

MIHIMIHI

This Fisheries Plan would not have been possible without the financial support of the Waikato River Authority. Te Arawa River Iwi Trust wish to acknowledge the Waikato Regional Council, Ministry for Primary Industries, Department of Conservation and Fish & Game NZ for their valued input and assistance in developing this Plan. We must also thank our neighbouring river Iwi (Ngāti Tūwharetoa, Raukawa, Maniapoto and Waikato Tainui) who have set the platform for Iwi/crown co-governance and co-management of fisheries in the Waikato River catchment through their Environmental Management and Fisheries Plans.

To Elva Conroy and Doug Macredie, thank you for your feedback and support during the development of this Plan. Also we wish to thank Bella Tait and Tamara Mutu for all their hard work completing the early stages of the Plan.

TE ARAWA RIVER IWI TRUST WANT TO THANK OUR IWI WHO GAVE UP THEIR TIME TO TELL US THEIR FISHING STORIES AND SHARE THEIR KNOWLEDGE.

Lastly, Te Arawa River Iwi Trust want to thank our Iwi who gave up their time to tell us their fishing stories and share their knowledge. Sometimes Iwi can be hesitant to share information with others but our people realise that this is an opportunity to keep those traditional ways alive for current and future generations.

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PART ONE: INTRODUCTION

PLAN PURPOSE

TE ARAWA RIVER IWI TRUST

GEOGRAPHIC AREA OF THIS PLAN

SCOPE OF THIS FISHERIES PLAN

FISHERIES REGULATIONS

FISHERIES MANAGEMENT

1.1 PLAN PURPOSE

Te Arawa River Iwi Trust (TARIT) has developed a Fisheries Plan to represent the fishing interests of our three river Iwi (Ngāti Tahu-Ngāti Whaoa, Ngāti Kearoa-Ngāti Tuarā, and Tuhourangi-Ngāti Wahiao). The Plan has three primary aims:

- Capture and record Te Arawa river iwi mātauranga and fishing practices.
- Describe the issues affecting fisheries and customary gathering
- Set performance measures for the long term sustainable use of freshwater taonga species

Within this Plan, the term “Upper Waikato River” refers to TARIT’s legislative boundaries, from Ātiamuri Dam to Huka falls including all the tributaries within this section (see section 1.2 and 1.3).

The term Te Arawa River Iwi means the relevant affiliate Te Arawa Iwi/Hapu, being Ngāti Tahu-Ngāti Whaoa, Ngāti Kearoa-Ngāti Tuarā and Tuhourangi-Ngāti Wahiao



1.2 TE ARAWA RIVER IWI TRUST

TARIT has its origins in the settlement of historical claims for Te Pumautanga o Te Arawa. Under the Te Pumautanga Settlement Deed, dated 11 June 2008, the Crown recognised the interests of the Te Arawa River Iwi in the Waikato River and its environs, from Huka Falls to Pōhaturoa. The Crown undertook to provide co-management arrangements in recognition of their interests, which were to be no less than those provided to Waikato Tainui.

The Trust was established to act as a forum for the three Te Arawa River Iwi to work together on issues relating to the river, and to exercise kaitiakitanga. Figure 2 shows the tribal boundaries of the three Te Arawa River Iwi as they relate to the Waikato River catchment.

- Ngāti Tahu-Ngāti Whaoa, whose tribal boundaries lie between Te Waiheke o Huka (Huka Falls) and Pōhaturoa at Ātiamuri and extends to the Kaingaroa Plains
- Tuhourangi-Ngāti Wahiao whose lands include the Rotomahana Parekarangi block and the important Whirinaki Stream
- Ngāti Kearoa-Ngāti Tuarā, whose traditional lands include Horohoro with their principal waterway the Pōkaitū stream just north of Pōhaturoa, which runs into the Waikato River

On 9 March, 2010 a Deed in relation to the Co-Management Framework was signed, and on 26 October, 2010 the Ngāti Tūwharetoa, Raukawa, and Te Arawa River Iwi Waikato River Act 2010 was enacted to provide legislative recognition of the Co-Management Deed and Framework. The purpose of the Act and Deed is to restore and protect the health and wellbeing of the Waikato River for present and future generations. TARIT's

role here is to represent, implement and act on behalf of the three river Iwi.

Together, the Act and Co-Management Deed:

- Recognise the significance of the Waikato River to the Te Arawa River Iwi
- Recognise the Vision and Strategy for the Waikato River
- Establishes and grants functions and powers to the Waikato River Authority
- Establishes the Waikato River Clean-up Trust
- Acknowledges and provides a process that may recognise certain customary activities of Te Arawa River Iwi
- Provides co-management arrangements for the Waikato River

TARIT is driven by Te Ture Whaimana o Te Awa o Waikato - the Vision and Strategy for the Waikato River which states:

“Our vision is for a future where a healthy Waikato River sustains abundant life and prosperous communities who, in turn, are all responsible for restoring and protecting the health and wellbeing of the Waikato River, and all it embraces, for generations to come”

Te Ture Whaimana o Te Awa o Waikato is the primary direction setting document for the Waikato River (Figure 1). This vision and strategy will prevail over inconsistent provisions in the Waikato Regional Policy Statement, and any national policy statement.

WHERE THE PLAN FITS

LINKAGES BETWEEN THE PLAN, LEGISLATION, IWI AND COUNCIL PLANNING DOCUMENTS

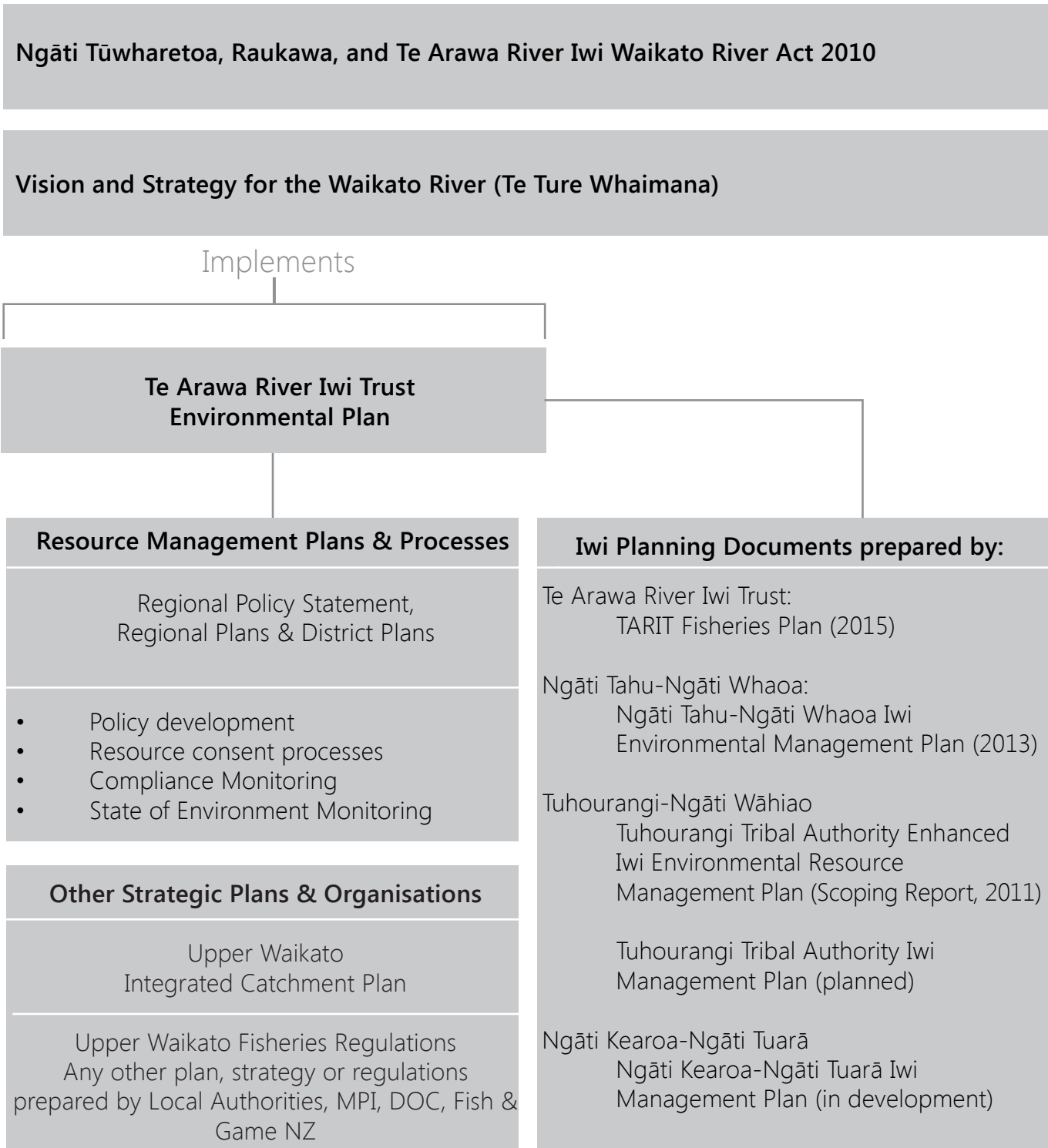


Figure 1: Role of TARIT in the co-management and co-governance of the Waikato River

1.3 GEOGRAPHIC AREA OF THIS PLAN

This Iwi Fisheries Plan applies to TARIT's co-management and co-governance area pertaining to the Waikato River as set in under legislation (see Figure 2 below). Please note that Lakes

Ngāhewa, Tutaeinanga and Ngāpouri fall within the jurisdiction of Te Arawa Lakes Trust and any fisheries regulations developed by Te Arawa Lakes Trust apply to these lakes.

