DEPARTMENT OF CONSERVATION

WHANGANUI RIVER

ATUTAHI SPAWNING HABITAT

ENGINEERING REPORT

ON

AN ASSESSMENT OF HABITAT IMPROVEMENT

Report prepared by

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WHANGANUI RIVER — ATUTAHI SPAWNING HABITAT ASSESSMENT OF HABITAT IMPROVEMENTS

1 INTRODUCTION

The Department of Conservation (DOC) has undertaken a survey of potential atutahi (īnanga) spawning habitat in the lower Whanganui River (Rainforth et al., 2022). Atutahi deposit their eggs in the riparian vegetation at the high spring tide level where the saltwater mixes with freshwater (Photo 1). The eggs must survive for up to a month out of water, and unfortunately the habitat needed for egg survival is often not available. One of the key conclusions of the Rainforth et al. report is that whilst there is potential for spawning along about 30 km of the lower reach and tributaries, there is actually very little suitable habitat. The presence of willows, lack of suitable dense grasses and very steep banks are the main limiting factors.

Photo 1. Atutahi eggs found in the roots of riparian vegetation.

The Whanganui River Catchment is part of DOC's Ngā Awa priority river restoration programme, working with communities towards healthy, thriving rivers from source to sea. Whanganui River is included as a Ngā Awa river to ensure DOC can practically support the aspirations of iwi, hapū and whānau to progress its health and wellbeing. Other authorities and organisations have an

interest in the lower reaches of the river. Horizons Regional Council (Horizons) manages a portion of the 30 km reach of interest under the lower Whanganui flood management scheme. DOC, Whanganui District Council, Horizons, hapū and Iwi have been working together in the Healthy Streams initiative exploring options for restoration in urban streams and storm water systems in the lower Whanganui River. A key consideration has been the need to improve habitat for atutahi spawning through riparian planting.

Through the Te Awa Tupua (Whanganui River Claims Settlement) Act 2017, the river has its own voice. This voice is provided by Te Pou Tupua, who represent and advocate for the interests of the River. Ngā Tāngata Tiaki o Whanganui (NTT) is the post-settlement governance entity for Whanganui Iwi, established to implement the settlement and develop the river strategy document, Te Heke Ngahuru ki Te Awa Tupua, provided for by the Act.

The Rainforth et al. (2022) report recommended a geomorphological assessment be undertaken to investigate where specific habitat restoration might best be focused to get the best outcomes for habitat improvement investments, and in a way that addresses multiple objectives (cultural, flood management and social, as well as environmental). The types of activities anticipated as being required to improve habitat would be a mixture of bank battering to reduce slope, willow removal to enable the growth of dense grasses, stock removal and planting.

This investigation was initiated in April 2022, to commence with an initial gathering of interested parties at sites along the river, to gain perspectives and views, including the identification of the various objectives held for sections of the river. The river side inspections took place on Tuesday, 3 May 2022.

A follow up closer viewing of sites from the river, by boat, was delayed by inclement weather, with river flows then likely to stay at higher levels over the winter and early spring period.

A preliminary assessment was carried out, based on a review of documents on īnanga (atutahi) spawning habitat improvement measures that have been carried out elsewhere in Aotearoa/New Zealand (see References), with potential improvement sites being selected along the river based on the initial inspections.

The river-based inspections finally took place on 9 March 2023, with DOC and Horizons staff, and representatives of iwi and hapū along the lower river.

The river reach covered by the site inspections is shown on Figure 1, which indicates where spawning had been identified.

This report outlines potential improvement measures specific to the lower reaches of the Whanganui River, based on the review of previous projects, the discussions and suggestions made during the field inspections, and my understanding of the river and its particular character and dynamics. I have undertaken many investigations and design work along the lower reaches of the river, through the middle reaches up to Pipiriki, and at Taumarunui, since the 1990s. This included investigations of the river and its catchment, the natural river characteristics of the lower reaches and its sediment transport processes, bank processes and the rates of movement of the river channel, and the design and construction of bank measures at sites along the lower reaches of the river.

