PART 3C: Action

Inanga/Whitebait
Long-term habitat restoration

National Inanga Spawning Education Programme from whitebait Connection Xstream about freshwater life

If you have assessed your local inanga spawning habitats and found them in less than ideal condition for spawning, here are some actions you can think about taking for future improvement.

If you have used our 'Inanga spawning habitat assessment sheet' you will already know there are twelve attributes required for a good spawning site. Here are some long-term restoration solutions you can look to implement for each of these attributes if you encounter spawning issues.

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Fish access:

Inanga spend part of their lifecyle at sea and migrate into fresh water as whitebait. If there is a barrier to their upstream movement they will not be able to make their way into the waterway and reach adulthood.

***Solution –** The barrier (e.g., drop culvert, weir) will need to be removed/mitigated to allow inanga.*

Saltwater access:

Inanga need saltwater present in the waterway to give them a cue to spawn. If it's not present, they don't know when or where to spawn.

***Solution –** The saltwater barrier (e.g., tide gates/ barrages) will need to be removed/mitigated to allow spawning to take place.*

Bank angle:

The right bank slope means there is a good amount of native habitat on the bank that can be used for spawning. Banks that are too steep will not be used for spawning. Banks that are too flat are susceptible to tide height change (so if there is a lower or higher tide, the bank will either be under or out of the water).

***Solution –** Get the bank regraded to a 7˚–25˚ slope.*

Bank material:

The bank material needs to be able to support lush plant growth and retain moisture for eggs to survive.

***Solution –** The bank will need to have artificial spawning habitat added, or the banks will need to be completely regraded and accessible.*

Vegetation cover:

There needs to be a good cover of vegetation on the bank to shelter and keep eggs moist. If the cover is too sparse inanga eggs will dry out and die.

***Solution –** Work out why there isn't good plant growth and deal with that issue as appropriate.*

- *Maintenance issue i.e., vegetation is cut too often – **review maintenance strategy**.*
- *Livestock access issue i.e., livestock are eating the vegetation or damaging the banks – **fence out livestock**.*
- *Bank slope issue i.e., the banks are too steep and are eroding away – **regrade bank slope**.*
- *Shading issue i.e., direct shading is restricting plant growth – **maintain shading trees/plants**.*
- *Exotic trees smothering plant growth with leaf-fall – **remove exotics and replace with natives or ensure leaf litter removal before spawning season**.*

Vegetation height

Vegetation needs to be the right height to ensure eggs can survive for the month they are out of the water. If the vegetation is too short it won't be able to create a thick enough root mat, if the vegetation is too tall it will start to thin out at ground level and not provide the density needed for egg survival.

***Solution –** If vegetation is too short or long then look at changing maintenance strategies to promote the best plant height.*

Vegetation type

Some vegetation types are good for spawning while others aren't. However, some diversity is always good (some patches of larger plants will give cover to fish while they are spawning etc.) – so don't remove all larger plants from a site unless they are a plant pest.

***Solution –** Look to remove these pest/problem plants and replace with species more suitable for spawning. Yellow flag iris is a pest plant and is not good for spawning. It is very hard to get rid of so **must be controlled** as soon as you first notice it at your site!*

Root mat thickness

Inanga need plant root mats to be nice and dense at ground level in order for moisture to be retained by the vegetation and for the plants to shade the eggs. The ability for this to happen relates to maintenance – if the grass is cropped/cut too regularly it will not be able to build up this layer of root mat/debris/stems.

***Solution –** Review maintenance strategy/remove livestock from the area.*

Ground moisture

Inanga eggs will dry out and die if they are not kept moist. The reasons for dry ground at a spawning site may be due to the bank material or the vegetation cover/type.

***Solution –** Either look to change the bank material type (if it is not earth/soil) and/or look at your maintenance/livestock strategies as shorter grass will mean the ground will dry out more quickly.*

Cover for fish

Inanga adults congregate before spawning, so need lots of cover (e.g., overhanging/emergent plants, logs, rocks etc.) to protect themselves from predators.

***Solution –** Depending on your stream you can add logs/rocks in the water to provide cover. Also look at planting some rushes in the water at low tide to provide some emergent cover.*

Bank maintenance

If banks are mown too regularly the vegetation will never grow to the height/thickness needed to protect the inanga eggs.

***Solution –** Talk to the people/authorities that maintain the banks to see if they can change their maintenance strategy to help promote better spawning conditions. Refer to previous attributes to get further information on what the current maintenance strategy may be affecting.*

Livestock protection

If livestock access spawning habitat they can damage the banks and keep the grass too short to protect the inanga eggs. They can also squash eggs if they access the site during the spawning season.

***Solution –** Talk to the landowner about putting in a permanent fence. Most Regional Councils have funding to help with this.*

Egg predators

Inanga eggs are very vulnerable. The only protection they have from being eaten by rodents and slugs etc. is the vegetation they are developing in.

***Solution –** 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.*

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

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