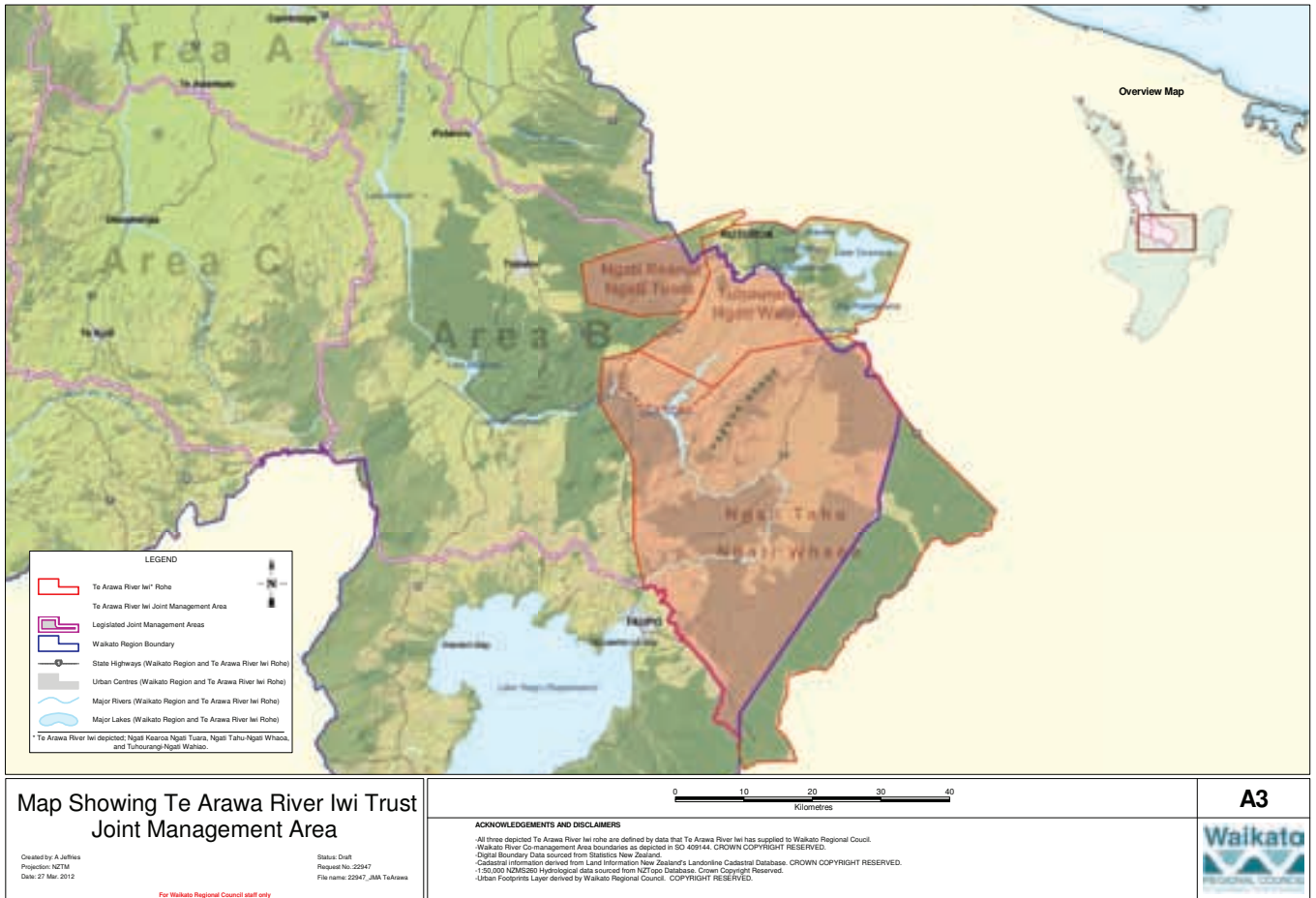


Figure 2: Boundaries of the Te Arawa River Iwi Trust whose jurisdiction lies with the Waikato River catchment, North Island, New Zealand.

1.4 SCOPE OF THIS FISHERIES PLAN

The Primary Industries Portfolio Accord between Te Arawa River Iwi and the Crown sets out that Te Arawa River Iwi Trust will prepare a Fisheries Plan.

Any persons and/or agency exercising functions, duties or powers under sections 12 to 14 of the Fisheries Act 1996, schedule 1 of the Conservation Act 1987, or the Resource Management Act 1991, must have particular regard for this Plan.

This Fisheries Plan is a recognised Iwi document and will be used alongside the TARIT Environmental Plan (EP), Ngāti Tahu-Ngāti Whaoa IEMP, Ngāti Kearoa-Ngāti Tuarā IEMP, and the Tuhourangi-Ngāti Wahiao IEMP.

This document does not supersede the IEMP or TARIT EP mentioned above and it does not negate the need for proper consultation with the local Iwi and whānau. Their contact details are listed at the beginning of this plan.

This document is also intended as a tool to work alongside the fisheries or environmental plans of our neighbouring river Iwi (Ngāti Tūwharetoa, Raukawa, Maniapoto and Waikato Tainui) whom, along with TARIT, have co-management and/or co-governance responsibilities to the Waikato River catchment. This document will help to inform those plans such as the Waikato Regional Plan, the Waikato Regional Pest Management Plan and other various planning documents that impact on the Waikato River (Figure 2).

1.5 FISHERIES REGULATIONS

This Fisheries Plan will guide the development and implementation of the Fisheries (Ngāti Tūwharetoa, Raukawa and Te Arawa River Iwi - Upper Waikato River) Regulations which are currently being developed (see Appendix 4). These fisheries regulations are in collaboration with Ngāti Tūwharetoa, Raukawa and the Ministry for Primary Industries, and will give Iwi the ability to manage customary gathering in the catchment above Karapiro Dam (Area B). These regulations will allow TARIT and the neighbouring Iwi to appoint kaitiaki who will then have the authority to issue permits for customary fishing within the rohe. Applications for customary permits will be considered by kaitiaki based on the methods and purposes set out in this and Fisheries Plans of Ngāti Tūwharetoa and Raukawa.

These fisheries regulations will include provisions that the Minister will make bylaws recommended

by Te Arawa river Iwi, Ngāti Tūwharetoa and Raukawa, unless the Minister considers that an undue adverse effect on fishing would result if the proposed bylaws were made.

The fisheries regulations will be made under section 186 of the Fisheries Act 1996, and section 58 of the Ngāti Tūwharetoa, Raukawa and Te Arawa River Iwi Waikato River Act 2010. The regulations will prevail over commercial, amateur and customary fisheries regulations.

Working collaboratively with other river Iwi will facilitate opportunities and the realisation of effective Iwi based kaitiakitanga, sustainable freshwater fisheries use and management, and enhanced well-being of the Waikato River by restoring essential habitat for freshwater fisheries.

1.6 FISHERIES MANAGEMENT

Below is a brief description of the non-iwi stakeholders who hold statutory responsibilities in fisheries management along the Waikato River.

1.6.1 MINISTRY FOR PRIMARY INDUSTRIES (MPI)

MPI was formed in 2012 after the merging of the Ministry of Fisheries and the Ministry of Agriculture and Forestry. MPI works to ensure that fisheries are used in a sustainable way and that we have a healthy aquatic ecosystem (www.mpi.govt.nz). The main role of MPI is to determine the allocation of fisheries resources (e.g. Quota Management Systems for commercial fishing) and ensure unwanted organisms do not enter the country. MPI has a variety of statutory requirements under a myriad of legislation including the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992, Fisheries Act 1996, Biosecurity Act 1993, Fisheries (Amateur Fishing) Regulations 1986, Fisheries (Kaimoana Customary Fishing) Regulations 1998 and Fisheries (Commercial Fishing) Regulations 2001.

1.6.2 COUNCIL

Waikato Regional Council (WRC) is the only regional council within TARIT's boundaries. One of their roles is to protect and manage the region's environmental resources, including water which in turn affects the fisheries. WRC regulates consents for major activities in the region such as water take, discharges and dams or diversions (Speirs et al, 2010). WRC also has a role in monitoring and managing pest fish in the region. WRC have

statutory roles under the Resource Management Act 1991 and Biosecurity Act 1993 (Speirs et al, 2010).

TARIT covers three district councils (Rotorua, South Waikato and Taupō) which write their own district plans relevant to their respective districts.

1.6.3 DEPARTMENT OF CONSERVATION

Department of Conservation (DoC) assists and manages the protection and recovery of rare and threatened species. In addition, DoC assists in the prevention of unwanted species spreading and works with partners to manage the distribution of established pests. The Lake Taupō trout fishery and whitebait fishery are the only fisheries resources managed by DoC. TARIT falls within DoC's 'Central North Island' region. Key legislation affecting DoC includes Freshwater Fisheries Regulations 1983, Conservation Act 1987 and Whitebait Regulations 1994.

1.6.4 FISH & GAME

Fish & Game NZ manages, maintains and enhances sports fish (e.g. trout, char) and game birds and their habitats in the best long-term interests of present and future generations of anglers and hunters (fishandgame.org.nz). Eastern Fish & Game oversee the areas of the Waikato catchment which fall within TARIT's boundaries. Sports fish in Lake Taupō are managed by DoC. The boundary between Eastern Fish & Game and Auckland/Waikato Fish & Game lies near Tokoroa. Along with DoC, Fish & Game have functions under the Freshwater Fisheries Regulations 1983 and Conservation Act 1987 (Speirs et al, 2010).



PART TWO: HISTORIC USE & ASSOCIATION WITH THE WAIKATO RIVER



STATEMENT OF SIGNIFICANCE

HISTORIC FEATURES AND GROWING THREATS

AREAS OF SIGNIFICANCE FOR FISHING

TRADITIONAL METHODS FOR FISHING

TRADITIONAL FISHERIES MANAGEMENT TOOLS

2.1 STATEMENT OF SIGNIFICANCE

The Waikato River and its tributaries is the source of identity for Te Arawa River Iwi. The resources collected from the river and its surroundings sustained the people through nourishment, protection and clothing, as well as providing goods that were traded with neighbouring Iwi. The following texts were taken from the deed in relation to a co-management framework for the Waikato River, describing briefly, how our river Iwi once relied on the river and its resources.