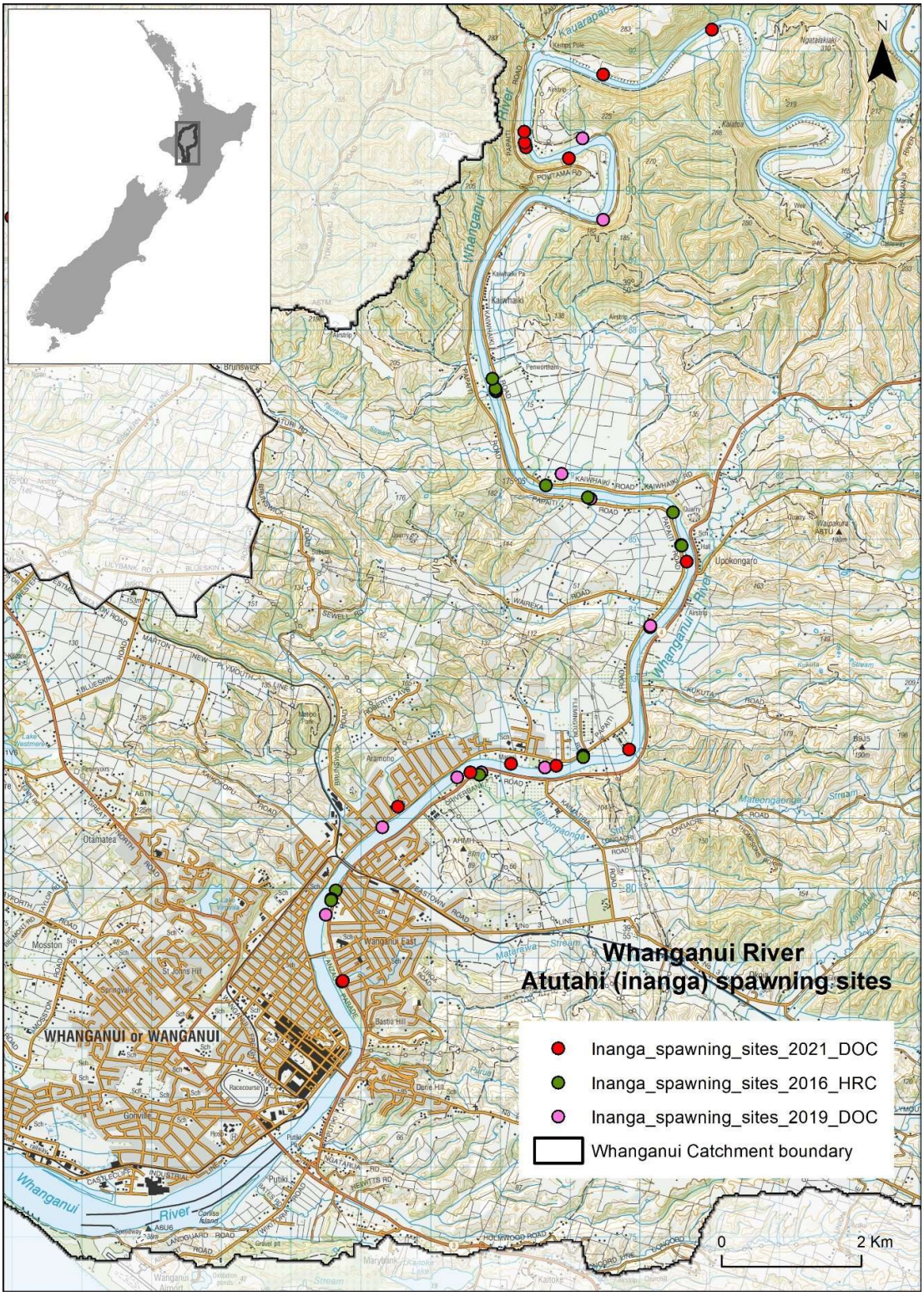


Figure 1. Atutahi spawning sites identified on the Whanganui River.

2 BACKGROUND

The Whanganui River has a diverse catchment, rising from the volcanic mountains of the Central Plateau of the North Island, then following a winding course through block-faulted rugged hill country, of siltstone, sandstone and limestone

base rocks. The river is confined to a narrow steep-sided valley through this hill country, with only a very small coastal floodplain at its mouth. The river is very flat-graded over its lower reaches, and has a tidal influenced reach of about 40 km upstream from its mouth.

The active volcanism of the catchment gives rise to a geologically very recent, raw and actively altered landscape. The whole catchment was very severely affected by an enormous Taupo eruption around 2000 years ago. Vast amounts of volcanic material flowed down the Whanganui River valley, which was then re-scoured out leaving remnant hillside deposits and deep layers of pumice materials on terraces and the lower reach floodplain. The river, thus, has unusually high banks along its lower reaches, with deep layers of pumice on top of the old floodplain materials, leaving just the small coastal floodplain of the present.

The river has a gravel bed material, sourced from its upper catchment of greywacke and volcanic materials. The limestone cap on the hill country alongside the river gives rise to limestone boulders and rock supply to the river, along with the erosion of the sandstone and siltstone materials at the river bed. The deforestation of much of the catchment, and the extensive landslide slope failures that occur in severe storm events, has greatly increased the fine sediment load of the river. The lower reaches were mined for gravel material in the past, but the bed is now covered with fine materials.

The high suspended sediment load gives rise to accumulations of fine materials on the steep banks of the lower river, with high rates of deposition within the riverbank margin vegetation. There is a cycle of deposition, accumulation and over-steepening of the banks, and then undermining and bank slumping during flood events, carrying vegetation into the river channel, and leaving a slumped and broken bank. The deposition cycle then starts again on the lowered area of the bank (Photo 2)

The extensive lengths of large trees along the steep banks of the river, mostly willows and poplars, means that large tree vegetation is carried into the river by bank slumping. Where the erosion pressure is against the bank, on the outer (convex) side of the channel meander curvatures, lateral erosion along the bank gives rise to long lengths of steep raw banks, with continual bank collapses from flood to flood.

Photo 2. Exotic grasses growing on an area of bank slumping where atutahi eggs have been found.

3 CHANNEL BANK DYNAMICS

3.1 BANK VEGETATION

The nature of the bank deposition and erosion is of particular significance to the availability of atutahi spawning habitat, and for any measures to enhance that habitat. The cycle of deposition and collapse depends on the type of edge vegetation along the banks.

A naturally forested bank, of native vegetation, with a forest edge margin at the river channel, will give rise to a diffuse flow boundary along the channel edge during flood flows, and the rate and amount of fine sediment deposition along this margin will be relatively restricted by the diversity and density of the edge vegetation. A band of willows and poplars with a light-sensitive undergrowth will give rise to a more pronounced influx of sediment laden floodwaters (Photo 3). This gives rise to a steeper bank of silt deposits among the larger trees, which becomes progressively more unstable (Photo 4).

Photo 3. Willows on steep banks.

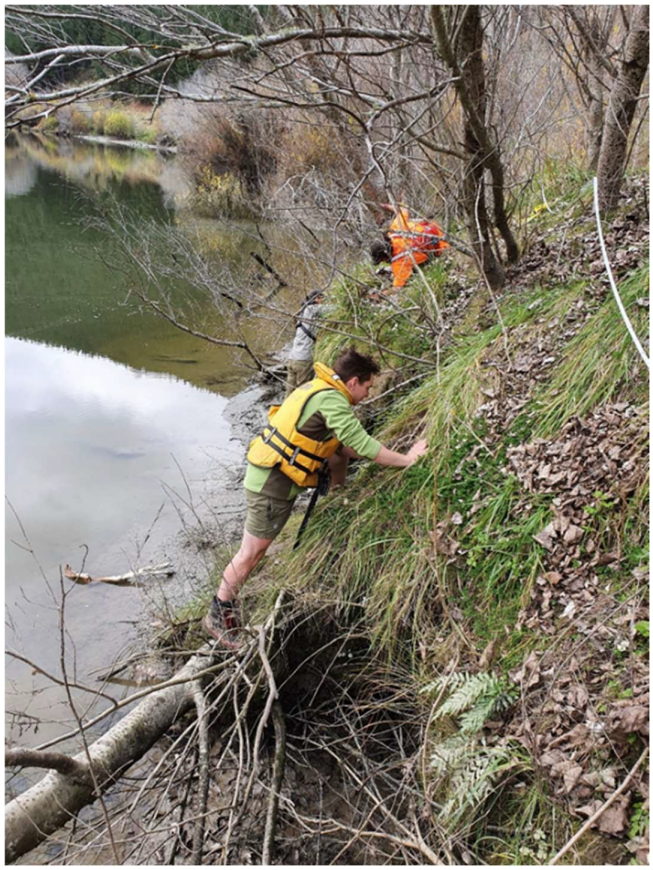


Photo 4. Steep unstable banks under poplar trees.

