"B"

WAIROA HERITAGE WORKSHOP

- A HUI FOR HERITAGE MANAGEMENT AND PROTECTION -

Te Huki Marae, Raupunga
20-21 March 1997

Kaiwhakahaere:
(facilitators)

Toro Waaka
Maori Liaison Officer
Wairoa District Council
P.O. Box 54, WAIROA.
ph 06838 7309 fax 06838 8874
025 492905

Susan Forbes, Kotuku Consultancy Limited
Paekakariki Hill Rd
RD 1
PORIRUA.
ph/fax 04 2399220
email: kotuku@xtra.co.nz
025 573326

This is the exhibit marked "B" referred to in the affidavit of Toro Edward Reginald Waaka on behalf of the Trustees of the Ngāti Pāhauwera Development and Tiaki Trusts affirmed at

Napier this 5th day of

December 2014 before me

Signature: Cara Bennett
Solicitor
Napier

A Solicitor of the High Court of New Zealand /Justice of the Peace

NGA RORI O MOHAKA
HEI KOKI KOKI ATU RA
WAIHO MAI RA
KO TE AROHA
HEI HOA HAERETANGA E

TE KUPENGA O TE HUKI
E TORONA WHANUI E
HOPUKIA RA
KO TE AROHA
HEI HOA HAERETANGA E

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Puritia nga taonga tuku iho i nga tupuna
Hei tiki huia ma nga uri whakatupu o Aotearoa

Table 1 - HUI DELEGATES

NAME	ORGANISATION	'PHONE	ADDRESS
Toro Waaka	Wairoa District Council - Maori Policy Manager	06 838 7309	P.O. Box 54, WAIROA
Susan Forbes	Archaeologist and Environmental Consultant, Kotuku Consultancy Ltd	04 2399220	Paekakariki Hill Rd, RD1, PORIRUA
Jack Tomairangi Raharuhi Te Whaiti		06 8746696	Nga Puhaka Te Ora, Kaumatua Flats, Flat 6, c/o Waimarama P.O., HASTINGS.
Tikirau Stevens	Ministry of Maori Development		P.O. Box 1440, HASTINGS
Sid Taukamo	Hawkes Bay Regional Council Maori Committee		
Makereta Puna	Hawkes Bay Regional Council Maori Committee Chairperson		
Victoria Grouden	Archaeologist and Department of Conservation staff	06 8678531 (DoC) 06 8673464 (home)	2 Murdoch Rd, GISBORNE. or Box 668, GISBORNE (DoC)
George Thomson	Contract Researcher	06 8376759	RD 4, Mohaka, WAIROA.
Ngahiwi Tomoana	Kaitakawaenga, Heretaunga Kaunihera	06 8780577	Private Bag 9002, HASTINGS.
Warren Gumbley	Archaeologist/Heritage Consultant	07 8259933	c/o AB McGillicuddy, Limeworks Loop Rd, RD 5, HAMILTON.
Nick Tupara	Te Whare Taonga o te Tairawhiti - Gisborne Museum and Arts Centre	06 8673832	P.O. Box 716, GISBORNE.

Dave Robson	Pouhere Taonga (NZHPT), Manager Maori Heritage Unit	04 4724341	Box 2629, WELLINGTON.
Te Aue Davis	Pouhere Taonga Board and Maori Heritage Council member	04 4724341	
Wi Wharehinga	Wairoa Maori Council, Whakaki	06 8377493	RD 6, WAIROA.
George Roberts	Wairoa Maori Council, Erepeti	06 8386572	Box 81, Frasertown
Marcel Wainohu	Taonga o Aotearoa		
Ruku Wainohu	Raupunga Marae		
Elizabeth Ormond	Wairoa District Council	06 8387309	P.O. Box 54, WAIROA.
Gordon Jackman	Archaeologist, Jackman and Black	06 8677204	17 Stout St, GISBORNE.
Stefan Naude	Wairoa District Council, Planner	06 838 7309	P.O. Box 54, WAIROA.
Raylene Albert	Wairoa District Council	06 8387309	P.O Box 54, WAIROA.
Eddie Te Kahika			RD 4, Putere Rd, RAUPUNGA.
Kay Te Kahika			RD 4, Putere Rd, RAUPUNGA.
Sophie Keefe	T.K.R, Hauora Marae		Box 21, RAUPUNGA.
Lilian Adsett	Executive Manager, Takitimu Marae		"Rau Pine", 65 Black St, WAIROA.
Andrew G. Ormond	Kaumatua Rongomaiwahine	06 8375683	P.O. Box 1003, Wainui Station, Private Bag, MAHIA.
Te Aroha Cooper	Te Whare Taonga ki Wairoa		c/o Wairoa District Council, P.O. Box 54, WAIROA.
Robin Black	Carter Holt Harvey Forestry		90 Tamatea Drive, NAPIER.

INTRODUCTION

WORKSHOP OBJECTIVES

The Workshop was proposed to:

1. discuss local heritage management and protection issues in a community of interest context
2. develop an awareness of tangata whenua values and concerns
3. develop clear procedures for consents and consultation
4. consider establishing a marae based Ropu Taiao at Pahauwera

The two day workshop aimed at achieving positive solutions to heritage management and protection.

BACKGROUND

The need for a workshop to discuss heritage issues in the Wairoa area was born from an urgent need to formalise a process for building tangata whenua into the consultative and consents 'loops' in the face of rapidly changing land use in the Wairoa area and wider Hawkes Bay region. Economic imperatives for land development, particularly for planting pines, put pressure on heritage protection agencies (Councils, Historic Places Trust, Maori Heritage Council, Maori groups) to allow archaeological and wahi tapu site destruction.

The hui was held at Te Huki marae, Raupunga. There are two houses on the marae: Te Huki and Hineringa. Te Huki is named after the Ngati Pahauwera tipuna whose children are the kaitiaki of the Mohaka River and lived, strategically positioned like floats in a net (Te Kupenga o Te Huki) along the Hawkes Bay coast. The other wharetipuna, Hineringa (Te Huki's great grand-daughter) has been recently restored. The house was a birthing house gifted to Ngati Pahauwera by Te Kooti, and is decorated with intricate Ringatu style paintings. The wharekai is called Te Kotahitanga.

AGENDA

- Powhiri, mihi
- Introductions
- Key concepts - kaitiaki and wahi tapu
- Heritage Organisations - the Maori Heritage Council, the Historic Places Trust, Historic Places Trust Regional and branch committees and heritage legislation
- Regional Round-up of heritage issues and the state of local recording
- Archaeology - functions, language and the process for consents
- Forestry
- Hui Resolutions and poroporoaki

APOLOGIES

Pam Bain (DoC, NZAA Filekeeper, Gisborne)
Elizabeth Pischief (DoC, NZAA filekeeper, Napier)
Ministry of Maori Development, Gisborne
Dave Para (DoC, East Coast)

Abbreviations used in the report

HPT (NZHPT)	New Zealand Historic Places Trust - Te Pouhere Taonga
HPA	Historic Places Act, 1993
RMA	Resource Management Act, 1991
MHC	Maori Heritage Council
PCE	Parliamentary Commissioner for the Environment

NGA KORERO

KEY CONCEPTS

These discussions flowed around the room giving everyone the opportunity to speak about their interpretation of kaitiaki and wahi tapu. I have recorded the talk verbatim but not recorded who said what. Those who attended will know who to attribute what korero to. These discussions were mainly to develop a broad kaupapa and philosophical base on which to build talk about developing processes to accommodate these concepts. The individual 'voices' here give an impression of the layers of thinking and the importance of individual expressions. I have not drawn out common threads from the talk in a summary. Each interpretation of the concept is as valid as any other.

Kaitiaki(Tanga)

I was always taught that we are uri of Papatuanuku and have a responsibility to care for her no matter where you live. We also have a responsibility for manaakitanga and a responsibility to maintain mauri. An example locally was when a Water Conservation Order was proposed for the Mohaka. Pahauwera explained that if you want to do anything in our area you need to ask us first. The response to the Waitangi Tribunal by claimants is another example; its the response of kaitiakitanga. Kaitiakitanga means you must have an element of spirituality. Only tangata whenua can be kaitiaki - not the Crown. Kaitiakitanga can also be moved from man to man. It involves the extended family and extends wider than just the close family.

It involves knowing where places are; what they are; and how to take care of them. But today things have changed. We need now to give information to the mokopunas. What I know about my place; my own home is kaitiakitanga.

There is not a lot of recognition of how we think as Maori and the consequences of how we think. Lets think about the kupu - kaitiakitanga. It starts with "kai" which has roots in things whakanoa, to make things available. The "tiaki'" element is whakatapu. The source or first element of the word is distinctly female. But obviously does not stand alone - it works in conjunction with the whole fabric of Maori society and interrelations between whanau, hapu and other iwi. Also, there is a kaitiaki role in wairua - its a protective element; its used in rahui. Also, kaitiakitanga is a formal management regime. there is a need to discuss tautoko roles for kaitiaki - we can't leave it alone.

Kaitiakitanga implies a caretaker role. It seems wrong to use the concept in terms of ownership. It is a simple god-given task to look after the earth.

After christianity kaitiakitanga changed from traditional concepts of acknowledging the children of Io as the kaitiaki.

The word "kaitiakitanga" was born from the young people who worked on developing the legislation (RMA) *It is an indictment on Maori to keep using it. Kaitiaki is the word and means guardian of the things belonging to us.*

We are all, here, kaitiaki. people like the Historic Places Trust, DoC, etc are kaitiaki turei or kaitiaki kawanatanga - we have legislative responsibilities. Maori are all kaitiaki of their ancestral lands and taonga. It is a responsibility that is a life-time one. It is an environment wide thing - not just over natural resources. We have a responsibility to nga uri whakatipu/descendants that we are not allowed to let them (our taonga) be desecrated or destroyed. All New Zealanders have similar responsibilities for protecting cultural, physical and spiritual resources.

In the Museum I never thought of myself as being a kaitiaki but it is a title the Museum use to define curator. But my position there is not as kaitiaki. I am, instead, a link to the people who are kaitiaki. The definition of kaitiaki doesn't sit with each individual. I am more someone who opens avenues to how hapu, and individuals can express being kaitiaki.

I don't think we are all kaitiaki. I also think we are using the wrong word. kaitiaki rests with mana whenua. As an individual I have a responsibility to care for all taonga but I don't have the right to be kaitiaki. I am not because I can't whakapapa. But we have been given the right to care for these things, and for each other. It is a concept connected to wairua. You need to have certain attributes to be kaitiaki. You need to karakia, to whakapapa, and to know about the land. It seems too that kaitiaki is connected to mana. these obligations are more properly called mana whenua. This is like a jigsaw and we are currently putting the pieces back.

Kaitiaki means protection, family responsibilities, learning, and guidance. For instance, the carvings in this house are to constantly remind us that they are kaitiaki.

At a recent hui we had an explanation as to why the word "kaitiakitanga" had been inserted in the RMA. It was seen as a useful device at the time but was never defined. It was left up to the hapu to define and for Councils to find out what each hapu wanted. It was to make Resource Managers recognise who the local kaitiaki were and who, in turn, could define the functions of kaitiaki in their area. But now the word has been taken out of the hands of manawhenua and into the rooms of Planning and Environmental Courts. It is a natural dilemma when we try to put Maori words into a Pakeha framework. At this hui I would like to discuss what the good examples are around the place and see how to 'steal' them to use here.

Maori have been disenfranchised by the power of the word. Clearly it can be dangerous when we don't discuss things.

Wahi Tapu

There are plenty of legal definitions of the concept - wahi tapu. They are found in the State Owned Enterprises Act, the Historic Places Act, the Tuku Iho document etc. Do they come near to the way we think about the concept?

The word goes back to our ancestors. the word was used a s a protective measure, to prevent people going into areas. In terms of wahi tapu places here I would like to see the places Registered and to know where they are.

When I talk about wahi tapu I am talking about my own area (Ruakituri). Wahi tapu were about protection for our people. Some areas were made whakanoa by the old people to seel etc. We can't now bring up notions of what is tapu because the ancestors went to the trouble to make them noa. Only pa and urupa are tapu.

We had many fights in the Trust on this subject. Yes burials are wahi tapu but what about birthing places. Will we allow pubs, hotels and eating places on them? There was a suggestion at the Trust that we should let the kaumatua work it out and then come back with ideas about what it means. Quite simply though it was, and is, places Maori consider tapu. But we at the Trust need to consider these things from a tribal view and also from a Maori view. Maori need to consolidate against European law.