2.1.1 NGĀTI TAHU-NGĀTI WHAOA

Ngāti Tahu-Ngāti Whaoa had many kainga, cultivations and burial caves along the edges of the Waikato River. Three of our four marae are situated along the Waikato River, the fourth marae being adjacent to Mangahōanga Stream.

Central to our identity is Orākei Kōrako, the original settlement and ūkaipō of the Iwi, a place of great significance to us. Here the Iwi resided, along the ngāwhā, on the banks of the Waikato River - taonga that characterise the rohe of Ngāti Tahu-Ngāti Whaoa. The pristine headwaters of the Waikato River and its extensive wetlands provided the Iwi with all we needed - pure water, abundant kai, and diverse resources and materials for our use. Paramount to Ngāti Tahu-Ngāti Whaoa is our participation in a co-management regime that protects, preserves and where possible restores our wahi tapu and taonga. From our perspective a co-management regime focus on the health and wellbeing of the Waikato River is the process by which to achieve our objective.

The close connection Ngāti Tahu-Ngāti Whaoa has with the Waikato River is illustrated by the significant number of places held sacred along the River from Te Waiheke o Huka to Pōhaturoa.

2.1.2 NGĀTI KEAROA-NGĀTI TUARĀ

The principal stream of Ngāti Kearoa-Ngāti Tuarā is the Pokaitū. It has its source in native bush at the northern end of the Horohoro Mountain. The Pokaitū Stream joins with the Rahopakapaka and Matahana Streams to become the Tahunaatara Stream.

As these waterways are inextricably linked to and contribute to the very life of the mighty Waikato River, so were they the very source of the cultural, spiritual, historical and traditional customs and practices Ngāti Kearoa Ngāti Tuarā depended on for their very sustenance.

In their original state the catchments were covered in pristine native forests, swamp lands, undulating hills of aruhe (fern) and rolling to easy fertile flats. The traditional association with the Matahanaarea, near Horohoro, can also be traced back to Haukapuanui and Tangiharuru visit to the area, where they were amazed at its fruitfulness. The streams were full of eels and water birds abounded. The bush likewise was full of birds and from that time on, the people lived well due to the plentiful resources.

From flax gathering in their swamp lands, bird snaring in and timber extraction from their forests, from fishing in their streams and from the crops in their cultivations, Ngāti Kearoa-Ngāti Tuarā clothed, protected, fed and sustained themselves, trading their produce on the Waikato River and keeping alive their whakapapa associations and alliances with neighbouring tribes.

The association of Ngāti Kearoa-Ngāti Tuarā with the tributaries of the Waikato River, which all have their beginnings in the tribal rohe, is one which still has great meaning to the people of our Iwi.

2.1.3 TUHOURANGI-NGĀTI WAHIAO

The association of Tuhourangi-Ngāti Wahiao, with the Waikato River itself and with the streams and tributaries of the Whirinaki Catchment is succinctly to be at one with Papatuanuku.

The cultural, spiritual, historic and traditional association of Tuhourangi with the Waikato River catchment and its resources has long been set down by the renowned tribal historian of his time, Mita Taupopoki. In his description of the Tuhourangi- Ngāti Wahiao tribal rohe, he referred to the Waikato River as follows:

2.1 STATEMENT OF SIGNIFICANCE

2.1.3 TUHOURANGI-NGĀTI WAHIAO (CONTINUED)

"...to Rahopaka Stream, thence down said stream along the rohe of Te Whakamaru Block to Ngapopoia-o-Tore, thence to Ohakuri, thence on the Waikato River to Te Motuwhanake, Wharerarauhe, thence it turns east..."

Tuhourangi-Ngāti Wahiao lived on the Parekarangi block, including at Parekarangi Pa. There were many food sources available from the catchment, including fern ground at Pukehou and Omanga. The waterways on Rotomahana Parekarangi provided food sources such as inanga (most likely referring to what we know as kōaro now), which were eaten as a relish for fern roots. There were also rat snaring grounds at Parekarangi, from Tuahuahuto Te Tara-o-te-marama. Tawa berries, a principal ancestral food, were also gathered from Parekarangi, and waka were carved here too.

Tuhourangi-Ngāti Wahiao exercised kaitiakitanga over their resources by declaring rāhui over flax grounds at Parekarangi, including Te Atamarikiriko and at Te Tuakanga East. The rāhui were over the place, the birds and rats.

Tuhourangi had an association with Ngāwapurua, which lies along the Waikato River. There were kumara plantations there. The waterways also provided relishes for kumara, including inanga, birds and rats.

Tuhourangi were also associated with Te Motuwhanake, which is on the River. It was still used as a Pa in the time of Mita Taupopoki's father. Te Pohutu was a burial ground on the Waikato River itself.

2.2 HISTORIC FEATURES AND GROWING THREATS OF THE WAIKATO RIVER

Prior to modification, the Upper Waikato River was rough and turbulent. Many rapids between Huka Falls and Karapiro Dam including the Horahora Falls, Maungatautari Falls and Aniwhaniwha Falls, prevented many species from accessing the upper parts of the river (Allen, 2010). Only stronger swimming species could navigate these rapids and therefore occupy the Upper Waikato River. Other species found upstream were those that do not have a marine phase (e.g. kōaro; see appendix 1 for fish profiles) and those that were moved around by Māori and Pakeha. Between the 1920's

and 1960's, major utilisation of the river for power generation began through a series of hydro dam developments (Table 1). During dam construction, many of the rapids which previously restricted fish passage became submerged by hydro lakes allowing large numbers of fish (including tuna) to access the Upper Waikato River, and again later when dams underwent maintenance shutdowns (Allen, 2010). Since then, hydro dams have restricted fish passage and slowed the flow of the river resulting in an accumulation of sediment, toxins and organic matter behind the dams.

Table 1: Characteristics of the Waikato River hydro dams and hydro lakes.

NAME	DATE COMPLETED [1]	DAM HEIGHT [1]	(MAXIMUM LAKE DEPTH [2]) (M)
Aratiatia	1964	5	5.0
Ohakurī	1961	52	37.5
Ātiamuri	1958	44	28.5
Whakamaru	1956	56	38.0
Maraetai 1 and 2	1953-1962	87	61.0
Waipapa	1961	34	16.5
Arapuni	1929-1946	64	64.0
Karapiro	1947	52	30.5

[1] Allen (2010).

[2] Livingston et al. (1986).

Between the mid-late 1800's, rainbow and brown trout were introduced to Aotearoa and the Waikato catchment. After the introduction of these fish, many native taonga fish became scarce, which was attributed to the predatory nature of the trout. Tuna, kōaro/kōkopu and kōura were a lot harder to find for our tupuna. In 1939, E. E. Vaile wrote 'Pioneering the Pumice', where it states "it is said the native kōkopu and inanga used to abound, but they have disappeared. Doubtless, they have been reincarnated as trout".

During the 600 years (approx.) of Māori occupation in the Ātiamuri Ecological District (which encompasses a greater area than TARIT's legislative borders), numerous wildfires altered the mostly mixed podocarp forests, podocarp-

broadleaved forests, and tussock, fern and manuka scrub to a predominantly tussock-dominated landscape (Wildland Consultants, 2012). During the early 1900s, further land clearing, logging and intensification of farming (including drainage) became more prominent resulting in a noticeable decline in water quality and habitat loss.

During this time of development and change, landowners changed and properties were either sold or leased to unknown buyers and managers. For Te Arawa River Iwi, this resulted in loss of access to traditional gathering spots. Concurrently, more Iwi relocated with their family to towns and cities further damaging their connection with the rivers and losing that mātauranga or traditional knowledge.

2.3 AREAS OF SIGNIFICANCE FOR FISHING

Locations for collecting kai (mahinga kai) were shared within the whānau, and sometimes between whānau. Listed below are some known areas where taonga fish species have traditionally been gathered.

KNOWN MAHINGA KAI LOCATIONS FOR TE ARAWA RIVER IWI

- Deep Creek
- Nga awa purua
- Tuarakereru Stream
- Karapiti Stream
- Patiki Stream
- Te Onewhero
- Kopaki Stream
- Pokaitū Stream
- Waikato River
- Kurarawa Stream
- Pokaiwhenua Stream
- Waimaruru Stream
- Lake Ohakuri
- Rahopakapaka Stream
- Waiotapu Stream
- Matahana Stream
- Rotohokahoka Lagoon
- Whirinaki Stream
- Mangahōanga stream
- Tahunaatara Stream
- Mangakara Stream

2.4 TRADITIONAL METHODS FOR FISHING

Te Arawa River Iwi utilised various tools for catching kai. The ways of fishing were mostly passed down through teaching and observation from parents, older siblings or extended whanau. Many adopted new methods using what they knew and trial and error. Commonly utilised methods among Te Arawa River Iwi include:

BOBBING

Bobbing was usually done for kōura and tuna. Bait was threaded amongst the fibres of harakeke or cabbage tree leaves and left to sit in the water where it would catch the teeth or claws of tuna and kōura. Migrating tuna were very difficult to catch using this method as they cannot be lured with bait. It was the feeding tuna that were caught.

“Bobbing for kōura involved simply a stick, needle, cotton and worms. We would thread worms onto the cotton which was roughly 2-3 feet long and then once the cotton was full we would then tie the cotton around the manuka stick. We would put the stick into the swamp and wait for the kōura to start clawing at the worms and the stick would shake, but we would leave it for a while and wait till the stick was quivering again and that might mean there was more than one kōura on your stick” - E George

“My uncle who was a kaumatua for Te Arawa used harakeke and would muka up the hard end and thread glow worms through the fibres. They would put the bundle of worms under the bank and attract the tuna” - W Hawe

HANDLINE

Homemade handlines were used mostly by rangatahi at the time as a source of entertainment. This involved a stick, nylon line, a hook and bait. This method resembles the recreation version seen today.