The erosion mitigation effects of edge vegetation arises from the buffering away of fast-moving channel flows by the slow-moving diffused flows within the edge vegetation. The most effective deflector of fast-moving flood flows is a body of slow-moving water, which both absorbs and deflects the currents of the main channel floodwaters.

The root binding of edge vegetation is a secondary effect in terms of bank erosion processes, while the weight of large trees has a destabilising impact, with the trees either sliding down the bank or toppling over during times of high bank saturation and strong winds.

3.2 ATUTAHI HABITAT

Effective habitat for spawning requires a balance of bank conditions, which allows fine-formed grasses or sedges to grow along the lower (tidal zone) bank without being smothered by fine deposits or being eroded away by strong currents. Smothering deposition takes place on the recession of flood flows, when flow velocities reduce and low-flow bank and channel conditions re-form.

Thus, to retain the open grass habitat, recession flows have to remain relatively flushing flows. At the same time, the flows cannot be too erosive.

This depends on the flow conditions generated by the channel shape, and on the bank slope and overall vegetation cover.

Improvement sites would then be along the inner side of the flood flow meander pattern, and not along the outer erosion side, but where there remains some flow energy during flood recessions. The bank vegetation would, as well, have a diversity of form and height, from the reeds and grasses of the spawning habitat itself, to shrub vegetation up the bank and then taller vegetation beyond, to give the best overall buffering and flow flushing, while maintaining light to the edge grasses.

3.3 SITE SELECTION

Aerial imagery of the lower reaches of the river was provided by Horizons, for a number of different time periods.

Information on the typography of the river channel and its banks was available from earlier engineering investigations for the lower part of the study length, to Aramoho. Contour plots, with 0.5 m contour lines is available from the mapping tools on the website of the WDC, to about the same area. This provided data above mean sea level. Combining this data enabled bank sections to be drawn at a number of sites.

This information provided the base physical data for the selection of potential enhancement sites.

4 ASSESSMENT

4.1 PRELIMINARY ASSESSMENT

The initial riverside site inspections and discussions provided a familiarisation of the lower reaches, the spawning habitats present and what was restricting the extent of such habitats.

In preparation for the on-river inspections, aerial plans of sections of the river were taken from the aerial maps provided by Horizons, and potential improvement areas identified, for closer inspection from the river.

These sites are shown on the attached aerial plans, from the Dublin Street Bridge, up to Kemp's Pole.

The entrenchment of the river along the lower tidal reaches of the river, due to the covering of its lower reach floodplain by the Taupo eruption materials, means there is no interchange between a main channel and floodable or connected flat land. The lowest reach of the river beside the remaining coastal floodplain has too high a salinity for atutahi spawning.

Thus, while there is a very long potential spawning length along the river, the areas of spawning habitat are very restricted in extent, being small ribbons of bank, in the high tide range, along the steep banks of the river.

The areas of low-lying wetlands or connecting stream waterways upstream of the high salinity reach are very limited. There is not, then, the potential for improved connection and development of adjacent wetlands or development of suitable areas at tributary confluences. Neither are there sites where backwater flows could be utilised to provide enlarged areas of tidal vegetation at the sharper bends of the river.

The river does have sharp bends, where it is deflected by the confining hill land, and there would be strong backflows at these bends, but there is no low-lying land at the bends to develop for spawning habitat.

The identified sites for improvements are, thus, lengths of bank. There being really only one type of improvement, that is, modifications to the banks, which are steep and high. The options are, then, around changes in the bank vegetation and changes in the bank profile, with the vegetation cover reflecting the bank shape and heights.

The lengths were selected because they are on the inner side of bends where flow velocities are lower, bank heights are relatively low and re-forming the bank less expensive, and there is minimal tall vegetation.

Access to the sites has also been considered, with access to some of the upstream sites being more difficult.

The bank sections drawn up for the lower part of the study length are shown on the attached section plans (Figure 2). The sections have a 2:1 vertical exaggeration.

These sections have a range of bank conditions, and potential bank re-profiling to increase the spawning area are shown on enlargements of some bank sections. (Figures 3 & 4). The range of high tides, from mean neap to mean spring, is indicated on these plans.

