

Atutahi spawning habitat in Whanganui River

Area of potential spawning habitat

Previous survey work in the Whanganui River catchment had identified atutahi spawning sites by surveying areas of habitat that looked suitable. That work indicated there was potential for spawning to occur in good habitat from about 10 km upstream to about 30 km upstream of the Whanganui River mouth.

The results, however, could not be used to determine what proportion of the potential spawning area was actually used for spawning. Because the total area is so large (more than 40 km if counting both banks of the main river and tributaries) it was decided to survey 32 randomly selected sites, so that the results could be extrapolated to the total area.

Sampled area

Each sampling site consisted of a 100 m stretch of river broken into 10 x 10 m wide blocks.

Good spawning habitat

Atutahi lay their eggs in thick vegetation like grass, beside the river. During a king tide, the water levels are very high, which enables the fish to swim right into the grass. Males add sperm and the eggs settle at the base of the grass and stay damp. They develop into larvae that hatch and are carried downstream out to sea during the next king tide.

Good spawning habitat has a gentle slope, suitable thick vegetation, is moist and has no overhead shading.

Atutahi eggs

Eggs were found about 200 m downstream of the Kōwhai Park boat ramp. The most upstream site was immediately below Hipango Park. A total of 32 sites were searched over 3 months, with eggs found at only 19% of sites. Only 0.3% of the total area searched had eggs present. No eggs were found in April.

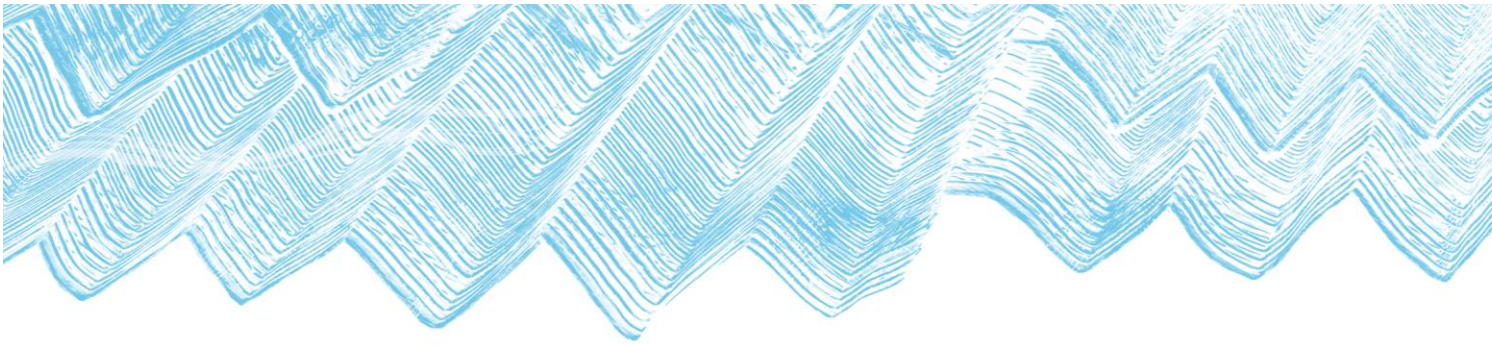
Atutahi is the local name for īnanga

In Whanganui, adult īnanga (*Galaxias maculatus*) are known as atutahi. The juveniles of this species are called karohi in Whanganui. Karohi are one of the five species of native fish caught as whitebait.



Hunting for atutahi eggs in grass beside the river. Image: DOC

	April	May	June	Total
Number of sites searched	6	16	10	32
Sites with eggs	0	4	2	6
Percentage of sites with eggs present	0%	25%	20%	19%



Riverbank slope

The angle of the bank was estimated at a representative place at the site. Spawning habitat is 'good' if it has a slope of 7–21° and 'OK' with a 21–35° slope.

Result: Bank slope ranged from 21–77°, average 50°. No sites had good slopes and only 19% were in the OK range.

The banks of the Whanganui River are generally too steep for atutahi spawning and the fish are relying on small, slumped areas. Any angle over 35° is considered poor, so the average of 50° clearly shows that bank slope needs to be reduced to improve spawning habitat.

Vegetation

Several measurements were used to work out how suitable the vegetation at each site was for spawning.

Vegetation cover

Result: Ground vegetation cover ranged from 9–99% cover, average 63%.

Dominant cover:

- tall fescue 25% of sites
- mixed pasture grasses 25%
- kikuyu grass 6%
- mercer grass 6%
- other vegetation 38%, which included wīwī, tradescantia, ivy, moss, a native sedge and introduced umbrella sedge.

Field horsetail, an invasive weed, was found at many sites. This plant may not provide good spawning habitat as it does not form the dense root mats that are needed to keep developing eggs damp.

Vegetation height

Result: The height of vegetation at each site ranged from 7–99 cm, average 45 cm.

Stem density

Result: Stem density ranged from 0–0.24 stems per cm², average 0.08 stems per cm².

Only 6% of sites had a high enough stem density (0.2 stems per cm²) to be considered moderate or high-quality habitat. Most of the area (62%) was dominated by pasture grass, which although suitable for spawning, needs to be thicker and cover more of the area.