“We would use a handline and bait while we waited a few hours for the hinaki, which took about 2-3 hours”. - H Maika

HINAKI

Hinaki were probably the most widely used method for gathering tuna. Hinaki are traps (usually baited with meat) with funnel shaped entrances that makes it easy for tuna to enter and difficult for them to escape. Usually hinaki would have a ‘lid’ at the other end that could be opened to retrieve fish. There were many different shapes and sizes as many were homemade. Traditionally they were commonly made from supplejack from the nearby forests and the hinaki were magnificent pieces of art. Gradually, as western materials become more available the art of crafting hinaki changed. Nowadays, you may find metal loops wrapped in metal wire-mesh or nylon mesh, the latter allowed for the collapse of the hinaki, the same as the fyke nets brought by early dutch settlers.



Hinaki were effective at catching tuna. One rangatira set four hinaki and left them overnight. Upon retrieval the next day they caught enough tuna to feed over 100 manuhiri at a family gathering. This is just one of many times when they would have experienced similar or greater catches for other hui or tangihana in the area.

HOME MADE NETS

Nets were used to catch many species of fish. One species was morihana which were easy to catch with any type of net in swampy, warm and/or raupo growing waters.

2.4 TRADITIONAL METHODS FOR FISHING

“People would [start upstream and] chase morihana downstream into others holding bags” - A Katene

Homemade scoop nets were used alongside rama (torch) to scoop kōura from smaller tributaries.

RAMA KŌURA AND RAMA TUNA (SPOTLIGHTING)

Rama kōura and rama tuna involved the use of some kind of torch. Many stories from kaumatua and kuia recall times before battery operated torches were around. Home made torches were made from available resource to illuminate the water.

“We used tyres cut in half and attached onto wood. The tyre was lit on fire as a light and we used scoops to catch the kōura.” - H Maika

MATARAU (SPEARING) AND GAFFING

Spears (or matarau) were sharpened blades attached to the end of a stick. Gaffs are large steel hooks on the ends of sticks. Both were used to catch tuna.

These tools were likely influenced by the availability of metal.

“Gaffing was good after floods where grasslands were swamped. We would throw the eels from the swamps onto the banks sometimes catching hundreds. After cleaning and gutting them, we would give them to the whānau, especially koroua and kuia that couldn’t get out.” - H Maika

RAPU

Rapu involved searching for kōura by feeling with hands and feet. This was sometimes done at night with rama (torches) in shallow water. Cobbles and stones were turned over and some would feel in the cracks and crevices along the stream. Similar methods were used among Māori for collecting kākahi in the shallow, muddy areas. Both men and women would feel for kākahi using their hands and toes, and place the mussels into bags.

“Originally my father and my elder brothers would catch kōura by hand. This was before scoop nets” - H Maika

2.5 TRADITIONAL FISHERIES MANAGEMENT TOOLS

Te Arawa river Iwi recognised the importance of restricting or limiting fishing pressure. The following practices were used in some places to protect the resource.

RĀHUI

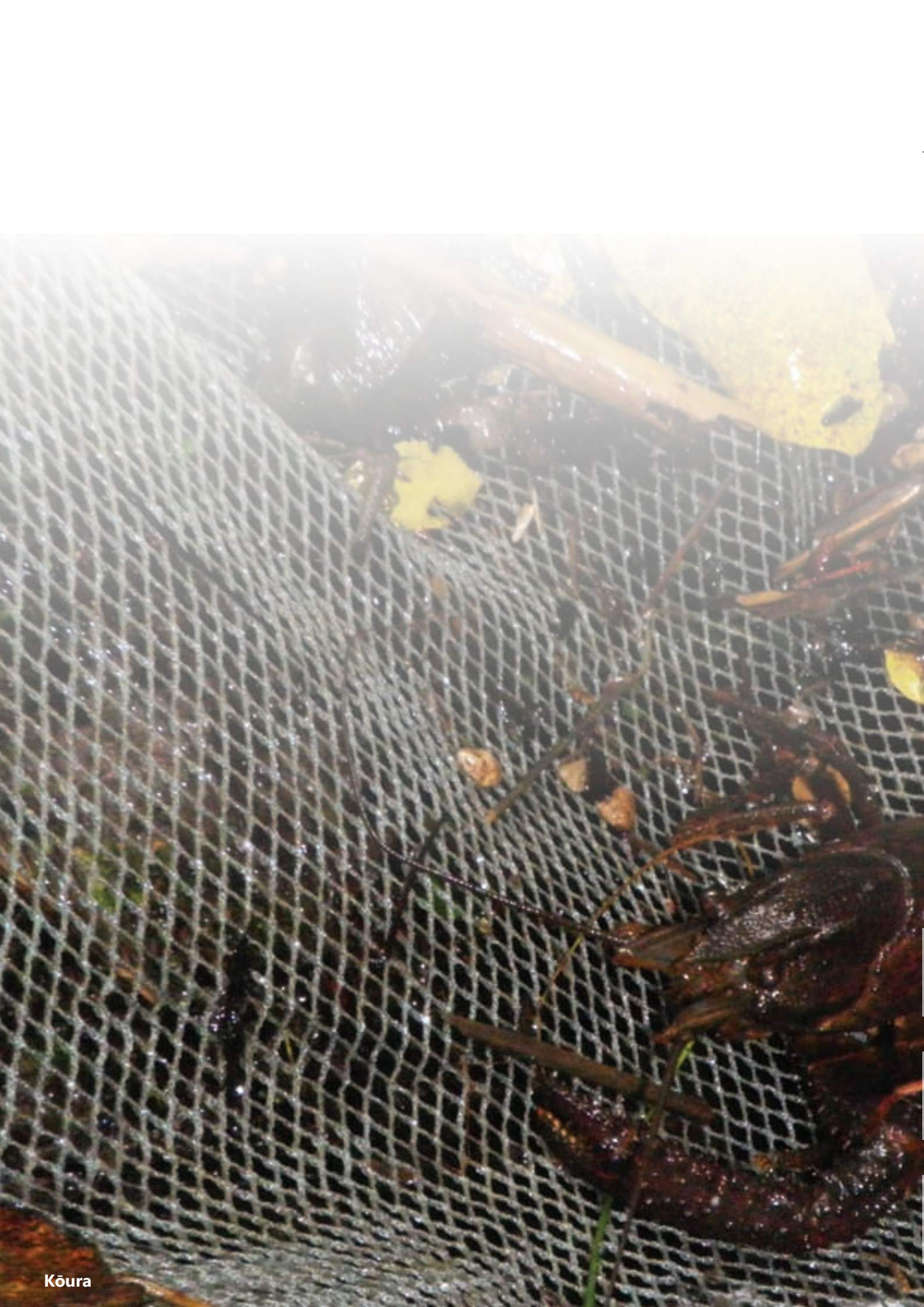
Rāhui were set up across Aotearoa as a means of protecting resources and allowing for natural recovery of the population. Essentially rāhui refers to a ban on a particular resource in a certain area. Rāhui over the resource were uplifted once the resource was thought to be in a stable state. In a similar fashion, Te Arawa River Iwi utilised a variety of food sources, and moved nomadically between food sources to allow for natural recovery and seasonal changes. There were indicators which signalled that it was the appropriate time to collect kai.

“Once you begin to see the ladybird or flowing of the manuka, it was time to collect the kōura” - H Paikea

SIZE LIMITATIONS

Much like size restrictions in place today, Iwi would return fish to the water that were considered undersized and not ready for consumption. This occurred for many taonga species including tuna, kōura and kākahi.

The size limit were determined by Iwi and whānau and shared via word of mouth. Te Arawa River Iwi have stated that when collecting kai, there were so many large individuals that smaller fish or kōura were rare to catch.



Kōura

PART THREE: FISH SPECIES



CUSTOMARY TAONGA SPECIES

NON-TAONGA SPECIES

UNWANTED FISH

FISH SPECIES

This section identifies the fish species (traditional taonga and non-taonga) recorded in the Waikato River (between Ātiamuri Dam and

Huka Falls, including all the tributaries). Detailed descriptions of each species can be found in Appendix 1.

3.1 CUSTOMARY TAONGA SPECIES

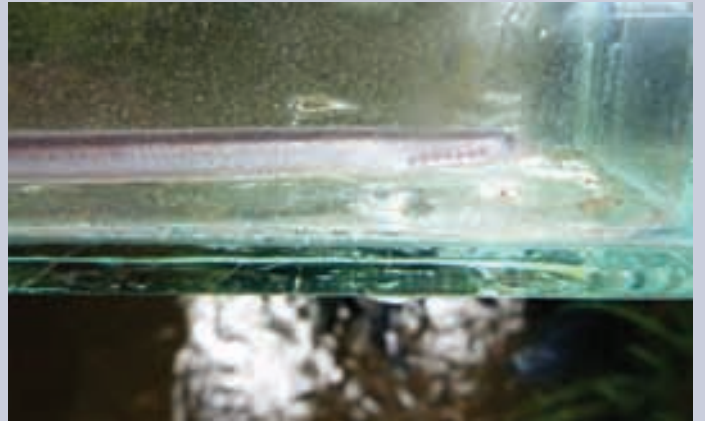
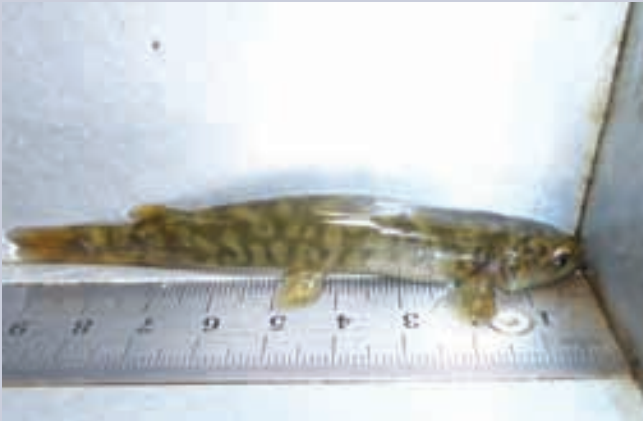


3.1.1 Tuna - Longfin eel (*Anguilla dieffenbachii*, left)
Tuna - Shortfin eel (*Anguilla australis*, right; Photos: Callum Bourke).



