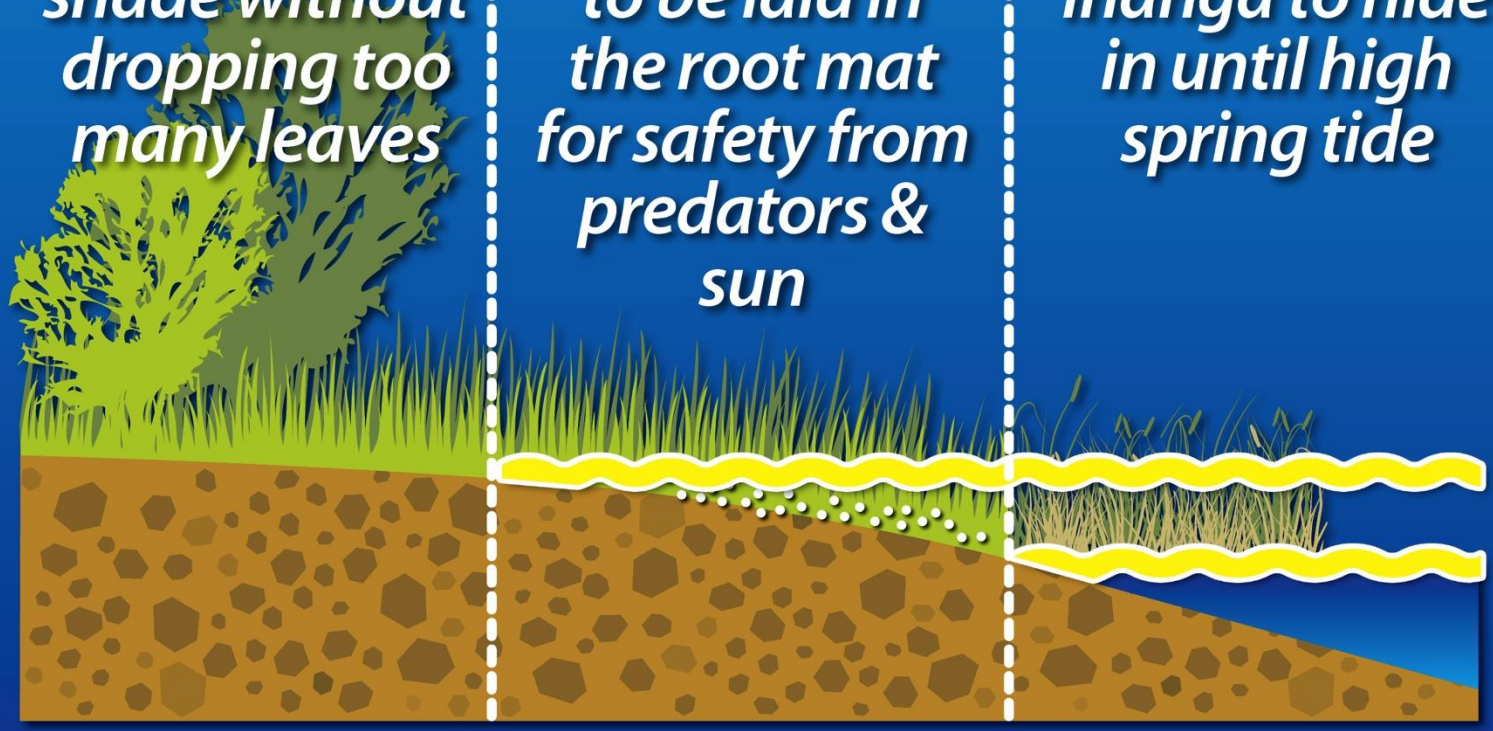
EOS ECOLOGY

good bank vegetation:

native tree canopy gives shade without dropping too many leaves

tall thick grass for eggs to be laid in the root mat for safety from predators & sun

plants rising from water for inanga to hide in until high spring tide



inanga numbers are DECLINING!

WHY do we care!

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EOS ECOLOGY

WHY do we care!

National Inanga Spawning Education Programme

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EOS ECOLOGY

WHY do we care!