On behalf of the Historic Places Trust - we have a legal definition which was put in place for our national registering system. But when it comes time to consider an application the only perspective considered is that of the applicant. The Trust is not there to define wahi tapu - only to assist in preservation.

Urupa are wahi tapu. No-one would say otherwise. This means any site that would contain koiwi, like battle grounds. There is a difficulty here for planners because there is no definition that sorts these places out. We need to have a clear process for protecting these places.

We need to ask - are there places that can be culturally significant to Maori that may not be wahi tapu? Maybe the ambiguity is caused by the need to call them wahi tapu in order to protect them.

In Hawkes Bay there have been instances of good actions, for example, fencing and protecting graves. But the Napier City Council have been allowing development along the hills in inappropriate areas. There should be a kaumatua hui to discuss important terms like this and it needs to be without Pakeha. Stop telling us that what we believe in is lore. It is not - it is us!

If the Auckland motorway can be diverted to protect Bishop Selwyn's grave then we should do the same for Maori! There needs to be a blanket coverage for all these places. Can we have a hierarchy of absolute protection and then only some protection? May be *we should create a hierarchy of absolute no-go areas. We came head to head with the Historic Places Trust over definitions of wahi tapu. We say that archaeological sites are wahi tapu. We need to think about what is covered; and what is not. For example, tauranga waka, food areas, spawning areas, swamps. We have put in a cover-all wahi tau policy which states that everything is wahi tapu until proved otherwise.*

I agree. We should wahi tapu everything. Lets get around the table and talk about how to benefit all of us.

We should look wider. We can't begin to define it - we should talk about what "tapu" is first. We need to find a kaupapa to talk about. Find out why the Historic Places Trust are interested in a place, then we'll define it and talk about is. Tapu, like wairua, is not a physical thing. It is there for protective, cautionary, rahui measures. We need to find out what the Historic Places people want rather than have the Historic Places come to the marae to say you sort it out. We should put in statutes what should be protected; sometimes even against ourselves. I believe we should record everything even if we can't put a name or feature on it. There also needs to be something that protects wairua Maori, even our korero. Each hapu, iwi and individual has different views. It is a wider things - not just about places, but about ourselves. It is then a tohunga's job to define it.

We need to remind ourselves that wahi tapu are not confined to the past like archaeological sites. Wahi tapu not definable and often cannot even be mapped. We need to discuss wahi tapu in terms of landscape systems not as discrete dots on maps. there is a danger in trying to record them as individual sites because inappropriate development could be allowed amongst them. We need to get a deeper understanding of how people lived, and live, on the land. Wahi tapu are physical manifestations of kaitiakitanga. If they have to be recorded on inventories let these be held at the marae and have planners come here for information.

All of Mahia is tapu. It is the landing place of the waka Takitimu. The long rollers are there still in the estuary but the logs are being carved and chopped up as momentos. people are buying up places that mark the origins of Kahungunu and will subdivide them. I would suggest that some of the money made available to us is ill-spent. It could be better spent on land. Lets buy back the wahi tapu. We have let ourselves down; we haven't taught our kids; and we have kept the history to ourselves.

THE MAORI HERITAGE COUNCIL - TE AUE DAVIS

The Historic Places Trust was born as a Pakeha mechanism to protect buildings and the like. I joined in 1984 as part of the Maori Advisory Committee, chaired by Apirana Mahuika. At that time only one member of the Trust Board was Maori - that was Lena Manuel. later she took on the chair of the Advisory Committee.

We fought hard to have a bi-cultural system put into the Trust Board but it didn't take because the archaeological people were so strong. To this day archaeological sites are still better protected than any other site.

In 1993 the Maori Heritage Council, rather than the Advisory Committee, was formed. At the same time three Maori seats (out of a possible nine) were established on the Trust Board. Now there is only one person in the Maori Heritage Unit (Dave Robson) and 99% of heritage in New Zealand is Maori.

We need to look at heritage here from the perspective of a family of people who have here and survived. We (Maori) know something about our limits. That is why the Trust is here today - to say what do you want us to do; what do you want us to protect.

We know that different areas have different concerns but the common concern is how we are going to protect it. For instance, in some areas of New Zealand heritage places were given scenic or historic reserve status and were under Survey and Lands (and now DoC). these were opened up to tourists. Te Porere is a place like this. How can we manage heritage and wahi tapu when they are also tourism destinations? What are the other options though? If Maori ask for them back we need to consider how we are going to look after those places. Often fences and pouwhenua are not enough.

My plea at this hui is that we get together with all our different thinking and fight the common enemy - the legislation; the Act.

THE HISTORIC PLACES TRUST - DAVE ROBSON

The Maori Heritage Unit's role is to protect sites of significance to Maori. There are other agencies in this battle - TPK, DoC, and Councils - but sites are being destroyed whilst we wait to resolve the issues. In my role as Head of the Maori Heritage Unit I am guided by the Maori Heritage Council (MHC) in site protection but District and City Councils are the critical link in providing protection for places.

One goal of the MHC is to empower iwi and hapu to preserve their cultural heritage places. I have to refute the suggestions that the Trust states what is wahi tapu and what is not. We always accept what the hapu say. There are wahi tapu which are not archaeological sites (and archaeological sites are the only ones protected under our Act) eg punawai, tauranga waka etc. Accordingly the HPT recommends that as much as possible is recorded and registered, and that the HPT and Councils assist in the planning talk.

Maori need to say: this is what we want recorded; this is what we want revealed; and this is how we want it done. The HPT will support iwi and provide extra advocacy and protection within the provisions of the Act.

Essentially, our goals are:
1. the identification and recording (by Maori) of sites, landscapes, marae etc
2. promoting the establishment of hapu groups to assist consent applications.

Group Discussion

Comments and questions of the Trust's role in heritage protection covered a broad range of issues:

Penalties:
Penalties for illegal destruction are severe but the Trust has no resources to prosecute offenders. There is also a difficulty in that offenders only have to attest their innocence - prosecution is complex and difficult. However, District Councils and DoC can prosecute under the HPA. We can propose joint prosecutions too. Solutions could be in developing more severe penalties and a cheaper prosecution process and, of course, in promoting avoidance. This is where District Councils are crucial and where Council planners can ensure Maori are involved in this process.

The PCE report pointed out these deficiencies, and especially that the HPT and Councils need to take more notice of Maori and take steps to resource Maori for heritage protection.

It is also obvious that the critical stage for protecting sites is before Resource Consents are issued. In order for this process to work Maori need to be one of the consents parties to determine whether consents should be issued, and what conditions should be imposed. mechanisms for getting Maori groups part of this process include:

- establishing Ropu Taiao for dealing with environmental and heritage consents
- participating in the District Plan, and rules, procedures, and conditions changes
- proposing clauses which nullify consents if offences are committed.

Forming Heritage Protection Authorities was debated but the reality is that if the Authority is successful in stopping development they could be asked to purchase the property.

HPT REGIONAL AND BRANCH COMMITTEES - NICK TUPARA

I am chair of the Gisborne Branch Committee. This is probably a relatively unusual group in that it is fairly young, with Maori members, and has strong professional contacts (e.g museum and archaeologists). In the Gisborne area Resource Consents are going through our committee but none of the Wairoa consents come here.

Branch Committees were formed to represent Trust members and can only assist at an advisory level. They can, though, nominate Board members to the Trust and are quite strong lobby groups. There are, nationally, four Regional Offices and many more branches. In this area we have no Regional Office so the onus is on the branches.

Group Discussion:

Ministerial lobbying:
Maori can go directly to the Minister with requests as can HPT Branch Committees.

Heritage Building Conservation:
The Gisborne Museum has a conservation service that works alongside the HPT. It also advises on funding possibilities.

Valuing Maori knowledge:
There is a challenge for us (Maori) to acknowledge kaumatua time and value them as we would any consultants.

REGIONAL ROUND-UP

Hastings - Ngahiwi Tomoana

Our Council produced a wahi tapu policy. It started with a database of known sites (and found most of them were not on Maori land). The policy works as an overlay on every other Council policy. This means that what ever people want to do they have to refer first to the wahi tapu policy.

Examples of areas being developed or proposed for development are at Pakipaki limeworks (the site of a pa and urupa) and proposed development at Te Mata maunga (our 'sleeping giant'). In the latter example development was not permitted on the hilltops - not for Maori values but because of its scenic/landscape values!

To cope with this trend in development on our sites we have proposed a Wahi Tapu Resource Management Unit which will work in conjunction with the Maori Committee. We are trialing one test area. Sites have been given numbers and names, and notices detailing the whereabouts and nature of the site were sent to landowners. One aspect of this is that we now have a situation where the protection mechanisms also entail exposing sites and revealing information about them.

Responses from landowners have ranged from no concern to owners requesting further information, to shock horror and open hostility with armed boundary patrols.

The Council though, has been adamant in its support for the wahi tapu policy to suceed and, by informing landowners, it is taking the consultative and educative approach rather than the heavy-handed regulative one.

LOCAL ARCHAEOLOGICAL RECORDING
WARREN GUMBLEY and VICTORIA GROUDEN

Field Work

Until 1996 field work was foccused on the Mohaka River, from the Te Hoe confluence to the coast. In 1996 a field work programme was undertaken to extend this into other parts of the Pahauwera rohe. In general, coverage of the rohe is patchy. However, a generally representative range of environments have been investaigated. Accordingly, we have enough information to understand patterns of settelemnt and develop predictive models which can be used to advocate for further research (especially where develeopment is planned). We also know that the places recorded are a fraction of what may have been there - many have been destroyed or damaged through landuse practices and erosion.

Artefacts

There are artefact collections in the hands of private landowners - we need to consider how we can meet the obligations of the Antiquities Act and obligations to local Maori. The marae needs to advise on a process for recording, possible return and storage of artefacts.

Site Protection/Conservation

This is dependent on the local situation and site needs. In general, vegetation should be managed to prevent degradation. Small trees, shrubs and garss which have shallow roots and narrow trunks are preferred. Grass is often managed with stock, howevere, do not stock with: deer, goats, cattle or pigs. The Science and Research Division of DoC have an on-going research project on the management of vegetation on earthworks sites like pa - they may be able to provide advice on this.

Some solutions

Investigate GIS mapping (ask Landcare and TPK for information on their databases. Ngati Porou have set up a GIS mapping programme - can we information on this? Can Lotteries fund this for us? George Thomson is currently coordinating a heritage inventory proposal for this area). A priority should be given to an aerial survey by an archaeologist of the Pahauwera rohe. Begin registering recorded sites with the HPT and put them on the District Plan.

Group Discussion

A Heritage Inventory is proposed for the Wairoa area. Some questions need to be debated about how this inventory could take shape. Issues to consider are:

1. that it needs to be wide - a broad landscape/mana whenua context
2. that this will mean a high cost
3. who will be involved (who designs it, manages it, who are the beneficiaries/users, who does the research, who controls it, who pays, and who stores it).

ARCHAEOLOGY - FUNCTIONS, LANGUAGE, & PROCESSES
SUSAN FORBES

What is it:

Technically, archaeology is about the study of ways people adapt to environmental change (eg the settlement patterns, migration, technology development, trade...).

Practically, archaeology is a 'meddling science'. It meddles in the worlds of *memory* and *identity*. The implication of this is, that, if we get it wrong then there is a lot at stake. At stake is the 'erasing of our origins'.

The 'Forbes Safety Code'

- Always ask (work with honesty and respect)

- Always assume that there are wider landscape connections (lets stop using the term 'site'. We lived and still live in cultural landscapes where places are connected to a 'family' of other places. Heritage values cannot be isolated from their ecological and historic contexts.

- Assume affection and knowledge of all places in New Zealand. Remember there are no empty or untouched; no 'wild' places in New Zealand.

- Knowledge and kawa are not universal - they are localised and specific. (Don't assume the same systems work everywhere).

- Even when the signs of a place have gone there is still a covenant between the place and its kaitiaki.

- There are no such things as "Maori Archaeology' and 'European Archaeology'. There was no time during the human occupation of this place when Maori were not here. We can, therefore, have no such thing as 'European archaeology' or European archaeological values'.

Some Issues in New Zealand Archaeology

Education

The public perception of archaeology is still largely romantic, and focussed on Eurocentric notions. Early practice of archaeology in this country paid little regard to tangata whenua needs and values - the result has been a fundamental mistrust of things archaeological and of heritage protection agencies. This is slowly starting to change. Archaeological information is not widely disseminated; nor is it taught in schools. A recent survey in Auckland (Hodge 1995) suggested that the public impression of archaeology was centred on: digging, ruins, bones, ancient civilisations, Egypt, and relics.