3.1.2 Kōura (*Paranephrops planifrons*; Photo: Clint Prior)
Kākahi (*Echydella menziesii*; Photo: Mark Hamer).

3.1 CUSTOMARY TAONGA SPECIES



3.1.3 Kōaro/ Kōkopu (*Galaxias brevipinnis*; Photo: Kristopher Taipeti)
Piharau (*Geotria australis*; Photo: Callum Bourke).



3.1.4 Morihana (Wild goldfish; *Carassius auratus*; Photo: Helen McCaughan).

3.2 NON-TAONGA SPECIES



3.2.1 Common bully (*Gobiomorphus cotidianus*; Photo: Simon Elkington)
Crans bully (*Gobiomorphus basalis*; Photo: Callum Bourke).



3.2.2 Pōrohe (Common smelt; *Retropinna retropinna*; Photo: DoC).

3.2 NON-TAONGA SPECIES



3.2.3 Trout

- 3.2.3.1 Rainbow trout (*Oncorhynchus mykiss*)
- Brown trout (*Salmo trutta*; Photos: DoC).



- 3.2.3.2 Brook char (*Salvelinus fontinalis*; Photo: Eastern Fish & Game).

3.3 UNWANTED FISH



3.3.1 Brown bullhead catfish (*Ameiurus nebulosus*; Photo: Kristopher Taipeti)
Rudd (*Scardinius erythrophthalmus*; Photo: DoC).



3.3.2 Gambusia (*Gambusia affinis*) (Photo: Callum Bourke)
Guppy (*Poecilia reticulata*)

PART FOUR: CURRENT ISSUES AND THREATS

PROTECT OUR WATERWAYS

Help slow the spread of Didymo and other freshwater pests. Always:

CHECK

Remove all obvious unwanted material from items that have been in contact with water.

CLEAN

Clean all equipment with a detergent solution ensuring surface contact for one minute. You can use a five percent solution of dishwashing liquid that you can buy from a supermarket.

DRY

Drying equipment for 48 hours will kill Didymo and other freshwater pests.



4.1 CURRENT ISSUES & THREATS

Many of the current issues related to the Waikato River are a result of the changes in landscape and development of artificial barriers that took place during the 1900s. Three broad issues have been highlighted as serious by Te Arawa River Iwi although there are other issues of concern to iwi. These are the barriers (e.g. hydro dams, culverts), degraded water quality and habitat loss.

The hydro dams have created an artificial barrier for migrating fish such as tuna, and changed the hydrodynamics of the Upper Waikato River. The trap and transfer of elvers (juvenile tuna) from below Karapiro dam into the hydro lakes above (see appendix 3) have provided a temporary solution but is not sustainable. By doing this, more individuals are removed from the breeding population resulting in potentially fewer individuals heading out to spawn. In addition, recent evidence has suggested that this sudden re-introduction of high tuna numbers may have negative impacts on the abundance of kōura (Clearwater et al, 2014), suggesting that a possible re-examination of the transfer program is needed.

The hydro dams also changed the flow characteristics of the river creating lakes and a build-up of material which otherwise would have washed and diluted downstream. Included in this build-up is geothermally-sourced mercury and arsenic from natural and artificial outlets. These contaminants are thought to accumulate in fish and invertebrates (e.g. kākahi) causing concerns when consuming these taonga species.

A decline in water quality is attributed to the changing and intensifying land uses. Algal blooms, turbidity and other water quality measures impact on species distribution. For example, species such as the longfin eel prefer clear flowing streams so the increase in turbidity and water temperature

is likely affecting the distribution of this tuna species. In addition, there are elevated levels of arsenic and mercury compared to 60 years ago. These heavy metals are toxic to humans and it concerns much of Te Arawa River Iwi that many of the kai species are now contaminated with these metals. Only occasional harvesting of tuna and trout is recommended, trout becoming a greater component in the diet of Iwi because of their abundance.

The combined activities of logging, river straightening, clearance of streambank vegetation and clearance of drains removed much of the stream habitat utilised by fish and kōura (David & Speirs, 2010). Without refuge and cover, fish species become more susceptible to predation and flood events (Parkyn & Collier, 2004) and for most species, a valuable source of food is removed in the process (e.g. kōura which feed on fallen wood and also the invertebrates that colonise the fallen wood).

In 2001, operation of the Waikato hydro system was modified to allow greater flexibility in power generation (MRP, 2001). This results in the daily fluctuations of lake levels, also known as flow ramping. It is thought that this flow ramping exposes much of the littoral (fringe) habitat which could otherwise be occupied by kōura and kākahi (Clearwater et al, 2014).

Pest fish also appear to have an important direct and indirect impact on taonga species. Direct impacts include predation (e.g. catfish predation on kōura; Clearwater et al, 2014) and competition (e.g. catfish competing with tuna). Indirect impacts include water quality decline due to feeding behaviours (e.g. catfish and gambusia feeding disturbs sediment and increases turbidity).

PART FIVE: OBJECTIVES AND METHODS



PERFORMANCE INDICATORS AND REVIEW

5.1 OBJECTIVES AND METHODS

This section sets out the ‘ultimate fisheries goal’ for Te Arawa River Iwi and methods to reach those goals. Sections are based on the issues mentioned above. For each issue, TARIT has outlined policies and actions to achieve the objective. These objectives, policies and actions are fully aligned with the policies and actions described in TARIT’s EMP. For more information on TARIT’s aspirations, refer to the TARIT Environmental Management Plan and those of our three river Iwi.

FISHERIES OBJECTIVE

“To protect, restore and provide sustainable management of the unique fisheries resources within the rohe, including the restoration of a sustainable tuna fishery” (Fisheries accord, Sec 4.1).

POLICY	ACTION
<p>F01 Promote the restoration of habitat for freshwater fish within the TARIT Area of Interest</p>	<p>F1.1 TARIT to support riparian planting and restoration projects led by, or involving, Te Arawa River Iwi and/or Māori landowners within the TARIT Area of Interest. Support could include funding and technical assistance.</p> <p>F1.2 TARIT to support initiatives by Te Arawa River Iwi to work together and/or with others in relation to restoration projects. This could include landowners, local community groups, other Waikato River Iwi and external agencies such as the Waikato Regional Council, Fish and Game NZ, Crown Research Institutes (i.e. Landcare Research) and Department of Conservation.</p>
<p>F02 Support efforts to improve fish passage within the TARIT Area of Interest</p>	<p>F2.1 TARIT to support and promote research by Mighty River Power, Waikato Regional Council and Crown Research Institutes (i.e. NIWA) addressing restricted migration by native diadromous species e.g. tuna, kōkopu</p> <p>F2.2 TARIT to support initiatives by the Waikato Regional Council and Department of Conservation to:</p> <ul style="list-style-type: none"> i) reduce the current numbers of brown bullhead catfish, gambusia and rudd in the TARIT Area of Interest. ii) ensure that koi carp (<i>Cyprinus carpio</i>) do not become established in the TARIT Area of Interest.
<p>F03 Improved water quality within the TARIT Area of Interest</p>	<p>F3.1 TARIT to support efforts by the Waikato Regional Council in controlling land-use activities that have significant effects on water quality.</p>
	<p><i>Cross reference with Land Policies L02 & L03 from the TARIT Environmental Management Plan</i></p>

5.1 OBJECTIVES AND METHODS

POLICY	ACTION
<p>F04 Improved fisheries monitoring within the TARIT Area of Interest.</p>	<p>F4.1 TARIT to work with the Ministry of Primary Industries in relation to the Upper Waikato River Fisheries Regulations</p> <p>F4.2 Waikato Regional Council to prepare a summary report outlining what fisheries monitoring is carried out within the TARIT Area, where and how often</p> <p>F4.3 TARIT to work with the Waikato Regional Council to identify the location(s) of additional fisheries monitoring sites within the TARIT Area of Interest</p> <p>F4.4 Waikato Regional Council and NIWA to identify opportunities to involve Te Arawa River Iwi in freshwater monitoring programmes.</p>
<p>F05 Prevent the spread of unwanted plants, pest fish and organisms (e.g. didymo)</p>	<p>F5.1 TARIT, Ministry of Primary Industries, Waikato Regional Council and Department of Conservation to share knowledge with Te Arawa River Iwi and raise awareness in relation to:</p> <ul style="list-style-type: none"> i. What type of freshwater pest animals, pest fish and organisms are found within the TARIT Area of Interest ii. How to manage freshwater pest animals, pest fish and organisms iii. Freshwater pest management projects that Te Arawa River Iwi could get involved with and/or lead <p>F5.2 TARIT to support initiatives by the Waikato Regional Council and Department of Conservation to:</p> <ul style="list-style-type: none"> i. reduce the current numbers of brown bullhead catfish, gambusia and rudd in the TARIT Area of Interest. ii. ensure that koi carp (<i>Cyprinus carpio</i>) do not become established in the TARIT Area of Interest.
<p>F06 Advocate for improved access to, and along, waterways within the TARIT Area of Interest</p>	<p>F6.2 TARIT to work with regional and local authorities as well as private landowners and Māori land trustees (through relevant Runanga) to identify areas where waterway access can be enabled or enhanced.</p>
<p>F07 Opportunities for aquaculture within the TARIT Area of Interest are pursued</p>	<p>F7.1 TARIT to work with the Ministry for Primary Industries and Te Wai Māori Trust to share information and knowledge with Te Arawa River Iwi regarding freshwater aquaculture.</p> <p>F7.2 TARIT to support initiatives by its Te Arawa River Iwi to investigate the feasibility of a tuna or kōura fishery (instream or land based) within the TARIT Area of Interest.</p>

5.2 PERFORMANCE INDICATORS AND REVIEW

To monitor the delivery of this Fisheries Plan, TARIT will report on progress towards the following key performance indicators (KPIs). Updates will be given at annual formal meetings (e.g. AGM, JMA meetings) and key publications (AGM report) briefly describing the progress of the actions mentioned above. This Fisheries Plan will be reviewed in 10 years to determine the effectiveness of the 'actions' and whether TARIT are closer to reaching the desired

objective(s), however, should changes be needed earlier, TARIT may decide to hold a review before the 10-year review date. At this review, there will be the opportunity to amend part or all of this Plan to reflect the changes that TARIT believe will make this Plan more effective, informative and applicable to achieve the trusts ultimate fisheries goal.