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EOS ECOLOGY

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

WHY they are declining

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EOS ECOLOGY

more introduced PREDATORS

WHY they are declining

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- damage to spawning HABITAT...including:
  - fewer 'good' banks
  - less overhanging plants = less safe places
- changes to whitebait & adult HABITAT... including:
  - less 'good' habitat
  - harder to move upriver – barriers

damage to habitats

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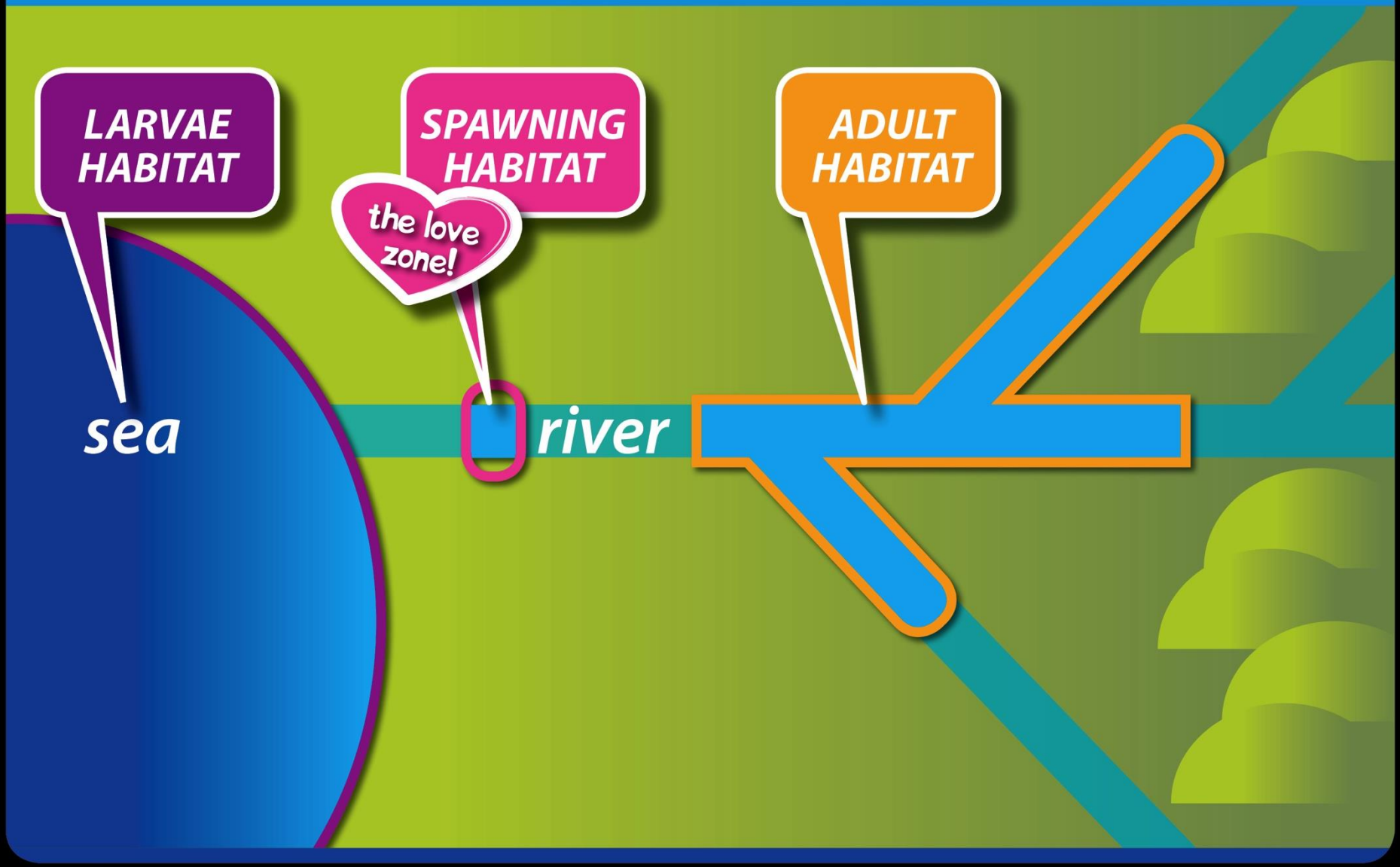

spawning habitat changes

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stock damage to banks

photo © EOS Ecology

spawning habitat changes

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man-made changes to natural banks

photo © EOS Ecology

spawning habitat changes

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spawning habitat changes

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excessive sediment on banks

spawning habitat changes

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barriers to inanga entering spawning areas