Funding

Funding continues to be very low amongst heritage agencies. DoC allocates only 2.5% of its budget; HPT allocates the largest percentage of its budget to built heritage (despite statutory requirements to promote cultural heritage).

Lack of legislative links

Both the RMA and HPA provide for heritage protection but the actual consents processes are not effectively linked. These Acts may be reviewed as part of the Heritage Review process.

Wahi tapu and cultural landscapes

Defining and recording wahi tapu is often problematic because tangata whenua view wahi tapu in different ways, and because they are often not visible as surface features. (Only about 16 wahi tapu are registered so far). The stance of the HPT is that they do not define wahi tapu and do not ever refute wahi tapu registration applications. Defining wahi tapu and determining their extent is the business of tangata whenua. There is a difficulty too in the requirement to get 'dots on maps'. Landscape approaches to recording is always the most desirable approach. Occupation areas were often connected in whole landscape systems - never in isolated 'sites'.

Pressure for development

A great percentage of archaeological and wahi tapu sites have disappeared, and are still disappearing, under pine farms, golf courses and urban development. In a sense the protection of survivors has become a more urgent issue because of this.

Maori and European archaeology

There continues to be a perception (even amongst the profession) that Maori and European archaeology are two separate things. Actually, there is no such thing in New Zealand as non-Maori archaeology.

Heritage Protection - the agencies, their laws and language:

New Zealand Historic Places Trust - Te Pouhere Taonga (HPT)

The Trust was formed, in the 1950s, primarily to conserve built heritage. It is an independent body (currently under the Minister of Conservation but new moves in heritage management may see it come under a new Minister - possibly Cultural Affairs) funded by membership, Government grants, and Lotteries funding.

Its functions include:

- processing Authorities to modify, damage or destroy sites
- recording and registering archaeological sites and wahi tapu
- maintaining a national site register (not to be confused with the National Recording Scheme)
- managing about 60 properties
- providing advice on heritage issues.

The HPT also keeps a list of consultant archaeologists (under Section 17).

The Trust's legislation is the Historic Places Act, 1993. This Act is a revision of the 1975 Amendments. The Act provides for site protection whether recorded or not, and even if a site is only "suspected". The main purpose of the Act is to provide for the *"identification, protection, preservation and conservation of the historical and cultural heritage of New Zealand."*

Archaeological sites as defined in the Act are:

"any place in New Zealand that -
(a) Either -
(i) was associated with human activity before 1900; and
(ii) is the site of a wreck of any vessel where the wreck occurred before 1900; and
(b) is or may be able through investigation by archaeological methods to provide evidence relating to the history of New Zealand."

Maori Participation

- *Authorities require Maori values assessments and details of consultation*
- *Opportunities for participation on Regional and Branch committees*

The Maori Heritage Council

In 1970 the HPT Board established a Maori Meeting Houses Committee - the first sign of recognising Maori values from the Trust. The Committee, which has been through several name and function changes, was reformed, in 1993, as the Maori Heritage Council. The functions of the Council include:

- promotion of tangata whenua autonomy in heritage protection
- advice on heritage issues
- processing of wahi tapu registrations and Authorities for the modification, and/or destruction of wahi tapu.

The Council has recently (late 1996) voted to move to becoming a stand alone Authority for Maori heritage protection.

Maori Participation

- *MHC handle all wahi tapu registration and Authority applications*
- *Maori membership of the MHC itself*

The New Zealand Archaeological Association (NZAA)

The Association is an independent body, comprising mostly professional archaeologists, established to foster research into archaeology. The Association maintains a national recordings scheme (held in a central file at DoC head Office) and in Regional files around the country. The records contain 50,250 archaeological sites but it is likely that this represents only about one quarter of surviving heritage sites. The scheme is based on map series numbers. This can occasionally cause problems when sites were recorded on the old NZMS series - often translation to the metric system locates sites in the wrong place.

Maori Participation

- *virtually none at present but we could:*
    1. *Make more Maori archaeologists!*
    2. *Lobby the NZAA to strengthen their code of ethics*

The Department of Conservation (DoC)

DoC's management responsibilities extend only in Crown land in practice (though the Conservation Act provides for advocacy over all of NZ). DoC has a staff of 'heritage protection managers' for archaeological research and heritage advocacy.

Maori Participation

- *Section 4 of the Conservation Act requires DoC to give effect to the Principles of the Treaty of Waitangi.*

Territorial Authorities

Heritage protection locally is the responsibility of District (land) and Regional Councils (rivers and water ways only). Most do not actively promote heritage protection because it often conflicts with development plans.

The Resource Management Act, 1991 which Councils administer provides for protecting resources of national importance. The sections that pertain to heritage protection are:

s.6 "the relationship of Maori and their culture and traditions with their ancestral lands, water sites, wahi tapu, and other taonga."

s.7 "*kaitiakitanga*" and "*recognition and protection of the heritage values of sites, buildings, places or areas*" and "*any finite characteristics of natural and physical resources*".

s.8 "*take into account the principles of the Treaty of Waitangi*"

At a recent national heritage hui it was agreed that the most effective means for heritage protection is through early intervention through the RMA and by attached archaeological assessments to Resource Consents before processing.

Maori Participation

- *Provisions of the RMA*
- *Submissions to District Plans*
- *Representation on Council*
- *Memoranda of Understanding*
- *Funding of marae Ropu to process Resource Consents*

The Parliamentary Commissioner for the Environment's Report

The Commissioner's (PCE) review of historic and cultural heritage management (in 1995) made a series of strong recommendations to address the current deficiencies in heritage protection. The key recommendations are that:

- a new portfolio be established with a Minister of Historic and Cultural Heritage;
- the Historic Places Act, 1993 be revised;
- a detailed national strategy be developed (including policy for Crown owned historic places);
- hui be convened to develop strategy for protecting Maori cultural heritage (using the Treaty of Waitangi as a guide);
- the RMA be amended to recognise that protection of heritage values as matter of national importance;

- all Regional Councils recognise and give effect to their role in integrated heritage management;
- the new Minister review Crown Purchase Agreements covering heritage to ensure core and statutory functions are funded appropriately;
- Territorial Authorities establish local incentive funds for similar purposes;
- a working group be convened on assessment and registration procedures, and upgrade the existing HPT register.

In a sense, whilst these recommendations do touch on where there are critical problems in heritage protection, many of them are simply recommending enforcing the current situation rather than proposing change. For instance, the Treaty of Waitangi is already a guide for protecting Maori heritage (s.8 RMA); the RMA already recognises that protection of heritage is a matter of national importance (s. 6); and that Territorial Authorities are already required to take local responsibility for heritage management and establish local funds for this purpose - recommending that they do what they are meant to be doing will not make it happen.

The implications of this report for developers and land users are that the Consents processes that affect heritage places will most certainly be strengthened.

Some Solutions:

- Ensure consents process has an archaeological and Maori values assessment before being considered by Council.
- form Ropu Taiao
- network - assess community skills and knowledge - keep matters local if you can - identify key people who can assist nationally (eg Dave Robson HPT, Nick Tupara Gisborne HPT branch and Gisborne Museum, local archaeologists).
- 'Whangai' favoured archaeologists and ensure they are used to work in your area
- Advocate training - scholarships (including in-service training and heritage training for planners)
- public awareness/education

Trends

- There is an increasing onus on local Authorities to take initiatives for heritage protection (locally)
- There is likely to be more instance of direct funding to individuals/whanau/hapu for heritage studies
- Changes in legislation are proposed (HPA, RMA, Antiquities Act)
- The Maori Heritage Council has resolved to move towards being a stand-alone body - this could see a strengthening of Maori heritage advocacy
- More registering of sites is being proposed
- Changes in archives, storage and intellectual property protection policies are likely
- The HPT will move to be under a new Government department or Ministry (Cultural Affairs?)
- The development of a National Heritage Strategy has been proposed
- The 1995 Parliamentary Commissioner for the Environment's review of heritage issues highlighted some critical gaps. As a result of this review a further heritage review process has been proposed.

What to do if you suspect or discover sites:

- If you suspect sites only, then inform the HPT and/or a local archaeologist, and local Maori to check the site and record it.
- If it does turn out to be a site avoid development in the area. If you plan to continue work in the vicinity of the site you may also need to get a survey done.
- If you have to work on or near the archaeological site then you must apply to the HPT for an Authority to modify, damage or destroy the site. These Authorities come in two forms: Section 11 for a specific site or part thereof; Section 12 for a collection of sites in one area or for a discrete area where sites are known or suspected (eg for a forest plantation or a cable trench). These Authorities can take up to three months to process and have a shelf life of only two years. They cannot be automatically rolled over. Authorities must have an assessment of archaeological and Maori values and must show details of consultation. There is no charge for processing these but expert advice (Maori, archaeologists etc) must be paid for.

- If you discover a site during the course of development you must cease work immediately and inform Maori and the HPT of your find. Generally, an archaeological assessment is required to determine whether work can continue and in what form. The assessment has to consider the extent of destruction and then determine remaining archaeological and Maori values.

- If you have discovered bones you must cease work immediately and inform local Maori and the HPT. Most marae have koiwi (skeletal) recovery policies and will be able to assist you with correct protocol and disposal.

Failure to comply with the provisions of the HPA is constituted an offence under that Act and you may be prosecuted and/or fined.

Decisions in Authorities may be appealed.

If you discover artefacts you must have them recorded by an archaeologist. Whenever possible leave them in situ because their context is often more important than the find itself. Storage of artefacts is normally left with local Maori despite the requirements of the Antiquities Act to have items recorded as Crown property. In practice most archaeologists discretely ignore this because the Act is outdated and racist. It is due for amendment in the near future.

The HPA covers all land and water no matter who owns it. Activities on privately owned land are subject to the same RMA and HPA provisions as public land.

Section 11 and 12 Authorities - Information needed:

The NZHPT has application forms which must accompany assessments. There are specific statutory requirements in these Authority applications - details of which must be included in the forms. They are: archaeological assessment, Maori values assessment, and consultation details. Essentially the forms require details of:

1. Applicant details (name and address)

2. Site Location and cadastral information (supply maps and photographs if possible)

3. Site Recording details (if known)

4. Activity Proposed and likely effect on site

5. Details on any consents issued or applied for

6. Name of land owner

7. Archaeological assessment:

    - description of site
    - archaeological values
    - effects of proposed development on values (detail mitigation proposed)
    - comments on any other options available

8. Maori values assessment

    - consultation details
    - Maori values
    - effects of proposed development on Maori values and mitigation proposed

A Suggested Process for Developers

These suggestions may be useful in forming guidelines for Ropu Taiao. A more useful scenario would be if heritage planning was integrated into District Plans in a manner similar to the Heritage Level Alert adopted by the Gisborne District Council.

1. Avoid archaeological and wahi tapu sites (and thereby avoid expensive and lengthy consents processes and possible delays, and possible litigation). Heritage (ie archaeological , history, cultural values) assessments are the best tools to provide you with information for avoiding sites but this can also be a costly process. In the first instance check District Plans and archaeological databases (NZAA and HPT), then check with Maori. If you are proposing development on or close to hills and mountain ranges, rivers, lakes, swamps, and the coastal zone then an assessment is recommended as a precautionary principle. Certainly you should avoid prominent or culturally significant mountains and other landscapes. Local marae will always tell you where these are.

2. Make it a policy to go to Maori directly rather than rely on local Councils to provide Maori values information.

3. Provide plenty of time for consultation and assessments (bearing in mind that Archaeological Authorities have a two year life span only).

4. Attach assessments of archaeological and Maori values[1] to <u>all</u> Resource Consent applications. The assessment of effects must involve a qualified archaeologist and tangata whenua. The assessment must be funded by the applicant. There is no onus on Maori to prove the presence of wahi tapu and all Maori interests should be consulted (S. 18 and S. 11 HPA). In situations where resource Consents have been granted without these assessments and it is believed that there may be impacts on archaeological and/or Maori values then a retrospective assessment can be requested.

5. Develop marae and hapu contacts. Many hapu are forming environmental and heritage committees for the handling of Resource Consents and the like. If you develop these networks now the consultation process will be much smoother. If the marae you are dealing with has an environmental committee or contact person let them determine the consultation process and also select an archaeologist (if one is needed). The committee may already have a list of requirements or a relevant policy draw up which you may be required to follow . If they do not have a preferred archaeologist Dave Robson at the HPT (ph 04 4724341) will provide a list of consultant archaeologists.

6. Consents from and consultation with Maori must always be funded appropriately. Some marae have a set rate of charges - ask them for this.