NB: Some KPIs may indicate a positive step for multiple objectives.

POLICY AREA	KEY PERFORMANCE INDICATORS
Habitat restoration, fish passage, water quality, biosecurity risks	Report(s) from TARIT and agencies to Te Arawa River Iwi regarding the results from work focusing on habitat restoration, fish passage, water quality and biosecurity
River monitoring	Upper Waikato River customary fishing regulations are operational and kaitiaki and permits are appointed/issued Iwi attendance in river monitoring programmes (e.g. WRC water quality and biodiversity sampling).
Integrated management	Upper Waikato River customary fishing regulations are operational and kaitiaki and permits are appointed/issued. Development/drafting of an Upper Waikato Integrated Management Plan Joint implementation of Iwi Fisheries Plans

PART SIX: REFERENCES



REFERENCES

REFERENCES

- Allen, D. G. (2010).** Eels in the Waikato catchment. Client Report for Mighty River Power Ltd, Hamilton. 105 pp.
- Barnes, G. E., and Hicks, B. J. (2003).** Brown bullhead catfish (*Ameiurus nebulosus*) in Lake Taupo. *Managing invasive freshwater fish in New Zealand: proceedings of a workshop hosted by Department of Conservation*, 10–20 May 2001, Hamilton.
- Booker, J. (2000).** Smelt (*Retropinna retropinna*) displacement and population dynamics in the Waikato River system. Unpublished MSc thesis. The University of Waikato.
- Butterworth, J. (2008).** Lake Rotokakahi: The kakahi (*Hyridella menziesii*) in a general framework of lake health. Unpublished MSc thesis. University of Waikato.
- Chisnall, B. L., Hicks, B. J. (1993).** Age and growth of long finned eels (*Anguilla dieffenbachii*) in pastoral and forested streams in the Waikato River basin, and in two hydroelectric lakes in the North Island, New Zealand. *New Zealand Journal of Marine and Freshwater Research* 27, 317–332.
- Clearwater, S. J., Kusabs, I. A., Budd, R., Bowman, E. (2014)** Strategic evaluation of kōura populations in the Upper Waikato River. NIWA Client Report: HAM2014-086. National Institute of Water and Atmospheric Research Ltd, Hamilton.
- Coffey, B. T. (1997).** A contribution to a biological description of instream community structure along seven permanent transects across Lake Ātiāmuri, Middle Waikato River. Summer 1996–97. SEM/L Ātiāmuri, MWR: 01 E.W.: 53
- David, B. O., Speirs, D. A. (2010).** Native Fish. Chapter 10. In: Waters of the Waikato: Ecology of New Zealand's longest river (pp 193–208). K. J. Collier, D. P. Hamilton, W. Vant and C. Howard-Williams (Eds.) Environment Waikato/ University of Waikato.
- Devcich, A. A. (1979).** An ecological study of *Paranephrops planifrons* (White) (*Decapoda: Parastacidae*) in Lake Rotoiti, North Island, New Zealand. Unpublished PhD thesis, University of Waikato, Hamilton, New Zealand.
- Eastern Fish and Game Council. (2014).** Sports fish and game management plan. Eastern Fish and Game Council, Rotorua.
- Goodman, J. M., Dunn, N. R., Ravenscroft, P. J., Allibone, R. M., Boubée, J. A. T., David, B. O., Griffiths, M., Ling, N., Hitchmough, R. A., Rolfe, J. R. (2013).** Conservation status of New Zealand freshwater fish, 2013. *New Zealand Threat Classification Series 7*. Department of Conservation, Wellington.
- Grainger, N., Collier, K., Hitchmough, R., Harding, J., Smith, B., Sutherland, D. (2013).** Conservation status of New Zealand freshwater invertebrates. *New Zealand Threat Classification Series 8*. Department of Conservation, Wellington.
- Hicks, B. J. (2003).** Biology and potential impacts of rudd (*Scardinius erythrophthalmus L.*) in New Zealand. In Munro, R. (Ed). Managing invasive freshwater fish in New Zealand. Proceedings of a workshop hosted by Department of Conservation. 10–12 May 2001, Hamilton, (pp.49–58). Wellington, New Zealand: Department of Conservation.
- Hicks, B. J., Ling, N., Wilson, B. J. (2010).** Introduced Fish. Chapter 11. In: Waters of the Waikato: Ecology of New Zealand's longest river (pp 209–228). K. J. Collier, D. P. Hamilton, W. Vant and C. Howard-Williams (Eds.) Environment Waikato/ University of Waikato.
- Hicks, B. J., Allen, D. G., Kilgour J. T., Watene - Rawiri, E. M., Stichbury, G. A., Walsh, C. (2013).** Fishing activity in the Waikato and Waipa Rivers. Environmental Research Institute Report No. 7. Client report prepared for the Ministry for Primary Industries. Environmental Research Institute, Department of Biological Sciences, Faculty of Science and Engineering, The University of Waikato, Hamilton.
- Hopkins, C. L. (1967).** Breeding in the freshwater crayfish *Paranephrops planifrons* White. *New Zealand Journal of Marine and Freshwater Research* 1: 51–58.
- James, A. (2008).** Ecology of the New Zealand lamprey (*Geotria australis*): A literature review. Department of Conservation, Wanganui.

REFERENCES

Jones, J. B. (1981). The aquaculture potential of New Zealand freshwater crayfish. *New Zealand Agricultural Science* 15: 21-23.

Livingston, M. E., Biggs, B. J., Gifford, J. S. (1986). Inventory of New Zealand lakes. Water and Soil Miscellaneous. No. 80 and 81. National Water and Soil Conservation Organisation, Wellington.

Martin, M. L., Boubée, J. A. T., Bowman, E. (2013). Recruitment of freshwater elvers 1995-2012. *New Zealand Fisheries Assessment Report* 2013/50: 111.

McDowall, R. M. (2000). The Reed field guide to New Zealand freshwater fishes. Auckland: Reed Publishings (NZ) Ltd.

McDowall, R. M. (2011). Ikawai: Freshwater fishes in Māori culture and economy. Canterbury University Press, Christchurch.

Mighty River Power (MRP). (2001). Unpublished Taupo Waikato resource consents assessment of effects. March 2001. Mighty River Power, Hamilton.

NIWA. (2010). Waikato River independent scoping study: Te Arawa, Mataarae marae. NIWA Client Report: WLG2010-2. National Institute for Water and Atmospheric Research Ltd, Wellington.

Parkyn, S. M., Collier, K. J. (2004). Interaction of press and pulse disturbance on crayfish populations: flood impacts in pasture and forest streams. *Hydrobiologia* 527: 113-124.

Parkyn, S., Kusabs, I. (2007). Taonga and mahinga kai species of the Te Arawa lakes: a review of current knowledge - kōura. NIWA Client Report: HAM2007-022. National Institute for Water and Atmospheric Research Ltd, Hamilton.

Speirs, D. A., Allen, D. G., Kelleher, R. M., Lake, M. D., Marchant, A. N., Mayes, K. A., Watene-Rawiri, E. M., Wilson, B. J. (2010). River management. Chapter 2. In: Waters of the Waikato: Ecology of New Zealand's longest river (pp 209-228). K. J. Collier, D. P. Hamilton, W. Vant and C. Howard-Williams (Eds.) Environment Waikato/ University of Waikato.

Walker, K. F., Bryne, M., Hickey, C. W., Roper, D. S. (2001). Freshwater mussels (Hyriidae) of Australasia. In: Bauer and Wachtler (Eds.). Ecology and evolution of the freshwater mussel unionoida. Springer-Verlag, Berlin. pp 5-31.





PART SEVEN: APPENDICES



APPENDIX 1 FISH TECHNICAL PROFILES

APPENDIX 2 NZ THREAT CLASSIFICATION RANKING

APPENDIX 3 NUMBERS OF ELVERS TRANSFERRED FROM LAKE KARAPIRO

APPENDIX 4 SUMMARY OF UPPER WAIKATO RIVER CUSTOMARY FISHING REGULATIONS

APPENDIX 1: FISH TECHNICAL INFORMATION

The following information provides background into the behaviour and ecology of the species mentioned in this report (both taonga and non-taonga species). Also, the current national threat status for each species or group is mentioned (Goodman et al, 2013; Grainger et al, 2013). See appendix 2 for a ranking of the threat classifications.

TAONGA SPECIES

LONGFIN EEL

NZ threat classification: At risk (declining) - Very large population and low to high ongoing or predicted decline.

Longfin eels are endemic to New Zealand, which means they are found in no other country. They prefer flowing rivers and are adept climbers, resulting in their distribution far inland and at high elevations. Like many of New Zealand's other native freshwater fish, this species requires passage to and from the sea, where they spawn in the western subtropical regions of the Pacific ocean (McDowall, 2011). Females can reach a maximum size of over 2m and weigh more than 30kg, while males can grow to about 700mm (McDowall, 2000). Males and females reach maturity at 25 and 35 years of age respectively, however, some females could reach 80 years of age before maturing.

LONGFIN EELS ARE ENDEMIC TO NEW ZEALAND, WHICH MEANS THEY ARE FOUND IN NO OTHER COUNTRY.