Photo: © EOS Ecology

inanga habitat changes

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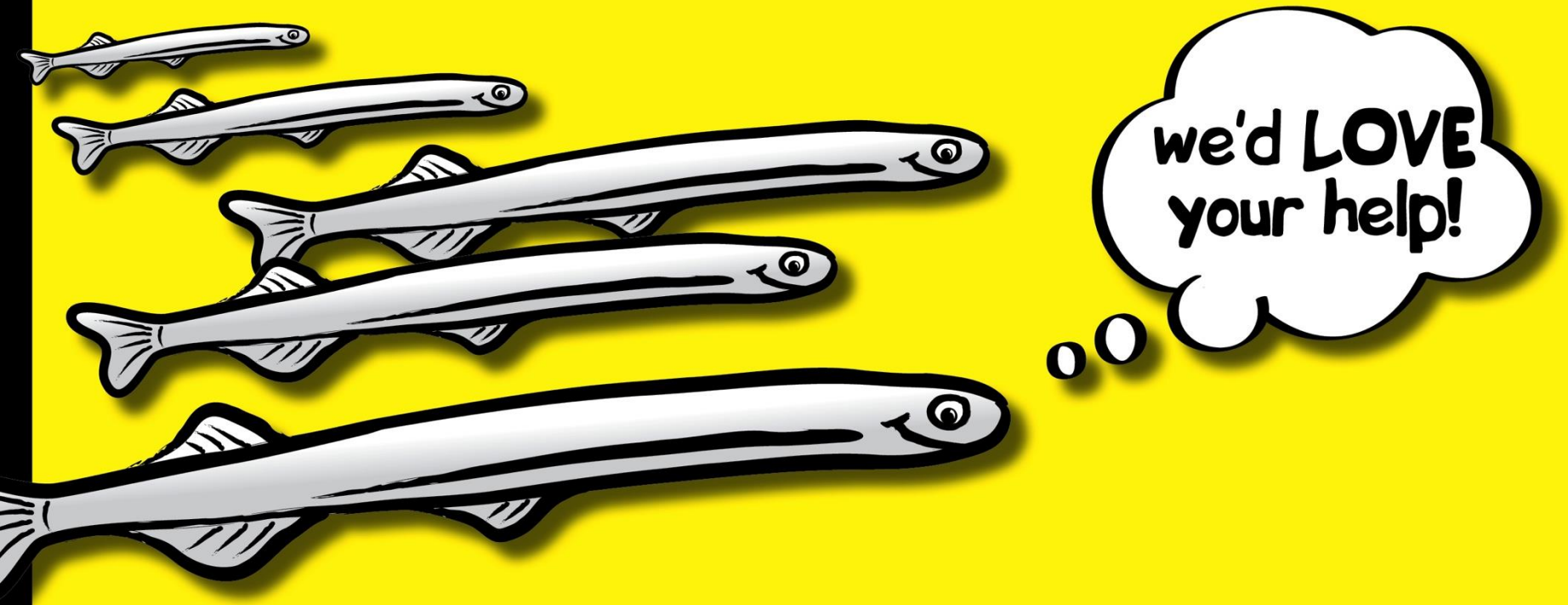
barriers to swimming upriver

photo © EOS Ecology

HOW we can help the inanga!