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1 Assessments should included information on: a description of the site and area, details of the field inspection, plans and maps, site condition, physical setting, historic and oral history information, an assessment of archaeological values, an assessment of effects, and an assessment of Maori values (from tangata whenua).

CARTER HOLT HARVEY FORESTRY - ROBIN BLACK

Our area covers King Country, Tokoroa, East Cape, and Hawkes Bay. Two of the key components of my job are: communication and establishing comfort zones/networks and relationships. My task is certainly to become more aware of cultural needs.

With regard to archaeological sites, we have a basic archaeological register of the old Forest Service lands one by Louise Furey. We also have a code of practice for staff to follow. Our major difficulty is with wahi tapu - we don't know where or what they are.

Our objectives are to identify timeframes to get the work done, and to do the right thing by the sites and by the community. We would like to incorporate Maori feelings into planning but want more direct lines of communication. We need your advice. For instance, are there wahi tapu you would like to protect but can't tell us about?

When we acquire land for forestry use we have a sequence of checking for sites. We study aerial photos, walk the property and, if we recognise archaeological sites then we get in an archaeologist. Also, our procedure are retrospective in that we look at already planted properties in the same way.

Group Discussion:

HPT Perspective:
We recommend that you get in an archaeologist before planting, before roading, and certainly before harvesting already plated blocks. Even if there are not visible archaeological remains (and this is aside from Maori values) there are still possibilities of archaeological sites without visible surface features. Also, the Forest Service work done was 'patchy' because many areas could not be examined due to heavy scrub cover and inaccessibility - the current logging rights holders have inherited problems that the Forest Service did not deal with. In Coromandel CCH have a Maori Resource Planning group (that CCH fund) - could this be a good model?

The Local Situation:
The Mohaka Forest has never been looked at properly. WE have locals here who know the area and could identify sites. It seems that this is a priority. One of the problems, for Maori, is that in this area forestry does not require Resource Consents. Maori are left out of the planning loop because of this. Currently forestry is permitted everywhere except in cities and on steep (over 12o) land. One solution may be to put some changes in the District Plan to put forestry in as a restricted activity with certain conditions. CCH suggested that Maori draw up a list of requirements for CCH to adhere to. Other solutions may be in developing forestry module courses that make wahi tapu and archaeological sites recognition as part of the training.

Action

- **Dave Robson** - bring copy of Coromandel model to next hui.
- **All** - Change the District Plan to have forestry as a Restricted Activity with certain conditions imposed
- **Pahauwera** - Establish similar agreements with other forestry companies
- **Pahauwera (and Toro?)** - Assess this draft list of requirements

Draft List of requirements:

1. Assess all areas to be planted (to include the wider areas of forestry roading and harvest, haul out areas) regardless of Forest Service survey results

2. Identify clear lines of community communication (this could be assisted with the establishment of the Ropu Taiao at Pahauwera)

3. Maori to be the first point of contact, and to determine: whether an archaeological assessment is required (and who should do it), whether Authorities are required from the HPT

4. That planning work provides adequate consultation time (keeping in mind the HPT Authorities only last 2 years)

5. That CCH agrees to fund the Ropu Taiao for work done for CCH

6. That Maori and CCH work together on developing an appropriate code of practice to cover cultural heritage, and the possibility of training modules in identifying cultural heritage sites

7. To amend Forestry Management Plans to reflect these new agreements

A SUMMARY OF DISCUSSION TOPICS

Maori Representation:

- get Maori on Councils,
- get Maori on HPT Committees,
- form local (marae based) Ropu Taiao
- participate in District Planning and conditions changes

Networking:

- submissions and letters to Ministers
- develop relationships with other users (eg forestry requirements)
- get feedback on other hui and other Ropu
- 'whangai favoured archaeologists and other technicians

Autonomy:

- direct funding
- GIS mapping and holding database information at a marae level
- marae involvement in the Consents process
- develop requirements for land-use (eg forestry)

Nga Uri Whakatipu:

- education
- scholarships
- training (museum courses, forestry training in archaeological site identification)
- get more sites recorded and registered
- develop marae based heritage inventories.
- form partnerships not just policies
- get hui messages back to the marae/whanau/your organisations

HUI PROPOSALS

1. **To form a local Pahauwera Ropu for heritage recording and protection, and to assess consents.**

This Ropu Taiao should:

- be independent
- link into other key groups
- encourage others
- provide expert Maori advice
- be funded for that advice
- have input into the District Plan (and also propose that that there is a requirement to consult and pay for Maori advice)
- negotiate directly with home marae
- identify whanau skills and use them
- be established under marae protocol (achieve a mandate for action)
- ensure that business and tikanga do not clash

2. **To agree to meet regularly for one year to keep up the momentum of this hui; to monitor and report back on the goals of this hui; and to empower local marae to set up Ropu Taiao, and; that this agreement be known as the Te Huki Accord.**

3. **That the next hui be hosted by the Hastings District Council with the hui to be held at Houngiaria marae, Pakipaki on June 26-27 (see the panui attached to this document).**

The goal for subsequent hui is to derive a formula that we can take to Councils and Statutory Authorities that contains a template for cost recovery; and that we formalise a process for consultation (ie develop written requirements)

<u>Tasks for next hui</u>

- Collect documents, databases, etc for other national models, Ropu etc
- Invite other established envirnmental/heritage ropu to the hui
- Assess how processes are working at home (are they working? what are the projections?)

Appendix 1: THE HERITAGE REVIEW PROCESS

In the first week of April (only two weeks after our Te Huki hui) the annual NZAA conference was held. We met in Gisborne at Te Poho o Rawiri to discuss current research and issues in NZ archaeology.

There was a call for more active NZAA participation in the National Heritage Review (currently the Association is only being kept informed as an interest group). A Working Party was proposed to:

- gain active participation in the Heritage Review process
- write a detailed submission on behalf of our members
- form a 'Heritage Coalition' of other groups and individuals concerned with or affected by heritage management and protection. It was proposed that this coalition should be focussed on a NZAA/Maori basis. At the meeting the Ngati Porou Runanga offered their support to kick this process off. Contact for the Working Group is Susan Forbes (ph/fax 04 2399220).

The Te Huki Accord would be a valuable ally in the Heritage Coalition. Could delegates consider the proposal to join the Coalition - this will be formally proposed at the Houngiaria hui.

HE PANUI

TE HUKI ACCORD

HOUNGIARIA MARAE, PAKIPAKI
HASTINGS

JUNE 26-27

- *assemble at 10am on Thursday 26 for powhiri*
- *poroporoaki at 3pm Friday 27*
- *an agenda will be posted out in June. If you wish to present a 'paper' please contact Susan Forbes and/or Ngahiwi Tomoana - Kaiwhakahaere*

Kaiwhakahaere:

Ngahiwi Tomoana
Kaitakawaenga Heretaunga Kaunihera
Private Bag 9002
HASTINGS
ph 06 8780577
fax 06 8780550

Susan Forbes
Paekakariki Hill Road
RD 1
PORIRUA.
ph/fax 04 2399220
email: kotuku@xtra.co.nz
mobile 025 573326

"D"

FISHERIES RESOURCE INVENTORY: THE MOHAKA RIVER

Matt Hickey BSc

Fish and Game New Zealand
Hawkes Bay Region

August 2001

This is the exhibit marked "D" referred to in the affidavit of Toro Edward Reginald Waaka on behalf of the Trustees of the Ngāti Pāhauwera Development and Tiaki Trusts affirmed at

Napier this 5th day of

December 2014 before me

Signature:

A Solicitor of the High Court of New Zealand /Justice of the Peace

Cara Bennett
Solicitor
Napier

LIST OF TABLES

LIST OF MAPS

*Taken From: Hawke's Bay catchment Board and Regional Water Board. 1986. *The Mohaka River catchment Water and Soil Resource Management Plan.* P.O. Box 233 Napier.
** Taken From Hawke's Bay Regional Council . 2000. *Proposed Regional Resource Management Plan. Hawke's Bay Regional Council.* Napier.

1.0 SUMMARY

The inventory is a review of both current and historical data. This river inventory describes the entire Mohaka River catchment, including the fauna within the river system as well as the aspects valued within the fishery. The inventory identifies and reviews any potential threats to the fishery found within the Mohaka catchment. Where appropriate management recommendations have been made.

Physically the Mohaka River flows relatively steeply beginning at a height of approximately 1,200m above sea level. The Mohaka flows through beech forest, deep gorges and finally through river terraces before reaching the Pacific Ocean 135km from its source.

Land development within the Mohaka catchment is not as pronounced as many of the other river systems within the Hawke's Bay Region of Fish and Game New Zealand. A large proportion of the catchment is still covered by native forest. The main agricultural and exotic forestry areas of the Mohaka are in the middle to lower catchment.

Drift diving counts on the upper Mohaka have indicated that there is a good trout population within the Mohaka River. These fish tend to be of a good size, which reflects the availability and quality of habitat.

It was found that physical access on the Mohaka varies greatly depending on which part of the river anglers wish to access. The lower and middle reaches have excellent access with both State Highway 2 and 5 crossing the river and numerous side roads giving access. There is limited vehicle access to the upper reaches as the river flows through both the Kaimanawa and Kaweka Forest Parks and extensive areas of the upper reaches are privately owned.

It was also found that the greatest threats to the Mohaka fishery are likely to come from poor landuse practices during exotic forest harvesting and possible eutrophication from dairy conversions within the Taharua River Valley. Both these two types of land use have the potential to severely degrade the Mohaka fishery if they are not monitored regularly.

To maintain the fishery, Fish and Game must advocate that Hawke's Bay Regional Council monitors stringently the effects that logging and dairying is having on the Mohaka River. Fish and Game also need to use the Draft National Water Conservation Order (1992) and Resource Management Act (1991) where appropriate to protect the Mohaka Fishery.

2.0 INTRODUCTION

The Mohaka River inventory was undertaken to provide a reference document for the Hawke's Bay Fish and Game Council. The inventory co-ordinates information sourced from existing reports based on the Mohaka River catchment. In particular the information used was provided by Hawke's Bay Regional Council (H.B.R.C), The Department of Conservation (DoC) and the Hawke's Bay Fish and Game Council (H.B.F.G.C).

The inventory provides a broad background of the Mohaka River catchment, including aspects of geology, hydrology, stream morphology and biology.

Angler use of the Mohaka River is also discussed, including preferred fishing methods, and access issues. Any possible threats to the Mohaka fishery be they direct or indirect, current or future are also discussed. Where appropriate possible management recommendations are made.

Map 1 The Mohaka River catchment Location within New Zealand

Map 2 Topographic Map of the Mohaka catchment showing all Roads and Tributaries.

3.0 REGIONAL AND TERRITORIAL LOCAL AUTHORITY BOUNDARIES

The land area of the Hawke's Bay Region spans approximately 1,416,000 hectares, from north of Mahia Peninsula to south of Porangahau (H.B.R.C., 2000). The eastern boundary is lined by the coast and in the west by the Ruahine, Kaweka, Kaimanawa, Huiarau and Ahimanawa Ranges (H.B.R.C., 2000). Within the Hawke's Bay region there are six local authority governing bodies. These are (from north to south): The Wairoa District, The Taupo District, The Rangitikei District, The Hastings District, Napier City District, and The Central Hawke's Bay District (H.B.R.C., 2000). While there are six local governing bodies, the Hawke's Bay Regional Council maintains authority over these in accordance with the Resource Management Act (1991).

Sports fish and game bird management within the Mohaka River catchment is the responsibility of the Hawke's Bay Fish and Game Council. However, one Regional Council alone does not govern the Mohaka catchment in its entirety (Map 6).

The upper reaches of the Taharua catchment crosses the regional boundary between Hawke's Bay Regional Council and Environment Waikato (Map 6). Thus the upper reaches of the Taharua catchment are managed under Environment Waikato's Regional Resources Management Plan. All other tributaries and reaches of the Mohaka River are managed under the Hawke's Bay Regional Council Regional Resources Management Plan.

Map 3 Hawke's Bay Region Boundary

4.0 PHYSICAL CHARACTERISTICS

4.1. General Description

The Mohaka River is the northern most river in the Hawke's Bay Fish and Game Region. From its source in the Kaimanawa Ranges the Mohaka flows through dense bush and numerous gorges on its 135 kilometer (km) easterly journey to the Pacific Ocean (Graynoth, 1973).

The Mohaka River is snow fed, cool, and at times can carry a large amount of sediment (Graynoth, 1973 & Hawke's Bay catchment Board & Regional Water Board, H.B.C.B. & R.W.B., 1986). Generally the streambed can be broken into two distinct forms, the upper river has a boulder bed while the lower reaches have a shingle, silt and pumice base (Graynoth, 1973).