The tuna heke (downstream migration) of longfins ready for breeding takes place between February and April. Migrant adults have characteristic features: These include enlarged eyes; a flatter more stream-lined head; thinner lips; and darkening of the pectoral fins, head and back. Growth of both long and short fin tuna is highly variable, influenced by sex and environmental factors. One study found that tuna in pasture stream and hydro-lakes grow faster than forest-living tuna, which is likely due to warmer temperatures and increased productivity which likely leads to increased food resources (Chisnall & Hicks, 1993). Larger female tuna produce more eggs than smaller females meaning that they provide a larger contribution to the juveniles which may find their

way back to New Zealand, however, these females takes several decade to reach larger sizes and will likely be killed before they get the opportunity to spawn.

SHORTFIN EEL

NZ threat classification: Not threatened - Resident taxa that have large stable populations.

Shortfin eels can be found in a wide variety of habitats such as lakes, swamps, drains, rivers and streams. Unlike the longfin, shortfin eels can also be found in Australia. Shortfin eels also require access to the ocean for spawning like longfins. Female shortfin eels reach maturity at approximately 25 years of age or more, and can grow to 3.5 kg, while males mature earlier, at age 15. Within the hydro lakes of the Upper Waikato River, some tuna reach legal commercial size (0.22-4 kg) after 2-3 years (David & Speirs, 2010), potentially due to the warmer waters and abundant food source. The tuna heke for shortfins occurs between April and June. Migrant adults display similar features to migrant longfins (flatter head, thinner lips, enlarged eyes and darker colouration on head and back).

The most common approach to distinguish long and shortfin eels is by observing the starting points of the dorsal and anal fins (see figure 6). For shortfin eels, the fins originate almost at the same point along the body, whereas, the Longfin, the anal fin starts further down the body compared to the dorsal fin. In young tuna (elvers), identifying species can become difficult.

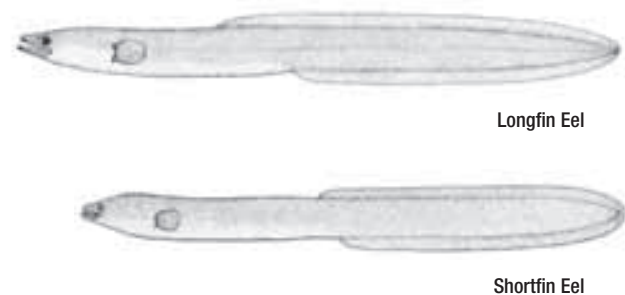


Figure 6: Starting point for the dorsal and anal fins of the Longfin and Shortfin eels (source: Ministry of Fisheries).

APPENDIX 1: FISH TECHNICAL INFORMATION

KŌURA

NZ threat classification: Not threatened - Resident native taxa that have large stable populations.

The lifecycle and growth of kōura can be influenced significantly by environmental factors (e.g temperature). Breeding may occur year round but it mainly takes place from April to June where eggs develop over winter. Another breeding period occurs from October to December (Devcich, 1979). Hatchlings usually remain on their mothers for 3 weeks before falling off. The whole breeding period could last between 25-26 weeks for stream populations (Hopkins, 1967).

Stream populations of kōura are thought to reach maturity at 18-24 months of age (Jones, 1981). The number of eggs produced is likely dependant on size of the female. 20-30 eggs were observed on 17mm carapace length females, compared to 150 eggs found on 30mm carapace length females (Hopkins, 1967). Few kōura are thought to survive the first year after parting with their mother. Stream kōura may live for 4-5 years (approximately 35mm OCL; see figure 9) (Parkyn & Kusabs, 2007) however, one female from Lake Rotoiti was thought to be 20 years old (Devcich, 1979).

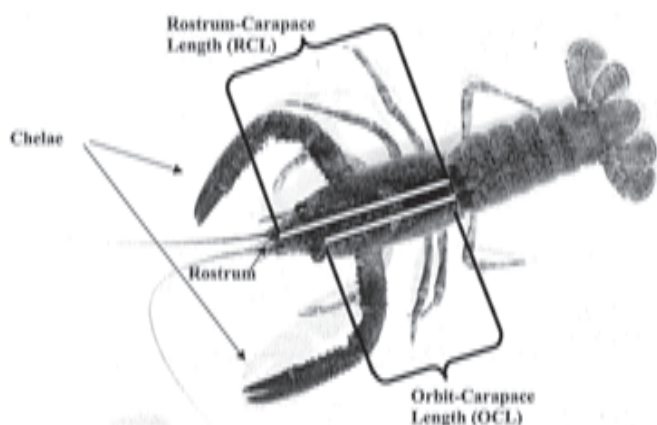


Figure 9: The OCL and RCL are commonly used methods for measuring kōura size (source: Parkyn & Kusabs, 2007).

KĀKAHI

NZ threat classification: At risk (declining) - very large population and low to high ongoing or predicted decline.

The native freshwater mussel (*Echyridella menziesii*) were plentiful in the Upper Waikato River. They are typically found at depths of 3-15m on gentle slopes of sand to muddy-type substrates (Kākahi can reach sizes exceeding 100mm and live for up to 33 years (Walker et al, 2001). They are filter feeding animals which means they feed by filtering particles from the surrounding water. Therefore, kākahi can have important water cleaning properties, especially in high densities (Butterworth, 2008).

Kākahi have a parasitic larval stage where tiny glochidia (kākahi larvae) are liberated into the water column from within adult shells and attach to the gills of fish, which are mainly kōaro. After a few weeks of feeding off the kōaro gills, the larvae fall off and are not seen again until they are at least 5mm in length (McDowall, 2000). Kākahi are not as common in Lake Taupō like they once were, and the reason for their decline is unknown, but some causes may include a decrease in kōaro (larvae host) abundance in the Waikato River, predation from kōura or competition with introduced weeds. During the kōura surveys of the Upper Waikato River, kākahi were common in the mainstem above Orakei Korako and in dense aggregations in Lake Ohakuri (Clearwater et al, 2014).

KŌARO / KŌKOPU

NZ threat classification: At risk (declining) - Very large population and low to high ongoing or predicted decline.

Kōaro (*Galaxias brevipinnis*) are commonly referred to as kōkopu by Te Arawa River Iwi. Kōaro belong to a group which also includes the inanga (*Ga. maculatus*), banded kōkopu (*Ga. fasciatus*), giant kōkopu (*Ga. argenteus*) and the shortjaw kōkopu (*Ga. postvectis*). These galaxiids and pōrohe make up the whitebait, a popular source of kai downstream. Although galaxiids are diadromous, kōaro are also capable of forming landlocked populations, which likely explains their presence in Lake Taupō and the Rotorua Lakes. For kōaro caught in the upper Waikato over the last few decades, they were probably recruiting from Lake Taupō as opposed to marine recruits. Kōaro are very capable climbers which allows them to reach habitat far inland.

APPENDIX 1: FISH TECHNICAL INFORMATION

PIHARAU

NZ threat classification: Threatened (Nationally vulnerable) - moderate population, with population trend that is declining.

Piharau or lamprey (*Geotria australis*) were once and important mahinga kai species to Te Arawa River Iwi (NIWA, 2010). In the South Island they are known as kanakana. Piharau spawn and die in small, shady, hard-bottomed streams. Larvae spend 4 years in freshwater as filter feeders before migrating to the ocean where they live as parasites on marine fish and possibly whales (James, 2008). After 3-4 years as an adult in the ocean, the adults migrate back into freshwater moving upstream ready to spawn.

MORIHANA

NZ threat classification: Introduced and naturalised - taxa that have become naturalised in the wild after being deliberately or accidentally introduced into New Zealand by human agency.

Wild goldfish (*Carassius auratus*) or morihana were introduced into the Waikato in 1871 and is now the most widespread introduced fish in the catchment (Hicks et al, 2010). Morihana have been used as a source of kai by Te Arawa River Iwi because of the relative ease of catching them. Some Iwi are known to use morihana as rongoa (medicine).

Morihana can reach at least 450mm and 3 kg and prefer shallow macrophyte beds in slow-flowing lakes and rivers (Hicks et al, 2010). According to many, morihana are not regarded as pests but they do have the potential to resuspend sediment, which leads to reduced water quality, and morihana also compete with native fish (Hicks et al, 2010).

NON-TAONGA

PŌROHE

NZ threat classification: Not threatened - Resident taxa that have large stable populations.

The common smelt (*Retropinna retropinna*) is widespread throughout the Waikato River and in Lake Taupō (Booker, 2000). Some people refer to smelt as inanga. Although they are native, pōrohe were not

naturally found in Lake Taupō. Their introduction to the Upper Waikato River and Lake Taupō coincides with the establishment of trout fisheries in these parts, as pōrohe comprise a large component of the trout diet. Pōrohe are diadromous but can also form landlocked populations like the kōaro. The turbulent nature of the Waikato River may have prevented the passage of pōrohe to the Upper Waikato River.

COMMON BULLY AND CRANS BULLY

NZ threat classification: Not threatened - Resident taxa that have large stable populations (both species).

Also known as common bully (*Gobiomorphus cotidianus*), which are found throughout the Waikato River. They can be diadromous or land-locked and tend to favour slow flowing waterways. Common bully can reach sizes over 120mm and are known prey for tuna and trout. Another species similar in appearance is the Cran's bully (*Go. basalis*). Cran's bully have been found in the Upper Waikato River in the past but their abundance and distribution is now unknown. Cran's bully have no marine phase so their ability to colonise river systems is reduced compared to diadromous species

TROUT

NZ threat classification: Introduced and naturalised - taxa that have become naturalised in the wild after being deliberately or accidentally introduced into New Zealand by human agency (all three species).