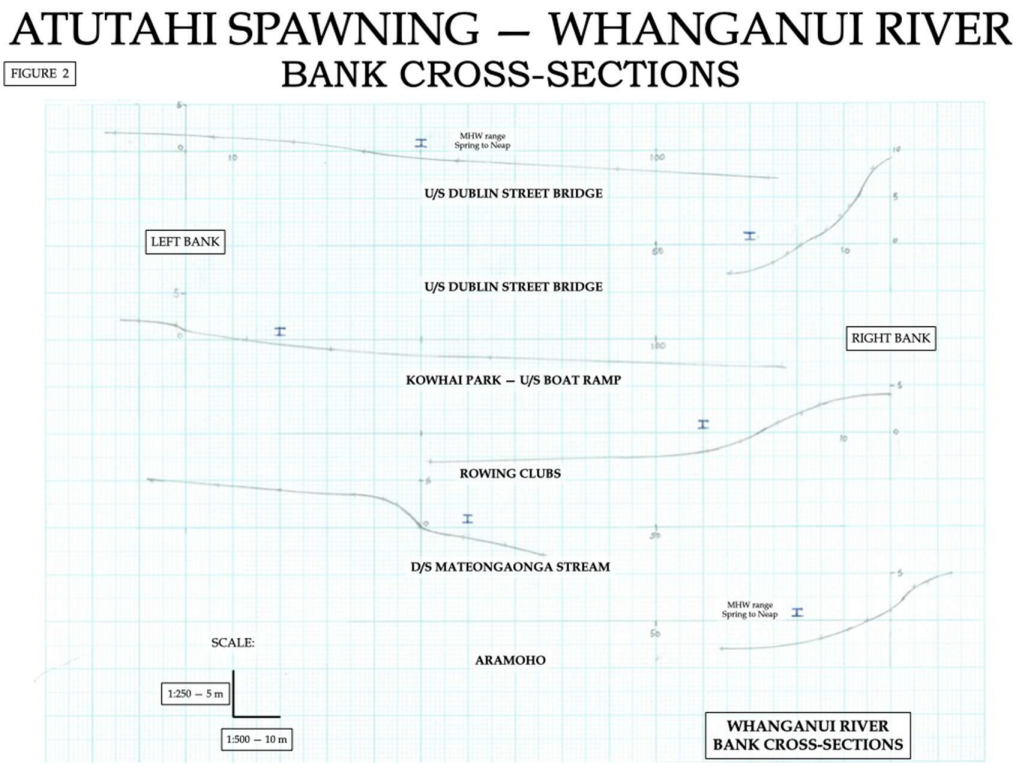


Figure 2. Bank sections for the lower part of the study length. The sections have a 2:1 vertical exaggeration.

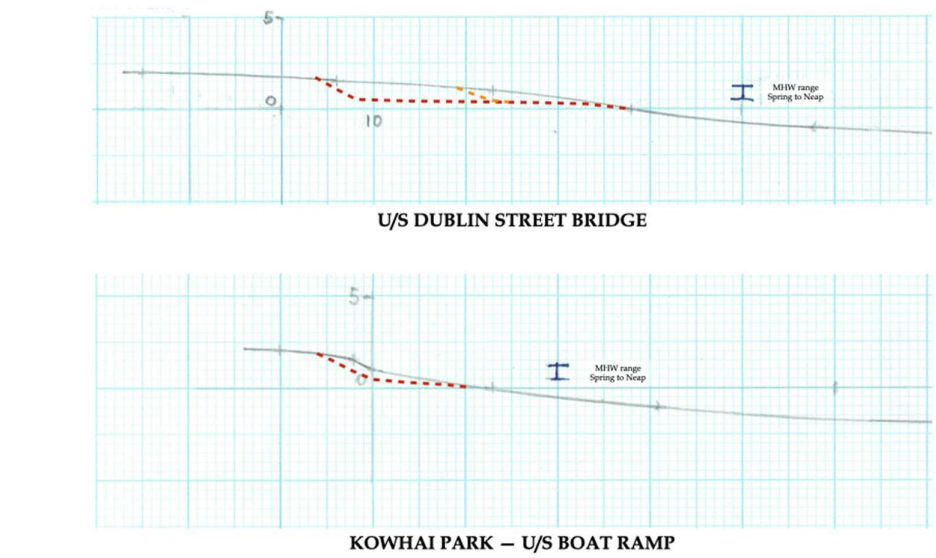


Figure 3. Potential bank re-profiling at u/s Dublin Street bridge and Kowhai Park sites.

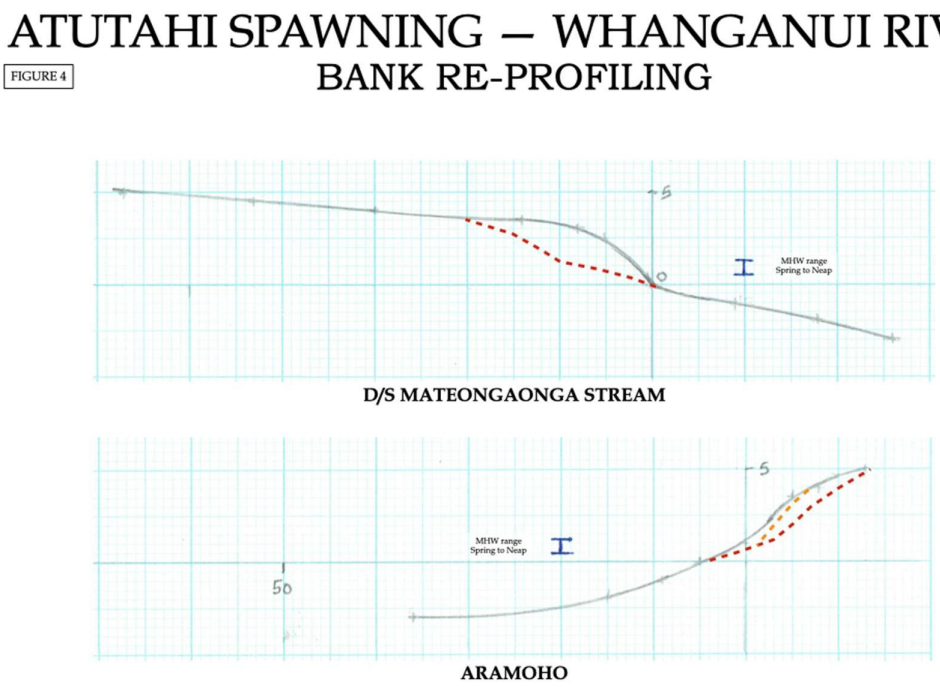


Figure 4. Potential bank re-profiling at Mateongaonga Stream and Aramoho sites.

4.2 RIVER-BASED ASSESSMENT

The river-based inspections and discussions at the potential improvement sites confirmed the general applicability of the selected sites, but there were major questions about vegetation cover and the pros and cons of changing the edge vegetation and bank profile.

The further up-river sites had long and difficult road (or track) access, with very high sloping banks down from any access. The sites along the city reach and immediately upstream had much better access, lower banks and were much more closely related to people in the urban areas. Suitable lengths of bank along these lower reaches, with a minimum of existing tall vegetation, would then be the most preferred in terms of initial priorities.