Root mat thickness

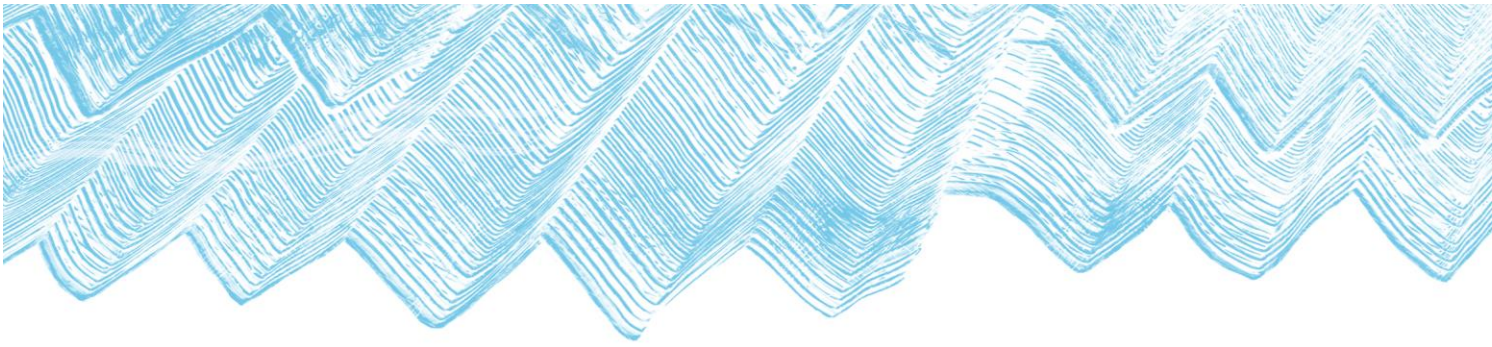
The root mat is the collection of aerial roots at the base of plants. It is often mixed with decaying leaves. The root mat helps to retain moisture and create a humid environment that is good for egg survival. It should be thicker than 0.5 cm ideally.

Result: Root mat thickness ranged from 0–0.9 cm, average 0.2 cm.

These results indicate that generally the root mat thickness was insufficiently thick to protect eggs from drying out.



Stem density was determined by the number of stems in a 10 x 10 cm quadrat (a cut out ice-cream container lid).



Overhead shading

Shading overhead reduces the amount of grass that can grow on the riverbank under the trees.

Result: Overhead shading ranged from 0 to 100% average 37%:

- no shading: 11% of sites
- some shading: 78%
- total shading: 11% of sites.

Shaded sites were dominated by willow (84% of sites) or other species (16%) including bamboo, mānuka, taupata and maple.



Shading from willow trees prevents any vegetation growth on the riverbank.

Ground moisture

Moist ground is needed to keep atutahi eggs alive. Ground moisture was described using 4 categories. Result:

- moist: 59% of sites
- dry and dusty: 3%
- dry in some places: 38%
- wet: no sites.

Fewer sites were moist in April than in May and June.

Overall habitat quality

Two different classification systems are used to assess the quality of spawning habitat. Both are described in the full report and show that spawning habitat for atutahi in the Whanganui River is poor.

Using Orchard and Hickford's habitat criteria, 100% of the surveyed sites were classified as poor habitat.

Using the adapted Whitebait Connection assessment system, 59% of sites were classified as poor and 41% as moderate habitat.



A slumped area of riverbank that provided atutahi spawning habitat.

Recommendations for restoring habitat

Urgent work is needed to improve spawning habitat. The actions below were recommended as being high priority.

Remove willow trees

Nearly 40% of the spawning area is shaded, mostly by willow trees. They prevent the growth of native and introduced spawning vegetation and cause the banks to become steeper. Intensive willow removal from above Dublin Street Bridge to Hipango Park is recommended.



Identify sites to restore

Engage a river engineer to recommend sites for habitat restoration. This work should consider the habitat required for atutahi spawning as well as constraints such as existing infrastructure, natural shape of the river, likelihood of sedimentation from flood events and river management objectives. Habitat restoration should also achieve cultural and recreational objectives.

Retain long pasture grass

There is no need to replace long pasture grass with native vegetation.

Keep stock out of the spawning area

Stem density was low, including in areas with no overhead shading. This may be because of stock access and mowing, or due to the bank angle and flood flows affecting grass growth.

Given stock affect spawning vegetation and egg survival, keeping them away from spawning areas should be the first action. Goat control may be needed in the upper area.

In an earlier report of spawning sites, one site was reported to have high numbers of eggs. No eggs were found there during this study, probably because it had been grazed. The landowner is now aware of the issues and is planning to keep stock out of this area in future.

Stop mowing riverbanks

Riverbanks are mown along the urban stretches of river. Discussions with landowners and land managers are needed review where and when mowing takes place. Stem density should then be monitored to determine whether it has improved sufficiently to allow spawning. If not, reshaping banks and creating spawning bays and backwaters should be trialled.



Restoration planting beside a tributary. Image: DOC

Allow for sea-level rise

Projected sea-level rise may push the spawning area further inland, although this effect also depends on the shape of the river channel. Restoration work should take this into account and may need to take place further upstream than the current spawning area. It may also be appropriate for spawning areas at the lower extent to receive less attention.

Report reference

Randomised assessment of atutahi (*Galaxias maculatus*) spawning habitat in the Whanganui Awa Hannah Rainforth, Rosemary Miller, Jane Taylor, Oliver Gansell. Kāhu Environmental for Department of Conservation, 2022. This is a summary of the full report. Images are by Hannah Rainforth unless specified.



Ngā Awa river restoration

working together from mountains to sea