HOW we can help inanga

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SHORT-TERM:
install temporary spawning habitat

HOW we can help inanga

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LONG-TERM:

- fence out stock
- implement riparian planting plan
- encourage authorities to review maintenance strategies for banks
- remove tide gates
- fix barriers so inanga can get upriver

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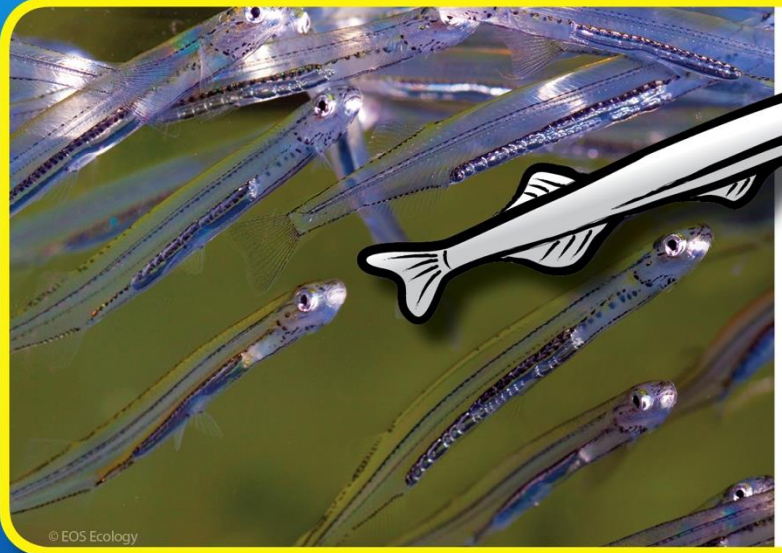

Inanga/Whitebait

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Inanga spawning
Instream workshops
Investigating freshwater
Drains to Harbour Project
Long-finned eels
Whitebait biology
Links
Resources
Downloads

WBC National Inanga Spawning Programme

Developed as part of the MBIE Unlocking Cu ...National Inanga Spawning Programme 2016

CURIOUS MINDS
HE HIHIRI I TE MAHARA

Information:

- Resource 1A - PowerPoint Introduction (
- Resource 1A - Spawning Video
- Resource 1A - Guided audio Inanga lifec
- Resource 1B - Introduction Summary Bo
- Resource 1C - Inanga ID Guide (4.66 MB)

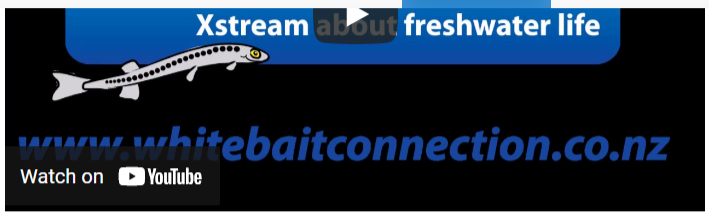
Experience:

- Resource 2A - Find a spawning site (1.03
- Resource 2B - Locating the Saltwater We
- Resource 2C - Assessing Spawning habitat (1.29 MB)
- Resource 2D - Counting Eggs (1.37 MB)

Action:

- Resource 3A - Installing artificial spawning habitat (straw bales) (1.07 MB)
- Resource 3B - Short Term Site Maintenance (3.44 MB)
- Resource 3C - Long term Site Maintenance (691.85 KB)
- Resource 3D - Pre and post straw bale installation sign templates (21.3 MB)
- Monitor Pest Activity (551.KB)

https://www.whitebaitconnection.co.nz/curriculum.html



By Ira Seitzer
2005 National Waterways/Whitebait Connection Facilitator - Northland

Inanga (galaxias masculatus) is the most well known species of Galaxias and is found around our coastal rivers, streams, lakes and swamps, in almost any fresh water that it can reach in its upstream migration from the sea.

Its familiarity is due to the fact that the Inanga juveniles are the most important and abundant species of the infamous annual whitebait catch where it is known to make up 90% of the entire catch.

Aside from bringing great culinary pleasure to many of us, Inanga are a source of food for many animals, birds and are known prey for large eels, flounder and no doubt many other fish who feed on them.

It is vital that we are able to understand and recognise Inanga spawning grounds and their important role in the life of whitebait.