At present the Mohaka River catchment does not suffer from pollution or any marked eutrophication (excessive nutrient input), with its water considered some of the purest in New Zealand (H.B.R.C., 1995). This may become a future problem because of increased dairy farming and forestry activity within the Mohaka catchment.

As a fishery the Mohaka holds a good self-sustaining population of wild brown and rainbow trout (H.B.F.G.C., 1996). The upper reaches of the Mohaka are considered to be a nationally important fishery while the middle and lower reaches are regionally important (Teirney, *et al.*, 1982)

4.2. Geology And Soils

The tectonic activity of the area has determined the landforms we see today (H.B.C.B & R.W.B., 1986). Mesozoic greywackes are the oldest rocks in the catchment and form the basement rocks in the greywacke steeplands and pumice country (H.B.C.B. & R.W.B., 1986). The Mohaka catchment contains two forms of greywacke, these are the Kaweka and Urewera greywackes with the former only found west of the Kaweka and Wheao faults (H.B.C.B & R.W.B., 1986, refer to Map 4).

The Mohaka fault zone marks the boundary between the greywackes and the tertiary sandstones, siltstones, and mudstones that lie above the mesozoic greywacke base (H.B.C.B & R.W.B., 1986, refer to Map 4). However, there are isolated areas of this tertiary rock on the western side of the fault within the Waipunga catchment at Te Haroto and at Pakaututu (H.B.C.B & R.W.B., 1986, refer to Map 2).

The Te Waka and Maungaharuru Ranges have been formed by the tectonic uplifting of this area, with the land in the east of the fault zones rising relative to the land in the west (H.B.C.B. & R.W.B., 1986). Approximately 250,000 years ago the Mohaka River course changed from southeast to northeast eventually flowing along the fault zone (H.B.C.B &

R.W.B., 1986). This flow change formed the Maungataniwha Gorge as the river down-cut through the Maungaharuru Range to reach the sea (H.B.C.B. & R.W.B., 1986).

The ash and pumice terraces of the pumice country (Map 4) were formed from deposits of tephra from the Taupo eruption approximately 1,850 years before present (Y.B.P) (H.B.C.B & R.W.B., 1986). The ash and pumice were washed down from the steep country within the Mohaka catchment and re-deposited as pumice alluvium (H.B.C.B. & R.W.B., 1986).

Volcanic ashes (tephra) are the main source of the parent material that makes up much of the Mohaka's catchment soils (H.B.C.B. & R.W.B., 1986). These soils have been deposited throughout time over the central North Island with the most recent being that of the Taupo eruption 1,850 Y.B.P. (H.B.C.B. & R.W.B., 1986).

The tephra layer within the Mohaka catchment is generally deeper closer to Taupo, gradually decreasing towards the East Coast (H.B.C.B. & R.W.B., 1986). The natural process of erosion removed large amounts of this tephra from the steep hills within the Mohaka catchment causing large variations in the depth of pumice layers between steep slopes and flatter country (H.B.C.B. & R.W.B., 1986). The additional soils found in the catchment are derived from either alluvial deposits or bedrock weathering (H.B.C.B. & R.W.B., 1986).

4.3. Climate

The climate within the Mohaka River catchment is largely influenced by distance from the coast with there being large differences in rainfall and temperature between the lower and upper reaches of the Mohaka River (H.B.R.C., 2000). The dominant winds of the Mohaka catchment are northwesteriies although both southwesterlies and southeasterlies are also quite common (H.B.C.B. & R.W.B., 1986). Rainfall within the Mohaka catchment increases the further inland from the coast (H.B.C.B & R.W.B., 1986). The annual rainfall for the catchment ranges from 1300mm for the coastal areas through to 2,400 – 3,600mm in the Kaweka Ranges (H.B.C.B. & R.W.B., 1986).

The coastal region of the Mohaka catchment experiences relatively mild winters while temperatures are generally much cooler in the upper reaches due to the increase in altitude (H.B.C.B. & R.W.B., 1986). Frosts in the coastal areas are infrequent but their frequency increases inland (H.B.C.B & R.W.B., 1986). Frost days generally total around 100 days annually in the Kaweka Ranges due to the high altitude (H.B.C.B. & R.W.B., 1986).

4.3.1. Rainfall

Because the Mohaka River catchment begins in the Kaimanawa Ranges it has a consistently high rainfall (H.B.R.C., 2000). This coupled with the sheer size of the catchment and tributaries results in a relatively stable flow (H.B.C.B & R.W.B., 1986), thus minimising low flow problems that affect many of the other river systems within the Hawke's Bay Region.

Due to the geographic shape and topography of the Hawke's Bay particularly the inland mountain ranges, the Mohaka catchment is susceptible to heavy rainfall associated with cyclonic storms (H.B.C.B. & R.W.B., 1986). The easterly winds that are associated with theses cyclones are concentrated and forced upwards against the central North Island mountains and this can result in high intensity rain events (H.B.C.B. & R.W.B., 1986). At the Makahu Saddle in the Kaweka Ranges, 257mm of rain was recorded in one 24-hour period during one such cyclonic event (H.B.C.B. & R.W.B., 1986).

For the growing season of pasture, water requirements are approximately 100mm per month, while during the winter months the water requirement drops to around 25mm per month (H.B.C.B. & R.W.B., 1986). Although the yearly rainfall total exceeds the monthly average needed to sustain pasture growth within the catchment actual monthly rainfall during the growing season often falls short of the water requirements (H.B.C.B. & R.W.B., 1986).

4.4. Hydrology

Approximately half the catchment area is remote wilderness covered in native bush (Galloway, 1980, refer to Map 6). The Mohaka is the least modified river within the Hawke's Bay Fish and Game region (H.B.C.B. & R.W.B., 1986). The largest recorded flood on the Mohaka River occurred in 1938 with an estimated flow of 3,500 cubic metres (cumecs) (H.B.F.G.C., 1985). The worst flood since 1938 occurred in 1985 with a flow of 2,178 cumecs. The flood of 1985, caused the river to shift its bed, washed away a 10 acre island at the mouth, and severely impacted on the Mohaka fishery (H.B.F.G, 1985).

Unlike many of the other rivers within the Hawke's Bay region the Mohaka does not experience the low flows that create the main hydrology problems within the Hawke's Bay region. This is due to the fact that most of the Mohaka catchment is still in native forest (Map 6), meaning there isn't the agricultural demand for water which other rivers within the Hawke's Bay region have. A draft Water Conservation Order affords the Mohaka some protection from major changes in flow.

For more information about the Conservation Order refer to section 4.0

Map 4 Geology of the Mohaka catchment.

4.5. Water Quality

In 1994 the Hawke's Bay Regional Council found that the Mohaka River surface water quality was typical of mountain-land catchments, and the water quality was amongst the purest in New Zealand (H.B.R.C., 1995). These findings are supported by the readings collected over the last 10 years 1988 to 1998 inclusive at two sites (Raupanga and Glenfalls) on periphyton cover in the Mohaka River, which was found to be extremely low (Table 1). Periphyton abundance is a good gauge as to whether nutrients are entering the river system. As nutrient input increases so to will the abundance of periphyton (Byers & Quinn, 1999). Periphyton is an algae that grows in mats less than three millimetres (mm) thick on riverbeds(Byers & Quinn, 1999). Once periphyton reaches levels in excess of 40 percent cover it is considered to be at nuisance levels (Byers & Quinn, 1999).
Table 1 illustrates the change in the observed periphyton growth within the Mohaka River in the last 10 years. It demonstrates that little change has occurred.

Table 1 Changes in Periphyton Cover as Mats and Filamentous Growths at Upstream (left-hand values of pairs) and Downstream Sites on the Mohaka River.

River	Mean % mat	Mean % filament	Mean % mat + Fil	Mean max. % Mat	Mean max. % Filament	Mean max. % mat + Fil
Mohaka	0 - 0	0 - 3	0 - 3	0 - 0	0 - 5	0 - 5

Source: Byers, G.G., Quinn, J.M. 1999. *The National Rivers Water Quality Network Tenth Annual Report: 1988-99.* National Institute of Water & Atmospheric Research Ltd. P.O. Box 11-115, Hamilton. New Zealand.

The Mohaka Rivers water quality observations (Table 2 and 3) in Byers & Quinn, (1999) support the Hawke's Bay Regional Councils view that the Mohaka River water is of high quality. The tables illustrate variables used to monitor water quality. These variables support the Hawke's Bay Regional Councils view that the Mohaka has high water quality (H.B.R.C. 1995). The Dissolved oxygen (**DO**) readings vary from a maximum reading of 15.7 parts per million (PPM) to a minimum reading of 9.1 PPM at the Raupunga site while the Glenfalls site obtained readings of 14.7 PPM to a minimum reading of 9.1 PPM. These **DO** readings are well above the minimum **DO** level of 5 PPM that trout will try to avoid (Dedual *et al.*, 2000). **DO** readings are highly temperature dependant, thus as temperature increases **DO** levels will generally decrease (Hudson, 1998).

Temperature levels within the Mohaka River at Raupunga bridge and Glenfalls bridge (as can be seen in Table 2 and 3) are well within the upper limits for trout survival as the highest temperature recorded was 22.5 degrees Celsius (°C). This is well below both brown and rainbow trout upper limits of 27°C and 25°C respectively (Hudson, 1998). Tables 2 and 3 indicate that the water temperatures are within the accepted temperature ranges for trout as detailed in Table 4.

Table 2 Mohaka River Water Quality Readings at Raupunga 1989 to 1998.

VARIABLE	UNIT	MAX	P95	P75	MEDIAN	P25	P5	MIN
Temperature	°C	22.5	21.4	17	13	9.7	6.9	5.1
DO Saturation	%	126.6	114.1	106.5	103.2	101.4	100	94.8
DO	ppm	15.7	12.7	11.7	10.9	10	9.4	9.1
Flow	m^3/sec	1050	171	99.1	63.7	37.6	21.1	18.0
Clar	M	3.62	2.33	.99	.38	.18	.07	.01
Turbidity	NTU	640	95.8	35.8	9.8	3.2	1.	.6
pH	Units	8.89	8.64	8.39	8.24	8.11	7.98	7.39
Conductivity	US/cm 25°C	140	132	118.6	109	97.6	84.3	76.9
BOD5	ppm O	5.5	1.06	.55	.4	.21	.10	0
NH4	Ppb N	21	13	8	5	3	1	0
NO3	Ppb N	485	227	159	94	37	2	0
TN	Ppb N	575	424	256	174	110	66	30
Drp	Ppb P	19	17	13	9.6	6	2.5	1
TP	Ppb P	3798	206	77	31	15	9	2
g340	/m	11.8	6.8	3.5	2.6	2.0	1.7	0
G440	/m	2.8	1.6	.89	.58	.46	.34	0
Ca	ppm	16.3	15.4	14.2	12.7	12	10.5	9.7
Mg	ppm	1.77	1.76	1.7	1.64	1.51	1.22	1.16
Na	ppm	9.5	9.4	8.1	7.6	7.3	5.6	5.5
K	ppm	1.38	1.34	1.17	1.13	1.07	.77	.68
Alk	ppm	44.5	44.5	42	40.3	38.9	34.8	34.5
CI	ppm	5.5	5.4	5.1	4.7	3.8	3.3	3.2
SO4	ppm	12.5	10.6	8.1	6.5	5.7	4.7	4.3

Source: Byers, G.G., Quinn, J.M. 1999. *The National Rivers Water Quality Network Tenth Annual Report: 1988-99.* National Institute of Water & Atmospheric Research Ltd. P.O. Box 11-115, Hamilton. New Zealand.

Table 3 Mohaka River Water Quality Readings at Glenfalls 1989 to 1998.