Bank re-profiling to provide a better bank shape for spawning habitat, as outlined above, involves a complete removal of existing vegetation, earthworks cutting and filling to give the new profile, and then re-planting with the diversity of plants that gives the most suitable conditions.

This re-planting has to be done as a mass planting, otherwise the bare ground will be quickly covered by the ever-present seeds of waterway margin colonising plants. There is a wide range of introduced such plants now present in our waterways and along our rivers.

A fibre-matting cover can be laid over the bare ground as a weed suppressor and to minimise bank scouring while the vegetation becomes established.

Instead of this major intervention of clearing, earthworks and mass re-planting, a minimal option would be to poison the large exotic trees: willows, poplars, acacias etc., and spreading tall grasses such as pampas, but otherwise leave the bank as it exists. The opening up of the bank would give rise to bank slumping and collapses, and a natural re-shaping of the bank. Where there are no assets at risk, this bank re-working can be allowed to take place naturally, with the slumped areas along the banks providing a suitable grassed environment for atutahi spawning.

4.3 BANK VEGETATION

The review of spawning habitat improvement measures undertaken in other places, from small urban area waterways to low-lying areas beside the lower reaches of large gravel-bed rivers, provided useful guidance on a planting regime that would suit the banks of the lower Whanganui River.

Planting plans for the banks of the Whanganui River have been drawn up for two example bank sites, one with a re-profiling of the bank, and one where the bank could just be planted (Figures 5 & 6).

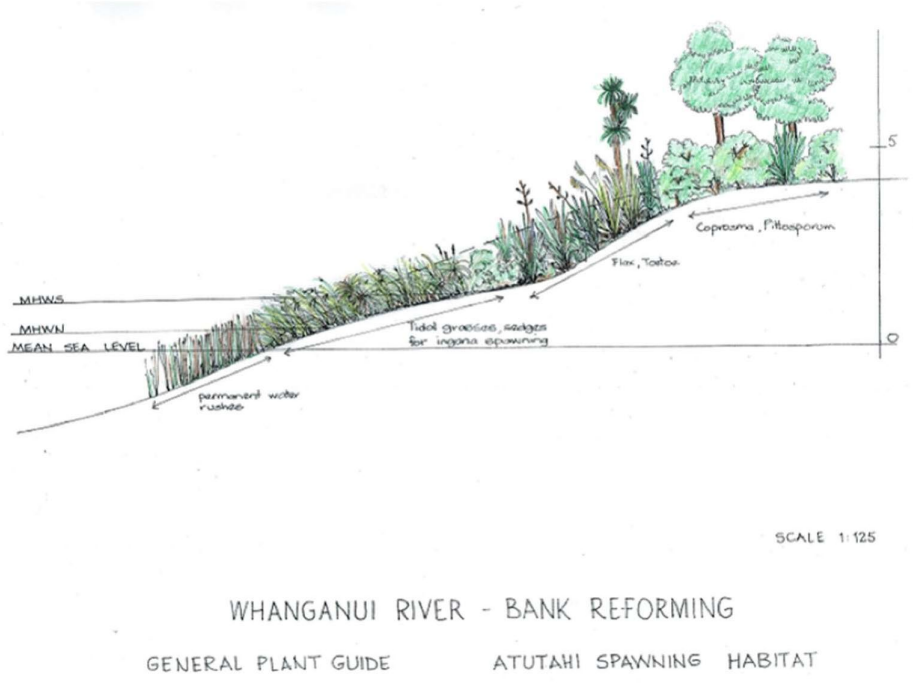
This shows a waterside margin regime from submergent reeds or rushes below the tidal range; emergent sedges and grasses within the tidal range; grasses within the high tide range; harakeke and carex species or herbs, then toetoe, ti kouka and maybe coprosma species, above the tidal range; and subcanopy natives at the back.

The actual species would depend on the site and the appropriate species that can be sourced locally.

ATUTAHI SPAWNING – WHANGANUI RIVER

FIGURE 5

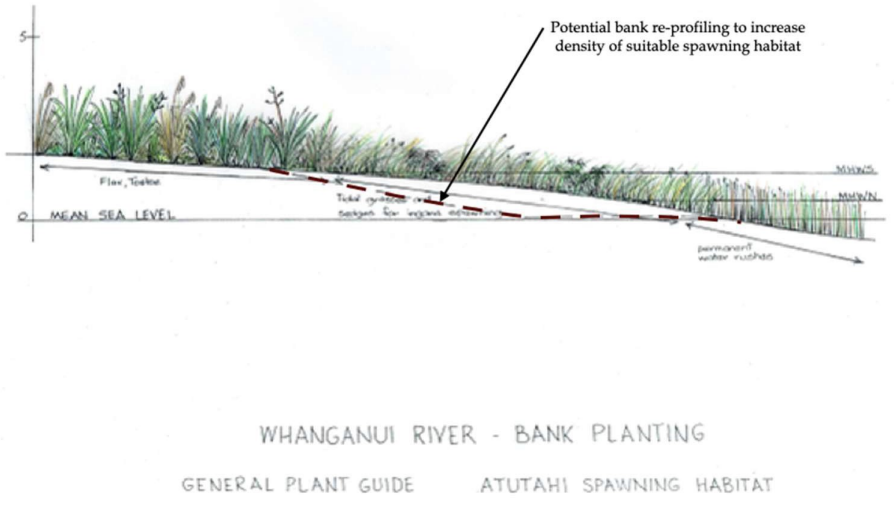
BANK PLANTING



ATUTAHI SPAWNING – WHANGANUI RIVER

FIGURE 6

BANK PLANTING



Figures 5 and 6. Planting plans for the banks of the Whanganui River.

5 PROPOSED IMPROVEMENTS

5.1 SELECTED SITES

The selected sites for the river-based inspections are shown on the 2021 aerial photography, with a potential length of bank for atutahi habitat improvement shown for each site. The sites vary in terms of salinity and tidal range, bank height and vegetation cover, and channel position that affects flood flow characteristics.

Each site is briefly described below.