Read more here

May 2014 – Parua Bay

2015 – Partnership with Reconnecting Northland/NZ Landcare Trust

www.whitebaitconnection.co.nz

2016 – Eastern Kaipara

https://www.youtube.com/watch?v=BI6VfCPWdAc

2016 - Hoteo River, moving South

2017 – Taking it national

whitebaitconnection.co.nz/curriculum/inanga-spawning.html

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A freshwater community conservation education programme

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Inanga spawning

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CURIOUS MINDS
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https://www.whitebaitconnection.co.nz/curriculum.html

Mapping our results

https://www.google.com/maps/d/u/2/edit?mid=14ilAXcSC4Hs00z_sAetzimirdiM&usp=sharing

- 92 spawning sites located and adopted around NZ in collaboration with our partners
- 12 in Nthld, 18 in Akld, 6 in Gisborne, 8 in Nelson/Tasman, 18 in Canterbury, 30 at undisclosed locations

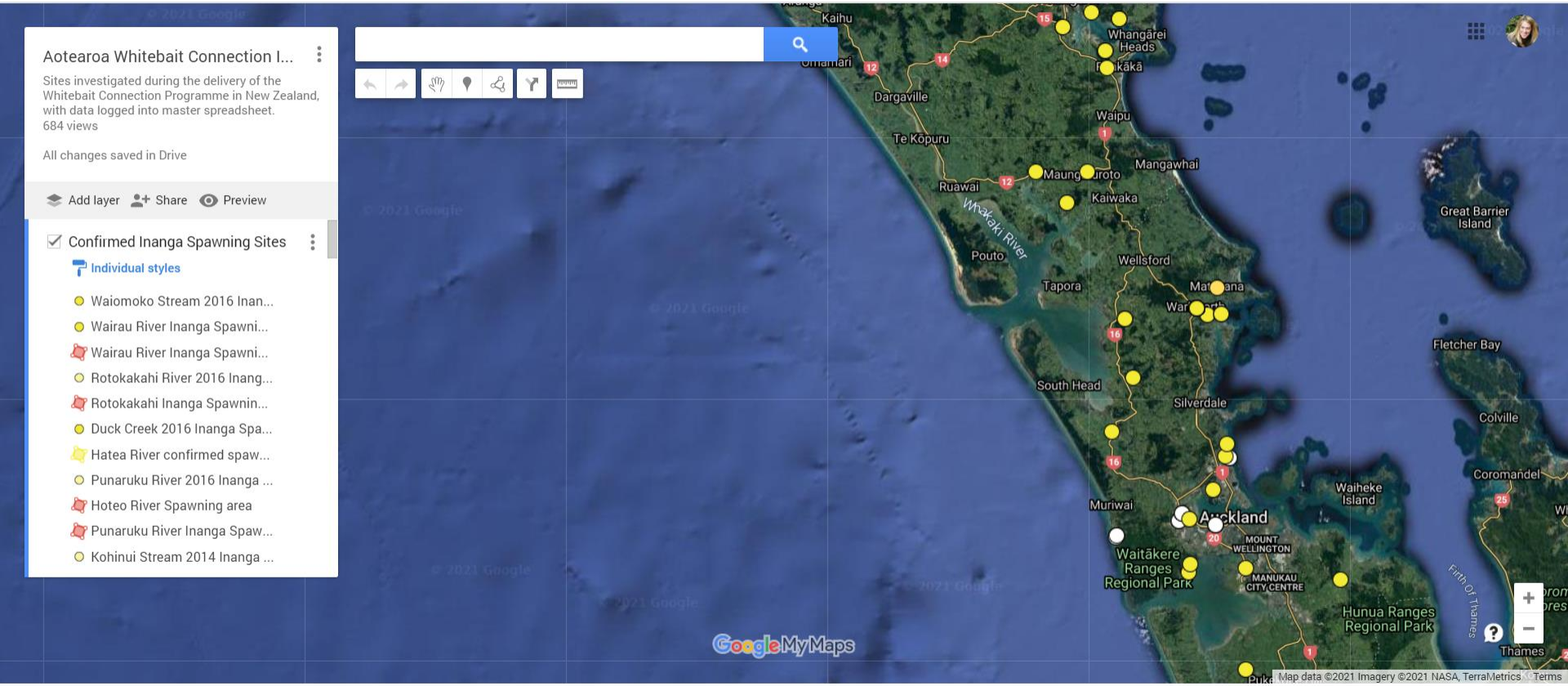
Mahurangi River

https://www.youtube.com/watch?v=yVmqBCpgu5o&list=PLPbxrvgC-enLUYe3lQzlcjiFYPMYK-7th

Making the programme more accessible

2018 - Te Whariki and Te Reo resources made.