VARIABLE	UNIT	MAX	P95	P75	MEDIAN	P25	P5	MIN
Temperature	°C	19.4	17.6	14.5	10.8	7.6	5.1	3.4
DO Saturation	%	123	108.5	104.1	101.8	100.6	99.7	81.2
DO	ppm	14.7	12.5	11.7	11	10.1	9.5	9.1
Flow	m^3/sec	138.9	86	43.4	26.3	17.5	12.8	5.6
Clar	M	6.15	4.39	3.29	2.26	1.35	0.38	0.15
Turbidity	NTU	69	6.9	1.9	1.2	0.6	0.4	0.3
pH	Units	9.02	8.31	8.07	7.91	7.8	7.67	7.54
Conductivity	US/cm 25°C	105	96.2	86.8	79	71.9	63.2	51.3
BOD5	ppm O	2.15	0.86	0.5	0.35	0.2	0.05	0.00
NH4	Ppb N	17	13	8	6	4	2	1
NO3	Ppb N	250	232	184	130	105	70	32
TN	Ppb N	570	330	240	198	166	136	94
Drp	Ppb P	13.1	10.6	8	6	4.7	2.8	1
TP	Ppb P	217	39	16	11	8	5	2
g340	/m	7.8	5.1	2.6	2	1.6	1.3	1.1
G440	/m	1.8	1.14	0.63	0.46	0.35	0.23	0.11
Ca	ppm	10.3	9.4	8	7.8	7.4	6.8	6.7
Mg	ppm	1.53	1.49	1.3	1.24	1.17	1.13	1.12
Na	ppm	6.5	6.5	6.2	5.8	5.4	5	4.7
K	ppm	1.14	1.09	0.99	0.92	0.83	0.78	0.76
Alk	ppm	32.5	31.4	30	26.3	25.5	25.3	25
CI	ppm	3.8	3.7	3.3	3.1	2.8	2.7	2.5
SO4	ppm	6.5	5.6	4.6	4.3	4.1	3.8	3.6

Source: Byers, G.G., Quinn, J.M. 1999. *The National Rivers Water Quality Network Tenth Annual Report: 1988-99.* National Institute of Water & Atmospheric Research Ltd. P.O. Box 11-115, Hamilton. New Zealand.

Table 4 Surface Water Guidelines from Both New Zealand and Overseas.

Water Quality Parameters	Surface Water
pH	Between 6.5 & 9.0**
Conductivity	-
Turbidity	-
Dissolved Oxygen (DO)	>6**
Colour	-
Salinity	-
Total Alkalinity	-
Hardness (Ca + Mg)	-
Phaeopigments	-
Saturated Dissolved Oxygen	>80 – 90%**
Suspended Solids (mgL-1)	<25 – 80% ***
Faecal Coliforms	-
Total Coliforms	-
E Coli	-
Nitrate Nitrogen	-
AFDW (g/sqm)	<40%*
Chl a (mg/sqm)	<100%*
Nitrate (mgL-1)	<0.06***
Ammonium Nitrate	Dependent on pH and Temperature
DIN (mgL-1)	<0.04 – 0.1*
Soluable Reactive Phosphorus (mgL-1)	<0.015 – 0.3*
COD (mgL-1)	10
Total Kjeldahl Nitrogen	-
BOD (mgL-1)	<2*
Chromium (mgL-1)	<0.01**
Iron (mgL-1)	<1**
TOC	-
Chloride	-
Nickel (mgL-1)	<0.015 – 0.15
Sulphate	-
Magnesium	-
Sodium	-
Potassium	-
Fluoride	-
Manganese	-
Calcium	-
Copper (mgL-1)	<0.002 – 0.005**
Zinc (mgL-1)	<0.005 – 0.05**
Arsenic (mgL-1)	<0.05**
Cadmium (mgL-1)	<0.0002 – 0.002**
Mercury (mgL-1)	<0.0001
Lead (mgL-1)	<0.001 – 0.005**

* Resource Management Water Quality Guidelines No. 1
** Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC)
*** Canadian Water Quality Guidelines
- No accepted guideline standard
(See Appendix I for explanations of each abbreviation)

Using the international and national guidelines for surface water quality (Table 4) it can be seen that in two categories only (pH and BOD) did any reading recorded in Tables 2 and 3 for the Mohaka River exceed these guidelines. The only time these guidelines were exceeded was in the column assigned to the maximum value recorded for that particular variable. Thus it is not a common occurrence for water quality to be unacceptable under the guidelines in Table 4.

Table 5 Temperature Range for Brown and Rainbow Trout.

SPECIES	UPPER LIMIT (°C)	OPTIMUM RANGE (°C)
Brown trout		
Adult	27	12-19
Juvenile	27	7-19
Spawning	≥ 10	2-13
Rainbow Trout		
Adult	25	12-18
Spawning	N/A	10-15.5

Source: Hudson, H.R., 1998. *Hawke's Bay Regional Plan Review: Fish and Game Related issues.* Hawke's Bay Regional Plan, Consultative Draft. Napier.

Although not an issue at present, water quality may become a focal point in the near future with increased exotic forestry and dairy farming within the Mohaka catchment. Dairy farming can produce increased nutrient input into a river system, particularly nitrogen (Environment Waikato, 2000). Increased Nitrogen can result in nuisance levels of periphyton, which reduce the **DO** levels in the water (Byers & Quinn, 1999; Quinn, 2000). Exotic forestry harvesting can result in large amounts of sediment loading (Quinn & Halliday, 1999; Minister of Conservation MoC 1990). Increased sediment loading may have a smothering type effect on the aquatic invertebrate life (Quinn & Halliday, 1999; Irvine, 1984; Collier *et al.,* 1997). Thus reducing the available food supply to the fishery (Kreutzweiser, 1990; Irvine, 1984).

For more information about threats to the Mohaka fishery refer to section 7.0.

4.6. Mohaka River Tributaries

Many tributaries of the Mohaka River are very important to the fishery as they maintain flows, provide spawning grounds and offer excellent juvenile rearing habitat. The tributaries are important areas for recruitment to the fishery. Many of the tributaries of the Mohaka River are considered to be excellent fisheries in their own right (H.B.F.G.C., 1996). The main tributaries are listed as follows, in order from the origin to the sea, with an extensive list of tributaries in appendix II.

4.6.1. Oamaru River

The Oamaru River originates in the greywacke ranges of the Kaimanawa Ranges (H.B.C.B. & R.W.B., 1986). The Oamaru Valley slopes are covered in native beech. The Oamaru is one of two rivers that join to form the beginning of the Mohaka River. The Oamaru is a fishery that experiences considerable seasonal angling pressure due to its proximity to public access points (Maxwell, pers com 2001).

4.6.2. Kaipo River

The Kaipo River is the river that joins the Oamaru to form the Mohaka River (H.B.C.B. & R.W.B., 1986). The Kaipo is very similar to the Oamaru River as it also originates in the greywacke ranges of the Kaimanawa's and also flows through beech forest to its junction with the Oamaru River (H.B.C.B. & R.W.B., 1986). As with the Oamaru, the Kaipo is a fishery in its own right and experiences considerable seasonal pressure (Maxwell, pers com 2001).

4.6.3. Taharua River

The Taharua River originates in the southwest Rangitaiki Plains (H.B.C.B. & R.W.B., 1986). It flows through a broad flat upper valley of erodable pumice (H.B.C.B. & R.W.B., 1986). As the Taharua River flows south, the valley retains its basic form becoming narrower, and the surrounding hills become steeper until it joins the Mohaka (H.B.C.B. & R.W.B., 1986). The lower valleys of the Taharua are very similar to that of both the Oamaru and Kaipo Rivers (H.B.C.B. & R.W.B., 1986).

The Taharua is an important fishery in its own right (Maxwell, pers com 2001). The entire catchment is contained within private land and the area is used extensively for guided angling. The upper catchment has recently changed with large areas subjected to conversion for dairy farming. At the time of the conversions, Fish and Game Hawke's Bay requested the following conditions be attached to the consent;

- that all permanent waterways be fenced off and riparian buffers be encouraged
- all riverbed disturbance is to occur outside the fish spawning months of May – September
- no uncured concrete is to be used within the watercourse
- macroinvertebrate community index (M.C.I) monitoring is to be undertaken at two-yearly intervals (Environmental Management Services, E.M.S., 1999).

4.6.4. Mangaroa Stream

The Mangaroa has a waterfall that prevents fish migration past its lower reaches. The catchment is also made up mostly of native beech forest (H.B.C.B. & R.W.B., 1986). The Mangaroa is also a tributary of the upper Mohaka. Access to the Mangaroa is restricted as it is privately owned. Access is available to paying passengers of licensed air charter operators.

4.6.5. Otupua Stream

A reasonably large tributary entering the Mohaka in the upper reaches just downstream of the Taharua River. The catchment of the Otupua is mostly beech forest (H.B.C.B. & R.W.B., 1986). Trout tend to be found in the lower reaches as there is a steep waterfall preventing fish migration upstream (Maxwell, pers com 2001). A small isolated trout population occurs above the waterfall but this is not highly valued. Access is restricted due to private ownership.

4.6.6. Mangatanguru Stream

A tributary of the Mohaka's upper reaches. Fish are found in the lower stretch of this steam but trout migration is halted above the lower section due to a waterfall (Maxwell, pers com 2001). The catchment is largely made up of native beech forest (H.B.C.B. & R.W.B., 1986).

4.6.7. Mangatainoka River

This river is considered to be a fishery in its own right. It is found within the Kaweka Forest Park, thus access is difficult. The catchment is mainly native beech forest (H.B.C.B. & R.W.B., 1986). The upper catchment is in private land administered by a trust. Access is provided through licensed air charter operations.

4.6.8. Makahu River

The Makahu River originates in the Kaweka Ranges. The catchment of the Makahu is relatively bare of vegetation and contains large amounts of scree slopes (H.B.C.B. & R.W.B., 1986). Thus the Makahu catchment is highly erodable. There are a few trout found in the Makahu River (H.B.F.G.C., 1996).

4.6.9. Ripia River

The Ripia River begins its journey from the south of the Rangitaiki Plains (H.B.C.B. & R.W.B., 1986). It then flows southeast from the open pumice country, through a series of gorges in angular pumice and volcanic alluvium where it is joined by numerous tributaries before entering the Mohaka (H.B.C.B. & R.W.B., 1986). The fishery is dominated by brown and rainbow trout (H.B.F.G.C., 1996). The Ripia is an important fishery. The whole of the true right bank, from the confluence of the Mohaka upstream for approximately 15km is boarded by a marginal strip allowing good public access.

4.6.10. Inangatahi River

The Inangatahi is a small river that has both native and exotic forest within its catchment. It is extensively used as a spawning tributary (Maxwell, pers com 2001). There are a few resident adult fish that comprise a small fishery.

4.6.11. Waipunga River

The longest tributary of the Mohaka River with a total length of approximately 50km, this river begin its journey south of the Rangitaiki Plains (H.B.C.B. & R.W.B., 1986). The Waipunga River flows through a narrow ash and pumice filled valley that is covered in native vegetation (H.B.C.B. & R.W.B., 1986). The upper reaches of the Waipunga contain brown trout that are isolated from the lower river due to a series of very large waterfalls - up to 50 metres (m) high, which prevent fish migration (Strickland, 1985). The lower reaches of the Waipunga are considered to be a very good fishery holding both brown and rainbow trout (H.B.F.G.C., 1996).

4.6.12. Te Hoe River

The Te Hoe River has a shingle and large rock bed and is one of the less accessible tributaries of the Mohaka due to the fact that in order to gain access one must cross the Mohaka River. However for the angler who makes the effort, good fishing is almost assured (H.B.F.G.C., 1996). There is both brown and rainbow trout found within the Te Hoe River (H.B.F.G.C., 1996).

4.7. Stream Morphology

The Mohaka River begins at the junction of the Oamaru and Kaipo Rivers (H.B.C.B. & R.W.B., 1986). Not far below this point one of the Mohaka's major tributaries, the Taharua River, enters the Mohaka. These three river systems begin their seaward journey from an elevation of approximately 1000 - 1200m above sea level (H.B.C.B. & R.W.B., 1986).

4.7.1. Upper Reaches

Greywacke steeplands and pumice infilled valleys that were formed through volcanic activity dominate the upper reaches of the Mohaka River topography (H.B.C.B & R.W.B., 1986, refer to Map 5). Five of the main tributaries of the Mohaka - the Oamaru, Kaipo, Taharua, Waipunga, and Ripia Rivers flow through some form of pumice valleys and greywacke steeplands (H.B.C.B. & R.W.B., 1986). All these rivers flow through steep country, which they have slowly incised over the centuries (H.B.C.B. & R.W.B., 1986). The Waipunga is the longest tributary of the Mohaka flowing for some 50 km from its source in the Rangitaiki Plains (H.B.C.B. & R.W.B., 1986). The Waipunga has numerous waterfalls where the river flows over ignibrite outcrops (H.B.C.B. & R.W.B., 1986).

The upper reaches of the Mohaka River contains a relatively stable boulder bed as is common with most river headwaters that originate from mountain ranges (Galloway, 1980).