5.2 KOWHAI PARK

There is a long length of bank along the inner side of a sweeping bend of the river down to the Dublin Street Bridge. The existing bank has a sharp edge to it, but is relatively low with a mostly grass cover and few larger trees. There is easy access from the park, and excavation cut could be spread over the adjacent grass areas of the park.

Two bank cross-sections taken along this length of bank are shown on the Cross-section plans (Figures 2 & 3). The length of bank and the position of the sections is shown on the aerial site plan (Figure A-1).

The river water has a relatively high salinity, with a saltwater wedge below the fresh water. Atutahi spawning has, though, been recorded along this river reach (Figure 1).

ATUTAHI SPAWNING – WHANGANUI RIVER

FIGURE A-1 SITE — KOWHAI PARK AERIAL 2021

5.3 ROWING CLUBS

The Rowing Clubs are sites along a straight reach of the river, but the strong outer bank flows are along the opposite left side of the river channel. There is a small floodable berm area, which is used by the clubs for arranging and launching, as well as for spectators (see Figure A-2 and Photo 5).

Photo 5. Aramoho Rowing Club launching area.

There are defined launching ramps and the area between the flat berm and the tidal river edge could be managed for atutahi spawning, through the use of appropriate plants and an awareness of their usefulness for spawning. A bank section along the bank is shown on Figure 2, with the section position shown on Figure A-2.

There is a relatively heavy use of this area, but this could be advantageous if the clubs were actively engaged with the management of the bank for spawning habitat.

ATUTAHI SPAWNING – WHANGANUI RIVER

FIGURE A-2 SITE — ROWING CLUBS AERIAL 2021

5.4 MATEONGAONGA

The Mateongaonga Stream channel is narrow and congested with large tree vegetation. However, immediately downstream of the confluence there is a grassed berm area, with a relatively low bank height.

The potential bank length is on the inner bank side at the lower end of a tight river bend, with a deep channel along the opposite right side (Figure A-3). The bank is easily accessed, and bank excavation material could be spread on the adjacent berm land. A bank cross-section is shown on Figure 2, and potential bank re-forming on Figure 4.

ATUTAHI SPAWNING – WHANGANUI RIVER

FIGURE A-3 SITE — MATEONNGAONGA AERIAL 2021

5.5 ARAMOHO

There is a small floodplain area on the right side in Aramoho, between the Te Ao Hou Marae and the Whanganui River TOP 10 Holiday Park. Here again, there is a relatively low bank on the inner side of the channel, with few larger trees along the potential length. The bank does, though, have flushing flows on flood recessions given the slight meander form.

Some trial planting has been undertaken along this bank, near the Marae, on the existing bank profile. A more diverse edge vegetation with suitable plants for atutahi spawning could be easily established along this bank with some re-forming of the bank (Figure A-4). Here too, the excavation material can be spread on the adjacent floodplain area. A bank cross section at the lower end of this site, where there is the trial planting, is shown on Figure 2 and potential bank re-forming on Figure 4.

ATUTAHI SPAWNING – WHANGANUI RIVER

FIGURE A-4 SITE — ARAMOHO AERIAL 2021

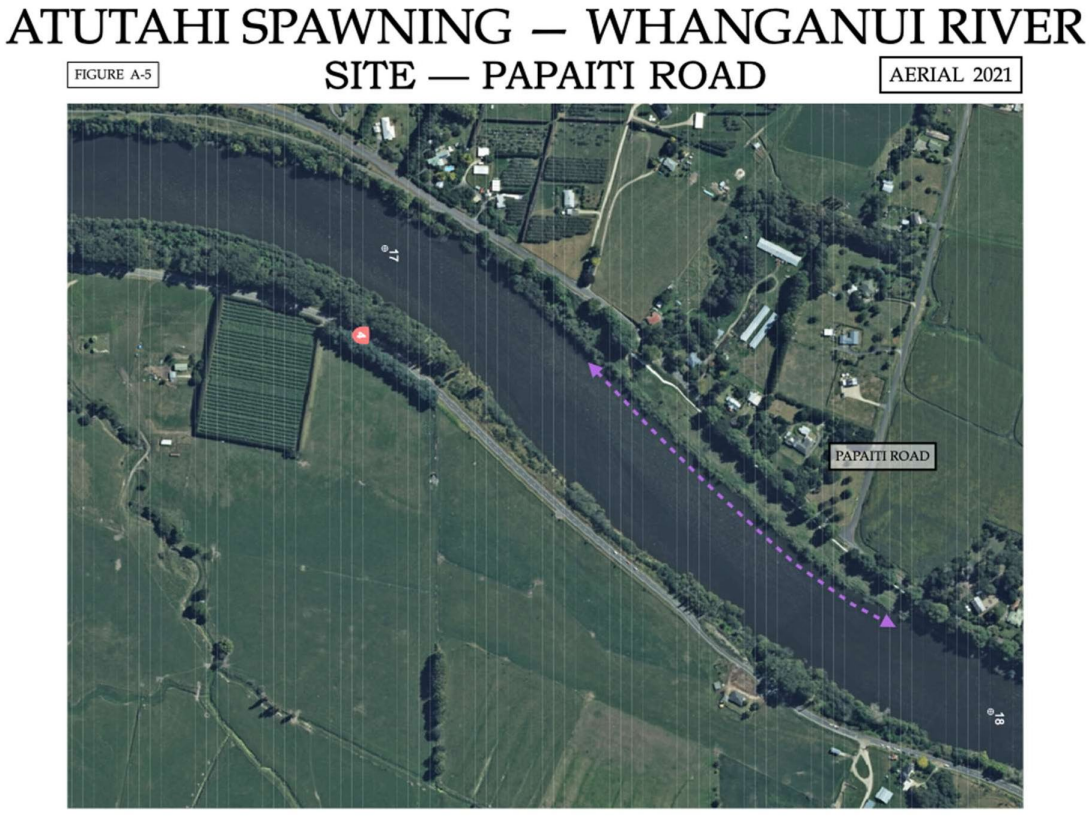
5.6 PAPAITI ROAD

There are lengths of bank along the right side of the river alongside Papaiti Road, between the road and the channel edge, where bank planting, with or without bank re-forming, could be undertaken (Photo 6).