2018 - Auckland Council funded region wide project.
2019 – NRC/Whangarei Harbour Kaitiaki Roopu - Whangarei Harbour NISP


Aotearoa Whitebait Connection I...
Sites investigated during the delivery of the Whitebait Connection Programme in New Zealand, with data logged into master spreadsheet.
684 views
All changes saved in Drive
Add layer
Share
Preview
Confirmed Inanga Spawning Sites
Individual styles
Waiomoko Stream 2016 Inan...
Wairau River Inanga Spawni...
Wairau River Inanga Spawni...
Rotokakahi River 2016 Inang...
Rotokakahi Inanga Spawnin...
Duck Creek 2016 Inanga Spa...
Hatea River confirmed spaw...
Punaruku River 2016 Inanga ...
Hoteo River Spawning area
Punaruku River Inanga Spaw...
Kohinui Stream 2014 Inanga ...
Kaihu
Whangārei Heads
Dargaville
Waipu
Te Kōpuru
Mangawhai
Ruawai
Kaiwaka
Wairoa River
Pouto
Wellsford
Tapora
Great Barrier Island
Fletcher Bay
South Head
Silverdale
Colville
Coromandel
Waiheke Island
Muriwai
Auckland
Waitākere Ranges Regional Park
Hunua Ranges Regional Park
Thames
Google My Maps
Map data ©2021 Imagery ©2021 NASA, TerraMetrics Terms

and going back to Takahiwai – spawning bench creation.