4.7.2. Middle Reaches

The middle reaches of the Mohaka River is dominated by tertiary hill country topography (H.B.C.B. & R.W.B., 1986). The boundary between the greywacke steeplands and tertiary hill country is approximately in the same area as the Mohaka fault zone (H.B.C.B & R.W.B., 1986, refer to Map 4). The tertiary hill country is composed mainly of sandstone, siltstone and papa (mudstone), with some overlying volcanic soils (H.B.C.B. & R.W.B., 1986). Deep gorges occur in the tertiary hill country section of the Mohaka below the junction with the Te Hoe River (H.B.C.B. & R.W.B., 1986). One particular gorge is the Maungataniwha Gorge. From this point on the Mohaka River lies deeply entrenched in a narrow valley of papa cliffs (H.B.C.B. & R.W.B., 1986).

In the middle reaches the Mohaka's substrate begins to be dominated by shingle rather than the boulders that occur further upstream (Galloway, 1980).

4.7.3. Lower Reaches

For approximately the last 25km of its journey to the sea, river terraces dominate the Mohaka River catchment topography (H.B.C.B & R.W.B., 1986, refer to Map 5). Flat and rolling land is scattered throughout the catchment, mainly at the confluence's of major tributaries as well as the middle and lower valleys of the Mohaka catchment (H.B.C.B. & R.W.B., 1986). These terraces are composed of gravel's and sands that have been overlaid by a thin layer of tephra through time (Galloway, 1980).

At the river mouth of the Mohaka a large shingle bar that has formed through alluvial movements (sediment carried downstream by the river) determines the rivers course (H.B.C.B. & R.W.B., 1986). The position of the river mouth can change depending on the frequency and severity of floods, tides, and storm wave approach (H.B.C.B. & R.W.B., 1986).

The river substrate in the lower reaches of the Mohaka is largely made up of shingle, silt and pumice (Galloway, 1980).

Map 5 Topographic Units of the Mohaka catchment

4.8. Landuse

The Mohaka River catchment is the least modified of all Hawke's Bay river systems (H.B.C.B. & R.W.B., 1986). Pastoral farming covers around 25% of the catchment land area (Map 6). Intensive grazing occurs extensively along the lower Mohaka catchment (H.B.C.B. & R.W.B., 1986). As the soils within the Mohaka catchment are pumice derived, they have very low levels of nutrients thus high applications of fertilizer are needed to maintain pastures for grazing (H.B.C.B. & R.W.B., 1986).

In the last 30 - 40 years, there has been increased activity in the exotic forestry sector, with large areas of hill country being planted in forestry. Around 15% of the Mohaka catchment is now covered by exotic forestry (Map 6), the main species being *Pinus radiata* (H.B.C.B. & R.W.B., 1986). Forestry activities are likely to become a concern as the combination of steep topography within the Mohaka catchment and heavy rain presents the very real threat of large amounts of soil being washed into the Mohaka (Quinn & Halliday, 1999). This increased sediment input could impact on the Mohaka River fishery by reducing invertebrate abundance and diversity (Quinn & Halliday, 1999; Irvine, 1984; Collier, *et al.,* 1997). If invertebrate levels decrease enough, it will reduce the fisheries' food supply (Kreutzweiser,1990; Irvine, 1984).

Of late, large dairy conversions have taken place in the headwaters of the Mohaka within the Taharua River Valley (E.M.S., 1999). This is potentially a major issue in the catchment as eutrophication from dairy farming can produce an increase in bacteria, phosphorus, and nitrogen (Environment Waikato, 2000; Quinn, 2000). Additionally, to achieve an extended grass growing period high levels of nitrogen rich fertilizer are applied to pasture. Ultimately this nitrogen will leech into the groundwater and eventually into river systems. Phosphorus and nitrogen increases can result in increased algae and weed production within waterways (Byers & Quinn, 1999; Quinn ,2000). For this reason the large dairy conversions within the Taharua River Valley offer a threat to the Mohaka fishery if they are not managed correctly.

Gravel extractions are also known to take place within the lower Mohaka (below the Te Hoe junction) (H.B.R.C., 1994). Although this practice occurs it is not has prevalent as on many of the other large Hawke's Bay rivers (H.B.R.C., 1994). At current levels gravel extraction is not considered a major threat to the Mohaka fishery provided that appropriate extraction practices are maintained.

Land based recreational activities within the Mohaka catchment are centered on hunting, tramping and scenic walks. Water based recreational activities revolve around angling, canoeing and rafting (MoC, 1990).

Map 6 Vegetation Distribution within the Mohaka catchment

5.0 WATER CONSERVATION ORDER*

5.1. Background

In October 1987 the Hawke's Bay Acclimatisation Society and the Council of the North Island Acclimatisation Authorities applied for a water conservation order over the Mohaka River. The Minister for the Environment in June 1988 decided that the application should be dealt with as one for a national water conservation order (NWCO). As a result a tribunal was established to consider the matter.

The tribunal determined that the Mohaka River and its tributaries had the following characteristics.

a) Outstanding wild and scenic characteristics on the Mohaka main stem from the origin to Willow Flat and in the Te Hoe Gorge.
b) Outstanding trout fishery above the junction of the Te Hoe and Mohaka Rivers.
c) Outstanding amenity and watersport value from Pungahuru to Willow Flat.
d) Outstanding spiritual and cultural values to the Tangata Whenua over the whole river.

On the 26th March 1990 the tribunal issued its decision and from that draft a NWCO was prepared and publicly notified.

Section 104 (1)(g) of the Resource Management Act 1991 states;
Subject to Part II, when considering an application for a resource consent and any submissions received, the consent authority shall have regard to--
(g) Any relevant water conservation order or draft water conservation order.
This in effect makes the draft NWCO operative until such time as it is adopted as an Order in Council.

The order is still in a draft form due to a Waitangi Tribunal claim from Ngati Pahauwera (local Iwi) who have concerns about the affect the order might have on their ability control the use of the river. Fish and Game have recently sought that the draft NWCO be adopted through the Minister of the Environment as the Waitangi Tribunal claim should not affect the implementation of the Order in Council. The matter is still proceeding with the claim as yet unresolved and the Crown reconsidering its position.

5.2. The National Water Conservation (Mohaka River) Order (1992)

The NWCO (1992) for the Mohaka River does not protect the entire river length, however it does cover a large proportion of it (from its origin to Willow Flat is protected). Four main features are used to establish this NWCO (1992) for the Mohaka River, these include; the outstanding trout fishery, outstanding scenic characteristics in the Mohaka River, outstanding scenic characteristics in the Te Hoe Gorge, and an outstanding amenity for water based sports.

Under the NWCO (1992) for the Mohaka River any dam constructed in the area covered by the NWCO (1992) must be under 3 metres in height and must be on a tributary of the Mohaka River. The dam is not permitted to detract from any of the outstanding features mentioned above.

Nothing within the NWCO (1992) for the Mohaka River shall be construed as limiting any right to the use of water for domestic needs, for the needs of animals, or the needs of fire fighting. Permits will be issued for the removal of water, gravel, the construction, maintenance or protection of roads, bridges, river crossings, pylons, and other necessary public utilities, or for soil conservation or river protection purposes. Provided that in each case the exercise does not detract from the outstanding features and characteristics outlined above.

*(See Appendix III for a copy of: The National Water Conservation (Mohaka River) Order 1992).

6.0 BIOLOGY

6.1. Invertebrates

The macroinvertebrates within a river fishery are the primary food source for trout (Hynes, 1976). Where macroinvertebrate numbers are low, trout growth rates may be slow, thus the trout population may be made up of a large amount of small fish (Kreutzweiser, 1990). Alternately with low invertebrate numbers trout densities may also be low (Irvine, 1984). Thus one of the underlying factors for a healthy fishery is a healthy invertebrate population.

Invertebrates can be used to predict water quality (Stark 1985). Each invertebrate species is scored from 1 - 10. Ten indicates that a species is very intolerant to poor water quality and an invertebrate with a score of 1 is considered tolerant of poor water quality (Stark 1985). The species values are then totaled to give a score known as the macroinvertebrate community index (M.C.I., refer to Table 6). Species such a Chironomids are an example of a low scoring macroinvertebrate on the M.C.I (low scoring meaning the species is tolerant of poor water quality). While *Zelandaperla* and *Delatidium* species score much higher on the M.C.I. (Stark, 1985).

The sampling sites used by the Hawke's Bay Regional Council are as follows:

- Upstream of the Mokomokonui/Waipunga River confluence; upstream of State Highway Five at the Waiarua/Mohaka River confluence;
- The Mohaka River at Willow Flat; and Makahu Stream at Makahu Road (Map 2). All of these sites are in the middle to upper reaches of the Mohaka River.

Hawke's Bay Regional Council uses a "kick sampling" method where the streambed is disturbed by foot, and fine organic matter (including invertebrates) is swept downstream into a hand held net. The booklet "A Photographic Guide to the Freshwater Invertebrates of New Zealand" produced by the Otago Regional Council is then used to determine the invertebrates species found and their respective scores out of 10. These scores are then used to determine each sites M.C.I. through a series of calculations. The species that are present within the Mohaka River indicate the river has good habitat and water quality (Table 7).

For more information about calculating M.C.I. scores refer to Stark, (1985).

Table 6 M.C.I. Scores and Indication of Water Quality.

Macroinvertebrate Community Index Score	Water Quality and Habitat
> 125	Good habitat quality
116 – 125	Good – moderate habitat quality
106 – 115	Moderate habitat quality
95 – 105	Moderate – poor habitat quality
< 95	Poor habitat quality

Source: Stark, J.D. 1985. A Macroinvertebrate Community Index of Water Quality for Stoney Streams. *Water and Soil Miscellaneous Publication No. 87.*

Table 7 Summary of the Number of Taxa and the M.C.I. Scores for Four Sites Within the Mohaka catchment From 1996 – 1999.

	Variables		Site No.		
		321	325	595	607
March-99	Taxa	11	6	5	
	EPT	9	6	4	
	Indv	560	29	134	
	MCI	155	128	144	
Aug-99	Taxa	11	10	8	
	EPT	6	9	4	
	Indv	642	38	123	
	MCI	138	160	120	
Mar-98	Taxa	21	23	24	23
	EPT	16	13	11	13
	Indv	442	523	368	2456
	MCI	122.9	106.1	85.8	114.8
Aug-98	Taxa	14	12	6	15
	EPT	11	11	3	10
	Indv	255	26	54	117
	MCI	143	133	153	136
1997	Taxa	13	10	5	14
	EPT	9	6	2	8
	Indv				
	MCI	152.3077	138	116	127.1429
1996	Taxa	15	15	12	16
	EPT	12	10	8	10
	Indv				
	MCI	158.6667	144	111.667	132.5

Site Locations
Site 321: Upstream of the Mokomokonui/Waipunga River confluence
Site 325: Upstream of State Highway five at the Waiarua/Mohaka River confluence
Site 595: Mohaka at Willow Flat
Site 607: Makahu Stream at Makahu Road

Source: Hawke's Bay Regional Council . 2000. *M.C.I. Raw Data. Unpublished.* Hawke's Bay Regional Council, Napier.

In February 1991 a survey of the Mohaka River's invertebrate community was carried out by the Department of Conservation (Collier, 1991). A total of 28 one minute kick samples were collected at seven different sites (four samples per site) along the Mohaka River (Collier, 1991). It was found that the aquatic invertebrate fauna of the Mohaka River is unexceptional (Table 8), with most taxa widely distributed throughout the country (Collier, 1991).

Table 8 The Invertebrate Species Present Within the Mohaka River System.

Common Name	Species Name
Mayfly	*Delatidium* Spp
Mayfly	*Coloburiscus humeralis*
Mayfly	*Nesameletus* Spp
Mayfly	*Austroclima jollayae*
Stonefly	*Zelandobius furcillatus*
Stonefly	*Zeladaperla decarta*
Horn Cased Caddis	*Olinga feredayi*
Caddis	*Beraeoptera roria*
Sandy Cased Caddis	*Pycnocentrodes aeris*
	Pyncocentria Spp
	Pyncocentria evecta
Caddis	*Psilochorema mimicium*
Caddis	*Hydroboasis* Spp
Green Caddis	*Hydrobiosis parumbripennis*
	Newochorema confusum
White Caddis	*Hydrobiosella* Spp
Caddis	Hydrobiosidae *indet*
Grey Caddis	*Aoteapsyche* Spp
Cranefly	*Eriopterini* Spp
Sandfly/Blackfly	*Austrosimulium Australense*
	Molcphilus Spp
	Tipulid Spp
Cranefly	*Paralimnophila Skusei*
Cranefly	*Aphrophila neozelundiea*
Fly	*Empididae* Spp
Fly	Ceratopogonudae
Midge	Chironomid Spp
Dobsonfly Larvae	*Archichauliodes diversus*
	Elmidae Spp
Worm	Oligochaeta Spp
Amphipod	*Paracalliope* Spp

Source: Collier, 1991. *Preliminary Findings of The Survey Of Aquatic Invertebrates In The Mohaka River.* Department of Conservation files, Napier.