Three species of trout are found in the Upper Waikato River. Rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*) were introduced to Aotearoa in the late 1800s and are native to California and the UK respectively. Rainbow trout typically live shorter than brown trout (4 and 7 years respectively) which also explains why browns can reach greater sizes than rainbows (Hicks et al, 2010). Brook trout (or Brook char; *Salvelinus fontinalis*) was also introduced around the same time. All three species require clean, cool, well oxygenated water which limits their distribution. During the summer, trout are excluded from the lower Waikato due to elevated water temperatures (Hicks et al, 2010). Brook char have limited distribution (Tahunaatara and Wairakei Streams) as they are regularly outcompeted by the other two trout species (Eastern Fish and Game Council, 2014). Rainbow and brown trout are found throughout the

APPENDIX 1: FISH TECHNICAL INFORMATION

catchment. Trout are classified as sports fish under the Conservation Act 1987 and managed by Fish & Game New Zealand. The trout fishery found in the Upper Waikato River is a self sustaining wild population and not actively stocked like the lower Waikato River hydro lakes (Arapuni/Karapiro) and some other fisheries within New Zealand.

UNWANTED FISH

BROWN BULLHEAD CATFISH

NZ threat classification: Introduced and naturalised - taxa that have become naturalised in the wild after being deliberately or accidentally introduced into New Zealand by human agency.

The brown bullhead catfish (*Ameiurus nebulosus*) are native to the southern and eastern states of America, and can live up to 8 years old and grow to 500mm or 3 kg (Hicks et al, 2010). Catfish are tolerant of a variety of environmental conditions which likely explains their wide distribution throughout the Waikato catchment. Juvenile fish feed on small invertebrates, plant material and detritus whereas adults feed on kōura and also other fish (Hicks et al. 2010). Barnes and Hicks (2003) have found that catfish greater than 250mm tend to consume more kōura than smaller catfish which is problematic considering the average size of catfish in the Waikato in 270mm (Hicks et al, 2010).

GAMBUSIA

NZ threat classification: Introduced and naturalised - taxa that have become naturalised in the wild after being deliberately or accidentally introduced into New Zealand by human agency.

Mosquitofish (*Gambusia affinis*) also go by the name "gambusia" are native to Central America and were spread globally because of their ability to consume large quantities of mosquitoes. Males and females grow to approximately 35mm and 60mm respectively. Gambusia are live bearers which means they give birth to live young as opposed to laying eggs like trout, catfish and many other fish. These fish are short lived but grow rapidly, reaching maturity in six weeks (Hicks et al, 2010). Mature females are capable of producing 150 young fish every 4 weeks under ideal conditions. Moreover, 10 female gambusia could

potentially produce 5 million descendants in 6 months under ideal conditions (Hicks et al, 2010).

Gambusia are widespread through the Waikato River catchment and can tolerate a wide variety of habitats including freezing and very warm temperatures (40°C) and oxygen depleted water (Hicks et al, 2010). They can be found in shallow water less than 1 metre and feed on small invertebrates.

GUPPY

NZ threat classification: Introduced and naturalised - taxa that have become naturalised in the wild after being deliberately or accidentally introduced into New Zealand by human agency.

Guppy (*Poecilia reticulata*) have been detected in the Upper Waikato River since 1979 although they were probably introduced to New Zealand sometime in the 1920's (New Zealand Freshwater Fish database; NIWA website). These introductions were probably via aquarium liberations (Hicks et al, 2010). They are livebearers like gambusia and reach a size of 60mm. Guppies mature in only a few weeks but their distribution is restricted to the geothermal streams of Reporoa. For this reason, guppy are not considered threats. Guppy have been found in the Waiotapu Stream and Waihunuhunu Stream.

RUDD

NZ threat classification: Introduced and naturalised - taxa that have become naturalised in the wild after being deliberately or accidentally introduced into New Zealand by human agency.

Rudd (*Scardinius erythrophthalmus*) belong to the carp family, along with morihana/goldfish. Rudd were illegally introduced and spread throughout New Zealand between 1960 and 1980 (Hicks, 2003). Single individuals were found in Ātiāmuri in 1997 and 2014 during kōura surveys (Coffey, 1997; Clearwater et al, 2014). Rudd can reach sizes of 200mm. Juveniles feed on invertebrates and are carnivorous but adults are predominantly herbivorous, eating mainly native plants. Rudd are classified as a noxious pest fish throughout New Zealand under the Freshwater Fisheries Regulations 1983. However, within the Auckland/Waikato Fish & Game Region, rudd are considered a sports fish and are managed by the Auckland/Waikato Fish and Game Council.

APPENDIX 2: NEW ZEALAND THREAT CLASSIFICATION RANKING

Appendix 2: New Zealand threat classification ranking (Goodman et al, 2013; Grainger et al, 2013)

<p>HIGHEST CONCERN</p> <p>↓</p> <p>↓</p> <p>↓</p> <p>LEAST CONCERN</p>	CATEGORY
	Extinct - Data deficient
	Threatened - nationally critical
	Threatened - nationally endangered
	Threatened - nationally vulnerable
	At risk - declining
	At risk - recovering
	At risk - Relict
	At risk - naturally uncommon
	Non-resident native - migrant
	Non-resident native - vagrant
	Non-resident native - coloniser
	Not threatened
	Introduced and naturalised

Classifications are based on the data that is currently available, and are determined for each species according to the size of the population and the rate (or expected rate) of decline. For example, low population size and high

rate of decline will get the highest risk. Large populations with low rates of decline will receive the lowest ranking. All combinations in between result in other classification rankings.

APPENDIX 3: TOTAL NUMBERS OF ELVERS TRANSFERRED FROM BELOW LAKE KARAPIRO

Appendix 3: Total numbers of elvers (in 1000's) transferred from below Lake Karapiro into the Waikato hydro-lakes (Martin et al, 2013).

Lake	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Karapiro	171	514	414	724	428	716	369	375	336	297
Arapuni	321	396	377	395	287	468	440	242	127	101
Waipapa	58	111	75	61	70	41	73	71	59	32
Maraetai	281	277	91	194	54	429	418	219	214	117
Whakamaru	453	247	63	89	62	401	301	222	237	164
Ātiamuri	83	134	56	76	83	244	262	237	196	104
Ohakuri	490	352	257	459	311	419	418	341	291	151
Total	1857	2031	1333	1998	1295	2718	2281	1707	1460	966

APPENDIX 4: SUMMARY SHEET OF THE DRAFT 'FISHERIES REGULATIONS'

Summary sheet of the draft 'Fisheries (Ngāti Tūwharetoa, Raukawa, and Te Arawa River Iwi - Upper Waikato River) Regulations'.

NB: the area mentioned here is different from TARIT's legislative boundaries.



TE POARI MATUA O RAUKAWA
RAUKAWA SETTLEMENT TRUST



Stakeholder consultation on the draft Ngāti Tūwharetoa, Raukawa and Te Arawa River Iwi (Upper Waikato River Fisheries) Regulations 2013

Background

Between 2009 and 2010 the Crown signed co-management deeds with Ngāti Tūwharetoa, Raukawa and Te Arawa River Iwi in respect of the upper Waikato River. The overarching purpose of the deeds is to restore and protect the health and wellbeing of the Waikato River for present and future generations.

The Ngāti Tūwharetoa, Raukawa and Te Arawa River Iwi deeds were given effect through the enactment of the *Ngāti Tūwharetoa, Raukawa, and Te Arawa River Iwi Waikato River Act 2010*. Among a range of matters, the Act provides for the development of fisheries regulations over the Upper Waikato River.

Fisheries Regulations

In mid to late 2012, Ngāti Tūwharetoa, Raukawa and Te Arawa River Iwi (the Upper River Iwi), in collaboration with the Ministry for Primary Industries, developed draft fisheries regulations as one of the co-management outcomes for the Upper Waikato River.

The intent of the regulations is to enable the Upper River Iwi to actively manage customary fishing in the Upper Waikato River and participate in fisheries management. In developing the regulations, the Upper River Iwi collectively agreed to manage the Upper Waikato River as one fisheries area. This is to reflect the interconnectedness and holistic nature of the Waikato River that is consistent with the principles of kaitiakitanga and kotahitanga. The fisheries regulations will in part be achieved through the establishment of a collective approach by representatives from each iwi on a fisheries management committee, which will facilitate collaboration between the iwi.

The three iwi also agreed that any action taken to manage the Upper Waikato River fisheries area must assist with achieving the following outcome:

To protect, restore, manage and enhance the fisheries resources of the Upper Waikato River and in doing so, enable customary practices that are consistent with the respective tikanga and kawa of Ngāti Tūwharetoa, Raukawa and Te Arawa River Iwi.

Where will the Fisheries Regulations apply?

The regulations apply to the Waikato River extending downstream from Te Waiheke o Huka to, and including, Lake Karapiro, and incorporate all tributaries set out in the map, attached as **Appendix A**. This is referred to as the Upper Waikato fisheries area in the regulations.

What is the scope of the Fisheries Regulations?

The regulations only apply to **fisheries resources** (i.e. fish, aquatic life or seaweed) managed under the Fisheries Act 1996. The most common species will be tuna (both short-finned and long-finned eels). Other species include crayfish, adult whitebait, any freshwater shellfish, freshwater goldfish, and catfish.

The regulations do not apply to the taking of species managed under the Conservation Act 1987 such as juvenile whitebait and **sports fish** (eg, rainbow and brown trout and perch), or to **unwanted aquatic life** (such as koi carp) managed under the Freshwater Fisheries Regulations 1983 or the Biosecurity Act 1993.

Commercial and recreational fishing can continue to take place within the Upper Waikato fisheries area. This may change should the Minister for Primary Industries approve a bylaw restricting or prohibiting the taking of any fisheries resource.

How do the regulations provide for management of the Upper Waikato River fisheries area?

The regulations allow the Upper River Iwi to collectively manage fisheries resources by employing a range of different management tools and actively participating in existing management processes.

Two of the key management tools are the ability for the Upper River Iwi to:

- issue customary fishing authorisations for the taking, using, possessing, depositing, removing, keeping and releasing of fisheries resources; and
- propose bylaws to the Minister to restrict or prohibit the taking of fisheries resources.

The Minister must approve bylaws recommended to him/her by the Upper River Iwi, but only if the Minister is satisfied that the proposed bylaws would not have an undue adverse effect on fishing.

NOTES