The banks are higher and steeper than the lower river sites, and disposal of cut material would be more difficult. Access would be off Papaiti Road, and spoil could be carted off site.

A diverse edge planting would be visible from the walkway/cycleway bridge and pathway by Papaiti Road. There is a length on the inner side of the river channel, with few large trees, which would be the better site (Figure A-5).

Photo 6. River bank along alongside Papaiti Road.



5.7 KAIWHAIKI ROAD

There are two potential sites along Kaiwhaiki Road where there would be flushing recession flows but relatively low erosion pressures, and the bank height is not too great with not too many larger trees (Figures A-6 & A-7).

The sites are easily accessed from the road, and there are flat berm areas for spreading cut material.

These sites are less visible and there would need to be interest in managing the plantings and maintaining stock exclusion.

5.8 KAIWHAIKI

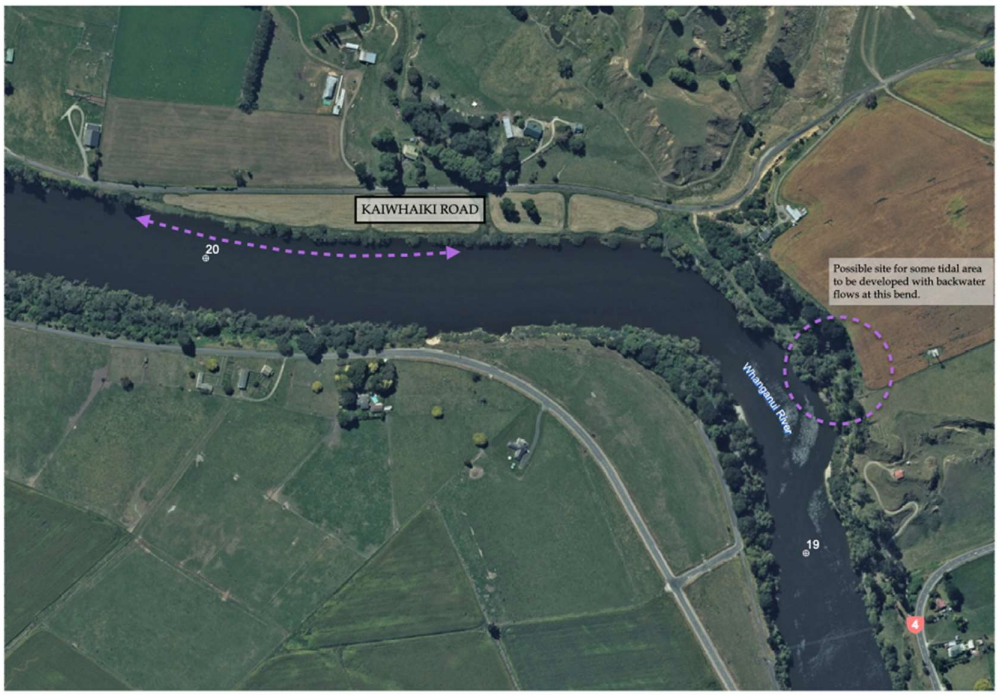
At the upper Kaiwhaiki area the river bends against the hill country and there is a well-formed inner beach, with access from the Kaiwhaiki flats.

The sharpness of the bend means that the inner side beach is a defined deposition area, with a relatively stable bar, that has a high central area. Some re-shaping of the downstream end of the beach may allow a small area of tidal level planting (Figure A-8).

In general, there are large trees along the banks, mostly willows and poplars, as a narrow channel edge tree buffer.

ATUTAHI SPAWNING — WHANGANUI RIVER

FIGURE A-6 SITE — KAIWHAIKI ROAD 1 AERIAL 2021

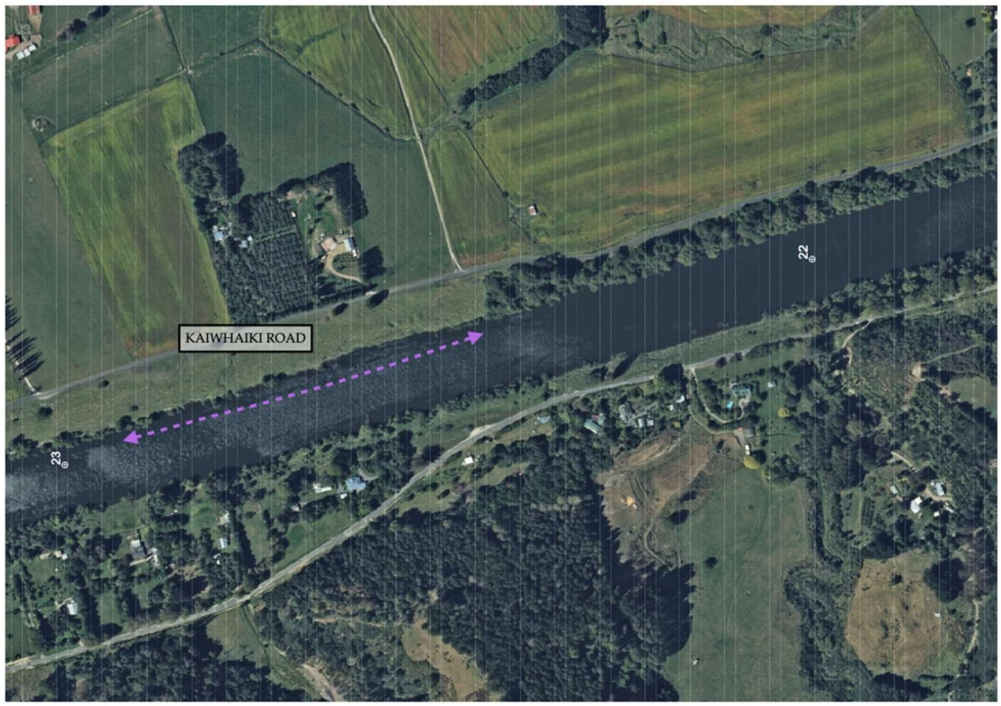


ATUTAHI SPAWNING — WHANGANUI RIVER

FIGURE A-7

SITE — KAIWHAIKI ROAD 2

AERIAL 2021



ATUTAHI SPAWNING — WHANGANUI RIVER

FIGURE A-8

SITE — KAIWHAIKI

AERIAL 2021

5.9 POUTAMA ROAD

Upstream of Kaiwhaiki, the river has a winding course with sharp bends where the hill country constrains the river. The banks are either steep cut faces in the hill country or high banks of deep alluvial deposits, and small terrace areas.