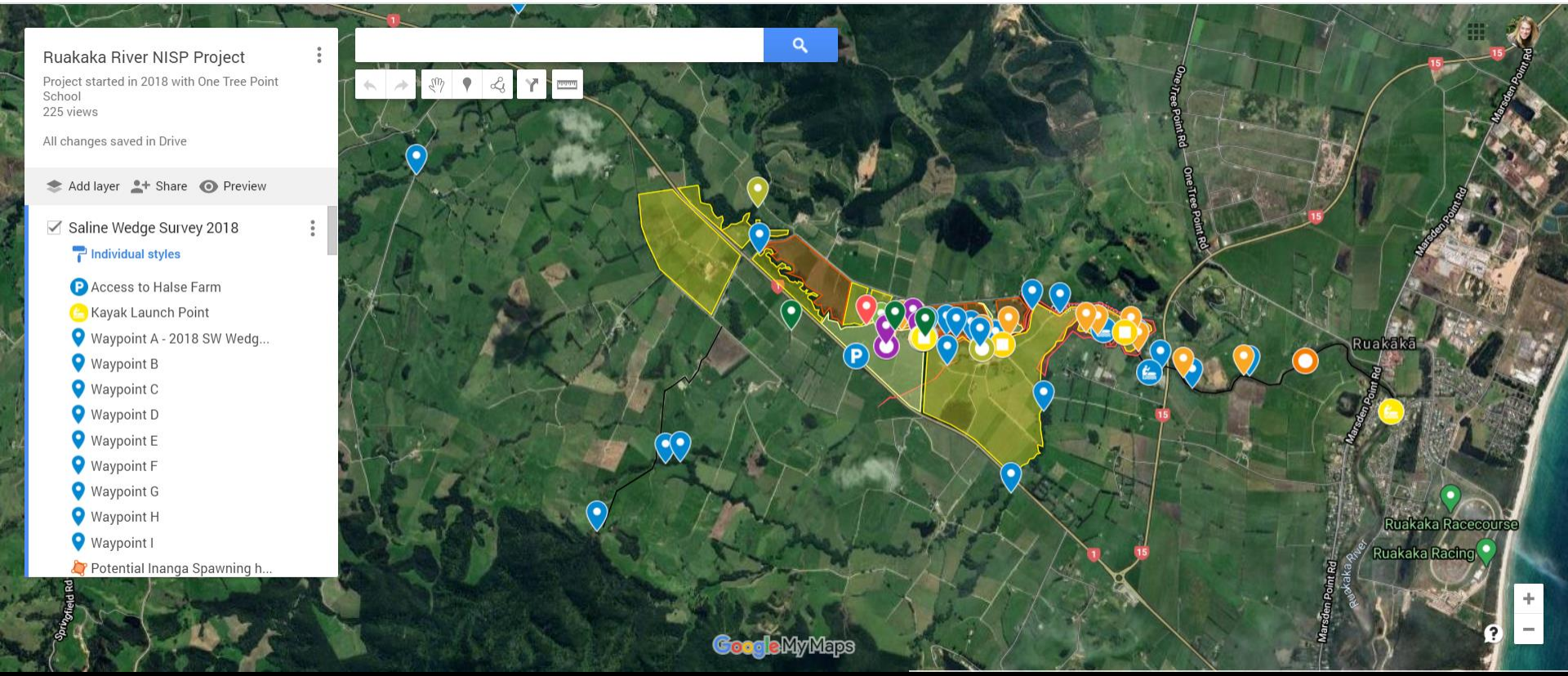

7/3/19
8/8/19

Acknowledgements

This project would not have been possible without the support of the people and groups listed below. Thank you all so much for your passion, enthusiasm and support!

- Luana Pirihi, friends and whanau
- Patuharakeke Te Iwi Trust Board
- Nick Bamford - NRC
- Carol Nicholson - NRC
- Alex Going
- Dr. Olivier Ball and MTSCT Trustees
- Meryl Carter from Patuharakeke and Ngā Whenua Rāhui
- Sustainable Coastlines' Sam Judd and Harry Lindsay
- MTF Whangarei's Mike O'Sullivan
- One Tree Point School students, teachers and whanau
- Local volunteers on planting days
- Taylor Fairbrother-Kees
- Nina Pivac
- Rosie Palmer
- Isabel Krauss
- Ruhiyyih WiHongi-Vaughan
- Million Metres
- Foundation North
- Dr. Michael Hickford
- Cyril Woodward
- Jordan MacDonald
- Blair Jones
- Joe Camuso
- Dr. Dai Morgan from NorthTec/Tiakina Whangārei

2021 – Ruakākā River research and Northland scale up



Locating and assessing īnanga (*Galaxias maculatus)* spawning habitat in the Ruakākā River, Northland, New Zealand

UniTec and NorthTec Bachelor of Applied Science – Biodiversity Management. Negotiated Research by Kim Jones. Supervisor: Dr. Olivier Ball

Rationale:

72% of NZ's native freshwater fish are either threatened with extinction or at risk of extinction (Goodman et al, 2014). This includes taonga species, such as īnanga, which are classed as 'Threatened – In Decline' (Dunn et al., 2018).

Degradation of īnanga critical life-stage specific spawning habitat is associated with their decline (Hickford et al., 2010). This includes degradation caused by livestock grazing.

Livestock must be effectively excluded from confirmed īnanga spawning sites in Northland under the new regional plan (NRC, 2019).

Spawning usually takes place within 200m of the upper extent of the saltwater wedge (Taylor, 2002).

The full extent of the īnanga spawning zone on the Ruakākā River is currently unknown.

Aim: Map the īnanga spawning zone of the Ruakākā River including suitability of habitat and confirmed spawning sites to help inform what actions could be taken to protect and enhance it.

Objective: To locate the full extent of the īnanga spawning zone in the Ruakākā River by surveying the saltwater wedge and spawning activity over the 2021 spawning season.

Methods

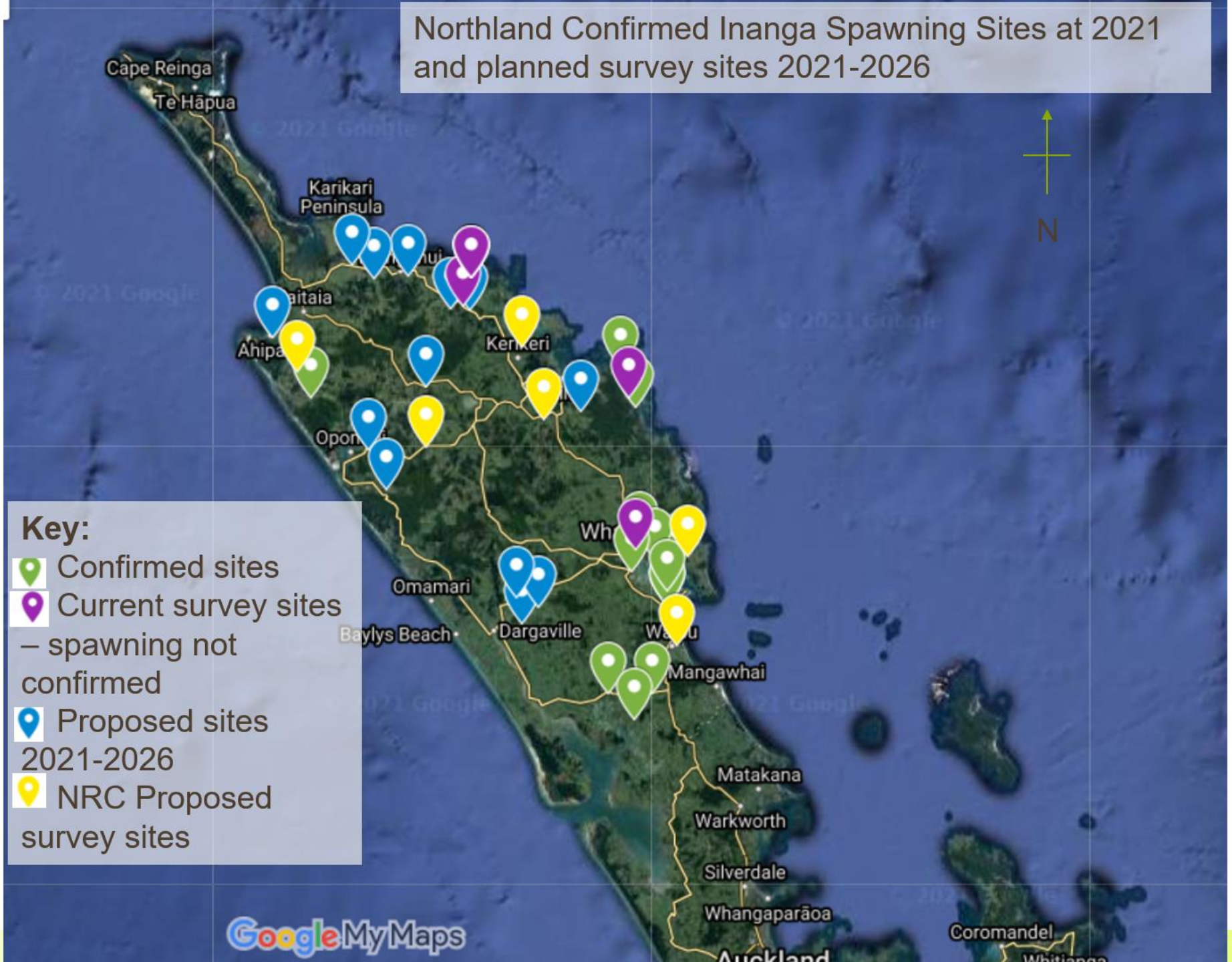
Saltwater wedge surveys and spawning activity surveys will be conducted by kayak on every spring tide from March-August 2021.

Riparian habitat from 200m upstream of the March upper saltwater extent to 2.4km downstream of that point, will be assessed using a series of attributes linked to spawning success.

Egg searches will be conducted along the 2.3km area, during low tides following spring tidal cycles (when īnanga spawn).

Eggs located will be mapped and quantified using random stratified sampling.

A GIS map will be created showing the full extent of the saltwater wedge alongside confirmed and potential spawning sites and NRC flow data.


Northland Confirmed Inanga Spawning Sites at 2021 and planned survey sites 2021-2026
Cape Reinga
Te Hāpua
Karikari Peninsula
Kerikeri
Omamari
Baylys Beach
Dargaville
Mangawhai
Matakana
Warkworth
Silverdale
Whangaparāoa
Coromandel
N
Key:
Confirmed sites
Current survey sites – spawning not confirmed
Proposed sites 2021-2026
NRC Proposed survey sites
Google My Maps

More Partnership potential