There could be some small areas suitable for low level planting around the inner beaches of the bends, but access would be difficult, and again there would have to be an interest in managing and maintaining the planted areas (Figure A-9).

Along the straight reaches between the bends there are large trees as an open buffer, higher up the bank or on the flat berm land above. The bank height and trees along the banks makes these areas impractical for habitat enhancement.

However, atutahi spawning has been found at these sharp bends, at the upstream entry to the bend, where there is a small area of river flats just before the bend. Additional planting could be undertaken in these areas, which remain relatively deposition free because of the flow pattern at the bends.

ATUTAHI SPAWNING — WHANGANUI RIVER

FIGURE A-9 SITE — POUTAMA ROAD AERIAL 2021

5.10 KEMP'S POLE

The Whanganui River is sharply deflected by hill country at the confluence of the Kauarapaoa Stream (Photo 7). The flood flows at this confluence are especially dynamic, and depend on the timing of flows in the tributary and main river. This gives rise to shifting point bars on the inner side of the main channel and around

the confluence, including scouring and erosion of the river banks as well as deposition.

There is a small terrace above the inner side at the bend, but access to the site would be difficult (Figure A-10). The shifting nature of the confluence at a sharp bend in the river means that any low-level planting on the beaches is unlikely to last.

Photo 7. Site of Kemps Pole at the confluence of the Kauarapaoa Stream and the Whanganui River

ATUTAHI SPAWNING – WHANGANUI RIVER

FIGURE A-10 SITE — KEMP'S POLE AERIAL 2021

5.11 PRIORITIES

There are a range of sites throughout the long tidal reach of the Whanganui River, of varying characteristic and ease of development for atutahi spawning habitat. Of these sites, there is likely to be greater interest and engagement with those along the lower reaches, within the urban and peri-urban areas of Whanganui. These sites also have easier access and lower banks, with generally berm or floodplain areas where any cut material could be spread out and re-grassed, or planted with riparian plants.

The District Council and Horizons would have more interest along the city reaches and the Horizons scheme reach. There would, though, be some interest throughout the tidal reach of the river, and in particular in the vicinity of the Kaiwhaiki Marae.

A possible prioritisation would be as follows:

1) Aramoho
2) Rowing Clubs
3) Papaiti Road
4) Mateongaonga
5) Kowhai Park
6) Kaiwhaiki Road

Actual priorities would depend on funds being made available by funding organisations or councils, and the specific interests of the different parties, local communities, hapū and Ngā Tāngata Tiaki o Whanganui.

6 CONCLUSIONS

There are potentially long lengths of banks along the lower Whanganui River that is suitable for atutahi spawning, the river having a very long tidal reach. However, the river channel is entrenched, within narrow steep-sided valleys, and then by thick volcanic and coastal deposits on what was a relatively small floodplain near the coast.

The lack of a floodplain with connected tributaries means that is little potential for developing atutahi habitat in backwater areas, side channels or tributaries. The main measures for enhancement then relate to alterations along the (steep) banks, changing the bank profile and the type and diversity of channel edge vegetation.

Potential habitat improvement areas have been identified where there is a balance of flow forces that minimise erosion pressures while maintaining relatively low levels of sediment deposition. These sites are on the inner side of the flow meander pattern where flood flow velocities are lower, but flushing flows are maintained during the recession of floods to minimise deposition. The best sites are where the bank heights are relatively low and re-forming the bank less expensive, with areas beyond the bank for spreading cut material, and there is minimal tall vegetation to be removed.

The selection of sites has, thus, been based on the natural characteristics of the lower reaches of the river and the flow dynamics that arises from its particular character. Priorities for habitat improvements will depend on the involvement of interested parties and funds made available, while the engagement of people and communities is important for the management and maintenance of the riparian planting along the river banks.

The lower reaches of the river, above Dublin Street Bridge, have bank lengths where there are lower banks with berm land behind. There is easy access to these sites and there could be more community engagement and hence care of the habitat areas.

Further upstream the banks become higher and access more difficult. At the same time there are fewer assets at risk, and there are bank lengths where the existing exotic edge vegetation (mainly willows and poplars with an exotic weedy undergrowth) could be poisoned and the bank otherwise left alone. The natural slipping and slumping of the fine sediments that have built up under this edge vegetation would give rise to low tidal-level areas of flatter land, suitable for atutahi spawning.

There are also small lower lying areas at the bends of the river where some planting would enhance the areas for spawning. These areas would remain relatively stable, with minimal longer-term deposition.

The banks along the lower reaches could, then, be cleared of existing exotic trees and groundcover and the banks re-planting with a range of native species that would give the best conditions for spawning, while minimising sediment

deposition. A re-profiling of the banks would involve machine cut and fill operations, but the width of spawning habitat could be significantly increased in this way. A better arrangement of reeds, grasses, shrubs and trees could then be implemented along the bank.

Alternatively, existing exotic edge vegetation could be poisoned and a natural re-working of the bank allowed to occur, giving rise to more bank shape and slope diversity.

The cost of habitat enhancement very much depends on the site and the approach taken, including the sourcing of plants, and the degree of physical rearrangement of the river banks.

The lowest cost would be planting on existing banks where suitable species could be established. If bank re-profiling is undertaken a mass re-planting would be required to ensure the desired vegetational range and diversity was established. The cost of poisoning depends on the number and size of trees along the channel edge to be removed, and the amount of follow up spraying required to ensure a complete change in the bank vegetation cover.

The nature of the different locations, the type of enhancement to be undertaken, and on-going management and community engagement, all need to be considered when deciding on funding and priorities.

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