6.2. Native Fish

Within the Mohaka River system 10 native fish species and two crustacean species have been identified. These species all spend a large proportion of their life in the Mohaka River (Strickland, 1985). Of the native fish nine of the 10 species depend on access to the sea for some part of their life cycle, as does one of the crustacean species (Table 7).

From Table 5 it can be seen that koaro were only found above the Mokonui Gorge, but were confined to steep bush covered tributaries with coarse substrate (Strickland, 1985). The only widespread native species was the long-finned eel, which was recorded at 70% of the sample sites (Strickland, 1985; refer to Table 7). Five species of native fish (torrentfish, crans bully, black flounder, common smelt, and inanga) were not found above the Mokonui Gorge, while densities of short finned eels and common bullies decreased significantly above the gorge (Strickland, 1985).

Table 9 The Native Fish Species Present Within the Mohaka River System.

Species	Common Name	Site Recorded From (%)	Distribution
Anguilla dieffenbachii	Long finned eel*	70	B
Anguilla australis	Short finned eel*	16	C
Galaxias sp.	Koaro*	11	A
	Inanga*	3	C
Cheimarrichthys fosteri	Torrent fish*	8	C
Retropinna retropinna	Common smelt*	5	C
Gobiomorphus cotidianus	Common bully*	9	C
Gobiomorphus hubbsi	Bluegilled bully*	3	C
Gobiomorphus basalis	Crans bully	1	C
Rhombosolea retiaria	Black flounder*	1	C
Paranephrops planifrons	Koura (freshwater crayfish)	N/R	N/R
Paratya curvirostris	Shrimp*	N/R	N/R
Rhombosolea leporina	Yellow belly flounder	N/R	N/R
Arripis trutta	Kahawai	N/R	N/R
	Snapper	N/R	N/R
	Spotted Dogfish	N/R	N/R
	Gurnard	N/R	N/R
Mugil cephalus	Grey mullet	N/R	N/R
Aldrichetta forsteri	Yelloweyed mullet	N/R	N/R

* Migratory to and from sea
Distribution A = Above Mokonui Gorge
B = Above and Below Mokonui
C = Principally below the Mokonui Gorge
N/R = Distribution and site were not recorded

Source: Strickland, R.R. 1985. Distribution and Habitats of Fishes in the Mohaka River. *Fisheries Environmental Report 55.*

6.3. Trout

6.3.1. Trout Liberations

Brown trout were the first species of trout to be liberated into the Mohaka River. This first occurred in 1878 into the Taharua River, a tributary of the Mohaka (Wellwood, 1968). It is believed that Rainbow trout were released later around 1900 into the same river, with regular liberations occurring both their and in the mainstem of the Mohaka until 1964 (Wellwood, 1968). The Mohaka fishery is today considered self-sustaining. The abundance of productive spawning tributaries, a plentiful food supply and relatively stable flows creates ideal habitat for recruiting juvenile trout to the fishery. The nature of the river is such that it also provides good adult habitat for the recruited juveniles to grow. In 1964, 25,000 rainbow fry were released into the Mohaka River (Hawke's Bay Acclimatisation Society, H.B.A.S., 1964). This is the last recorded trout liberation to have taken place in the Mohaka (H.B.A.S., 1964).

6.3.2. Monitoring

Drift diving surveys have been conducted on the river at times over the past 50 years. Diving between 1989 and 1999 has used the same sites (Bagshaw, 1997) to try and index change in trout abundance. Additional sites were added in 2000 to try and monitor all of the most popular fishing areas on the river. This early data has helped to establish a base line data set for comparison with future results.

6.3.3. Trout Abundance

From 1989 - 2000 Fish and Game have completed four drift dives in the upper reaches of the Mohaka, at the Redcliffs and Guides pools in Poronui Station (Bagshaw, 1997). There is also two other sites that are part of Fish and Games regular drift diving monitoring, these are the Hudsons bend and five minute flate sites, both of which are in the middle reaches of the Mohaka (Bagshaw, 1997). These drift dive surveys have indicated little variation in the trout numbers occupying these pools within the last 10 years (Bagshaw, 1997). There have also been other sites along the Mohaka that have only been dived once by Fish and Game. One of these sites was dived earlier by the fisheries research division in 1985, thus providing for some comparison for one particular site (Bagshaw, 1997). The following tables (Tables 10 – 14) demonstrate the results for the drift dives undertaken in the Mohaka River from 1985 - 2001.

Table 10 Drift Dive Results for the Redcliffs Pool (trout per km).

		15 Feb 89	8 Feb 90	20 Mar 97	31 Mar 99	1-Mar-00	15-Feb-01
BROWN	Small	3	0	2	0	2	0
	Medium	3	8	0	0	11	1
	Large	27	52	57	26	43	16
RAINBOW	Small	0	0	14	0	0	0
	Medium	0	0	0	0	0	0
	Large	3	0	0	5	8	2
UNIDENTIFIED	Small	0	0	2	0	0	0
	Medium	0	0	0	0	0	0
	Large	0	0	0	0	0	0

* Small (10-20cm) Medium (20- 40cm) Large (>40cm)

VARIABLES	Secchi Disc	10	8.8	8	4	9.2	9
	No. of Divers	3	3	3	2	4	3
	Cover Rating	4	4	4	4	4	NR

* Cover rating is on a ten-point scale where 1 = little cover and 10 offers a lot of cover in the form of undercut banks, logs etc.

Table 11 Drift Dive Results for Guides Pool (trout per km).

		15 Feb 89	20 Mar 97	31 Mar 99	1 Mar 00	15-Feb-01
BROWN	Small	8	0	0	0	0
	Medium	5	0	0	0	0
	Large	80	88	80	110	20
RAINBOW	Small	0	0	0	0	0
	Medium	0	0	0	0	0
	Large	8	5	33	10	19
UNIDENTIFIED	Small	0	3	0	0	0
	Medium	0	0	0	0	0
	Large	0	0	0	0	0

* Small (10-20cm) Medium (20- 40cm) Large (>40cm)

VARIABLES	Secchi Disc	10	10	4	8	9
	No. of Divers	3	3	2	4	4
	Cover Rating	4	4	4	4	NR

* Cover rating is on a ten-point scale where 1 = little cover and 10 offers a lot of cover in the form of undercut banks, logs etc.

Table 12 Drift Dive Results for Otupua Site.

		2 April 85	20 Mar 97
BROWN	Small	116	69
	Medium	80	85
	Large	173	13
RAINBOW	Small	0	1
	Medium	0	1
	Large	2	7
UNIDENTIFIED	Small	15	3
	Medium	3	1
	Large	0	9

* Small (10-20cm) Medium (20- 40cm) Large (>40cm)

VARIABLES	Secchi Disc	3.85	3.5
	No. of Divers	4	4
	Cover Rating	NR	7

* Cover rating is on a ten-point scale where 1 = little cover and 10 offers a lot of cover in the form of undercut banks, logs etc.

Table 13 Drift Dive Results for Hudson's Bend Site (trout per km).

		20 Mar 97	2 Mar 00	8 Mar 01
BROWN	Small	14	30	14
	Medium	36	41	30
	Large	50	23	58
RAINBOW	Small	0	3	17
	Medium	0	1	11
	Large	7	0	2
UNIDENTIFIED	Small	24	1	14
	Medium	8	0	6
	Large	21	1	1

* Small (10-20cm) Medium (20- 40cm) Large (>40cm)

VARIABLES	Secchi Disc	4m	7	6.5
	No. of Divers	4	4	4
	Cover Rating	5	5	NR

* Cover rating is on a ten-point scale where 1 = little cover and 10 offers a lot of cover in the form of undercut banks, logs etc.

Table 14 Drift Dive Results for the Five-Minute Flat Site (trout per km).

		20 Mar 97	2 Mar 00	8 Mar 01
BROWN	Small	12	29	0
	Medium	32	37	0
	Large	42	74	20
RAINBOW	Small	6	0	0
	Medium	0	2	0
	Large	1	0	19
UNIDENTIFIED	Small	0	0	0
	Medium	0	6	0
	Large	2	1	0

* Small (10-20cm) Medium (20- 40cm) Large (>40cm)

VARIABLES	Secchi Disc	4	5.5	7.5
	No. of Divers	4	4	4
	Cover Rating	5	5	NR

* Cover rating is on a ten-point scale where 1 = little cover and 10 offers a lot of cover in the form of undercut banks, logs etc.
* Secchi Disc is the distance in metres that can be seen through the water column

Source: Tables 10 – 14, pre 2000, Bagshaw, R. 1997. *Mohaka Drift Dive March 1997.* Fish and Game Hawke's Bay Region. After 2000, Maxwell pers comm 2001.

7.0 ANGLER USE

7.1. Introduction

The Mohaka River is considered one of the better trout fisheries within the Hawke's Bay region (H.B.F.G.C., 1996). But its importance does not stop there, from Willow Flat upstream the Mohaka River is considered to have national importance within the scenic category (Teirney *et al.,* 1982). Teirney *et al.,* (1982) also found that the middle and lower reaches were a regionally significant fishery within the Hawke's Bay region.

7.2. Angling Experience

The headwaters of the Mohaka above Willow Flat have been identified as a nationally important scenic fishery (Teirney *et al.,* 1982). This rating has come about due to the feeling of remoteness experienced on the Mohaka as well as the relatively large numbers of large trout (Richardson *et al.,* 1984). Access to the headwaters of the Mohaka (below the Oamaru and Kaipo confluence) is considered to be difficult due to access restrictions (Richardson *et al.,* 1984). The public have access to the river above this point via a Department of Conservation poled route through Poronui Station (Richardson *et al.,* 1984). For this reason many anglers consider the middle reaches far more accessible (Teirney *et al.,* 1982).

Over the last 10 - 15 years it has been observed that many headwater fisheries have been increasingly commercialised, the upper Mohaka is no exception (Bagshaw, 1997). Guided angling within the area is common, with it not being unusual to have a dozen guides working the main river and tributaries (Bagshaw, 1997). Light plane and helicopter access has made it far easier to reach these once remote areas. Thus fishing pressure has increased 10 fold in recent years (Bagshaw, 1997). This high use has increased concerns within Hawke's Bay's local fishing fraternity and Fish and Game for what was once a wilderness headwater fishery.

7.3. Fishing Methods

Current regulations seek to maximize opportunity while protecting the resource. The river has no minimum size and is able to be fishing using both fly and spin fishing techniques. A limit of two sports fish applies to the upper catchment (above the Managtainoka confluence), with a limit of four below that. The upper catchment (above the Mangatainoka confluence) is closed from May to August to protect spawning trout. The tributaries have a one fish limit and are also closed for the winter months.

The regulations on this river have sought over time to minimize the perceived high harvest in the upper reaches of the river. It is felt, as with many other Central North Island river fisheries, that with the advent of improved aerial access to the river harvest increased and subsequently impacted on the trout population.

Richardson *et al.,* (1984) found that wet flies, nymphs and spinners were all commonly used by anglers on the Mohaka River. Dry flies were also used but to a much lesser extent.

The suggested patterns for catching trout in the Mohaka are for the spin fisherman, large heavy spoons should give the best results as they "get down" to where the fish are likely to be (H.B.F.G.C., 1996). The fly fisherman should try weighted half back or Hares' Ear nymphs, but most flies will generally take fish (H.B.F.G.C., 1996). The Mohaka River is characterised by large, deep pools that large brown trout. This combination makes angling a challenge for the novice.

7.4. Angling Surveys

Teirney *et al.,* (1982) found from their national anglers survey that 62% of respondents fishing the Mohaka system came from Hawke's Bay, while 13% came from the central North Island (Rotorua and Taupo fishing districts) and 13% came from seven additional districts.

Richardson *et al.,* (1984) found from their study that the middle (61 – 80% of respondents fished this section) and upper reaches (41 – 60%) of the Mohaka River received most of the fishing pressure, while the lower reaches were hardly fished (<5%). Overall the respondents valued the Mohaka River highly. Area fishable, scenic beauty and solitude were all rated very highly.

Richardson *et al.,* (1984) found that the middle reaches of the Mohaka River were visited by over 61% of respondents. This is probably due to better access to this part of the fishery. Wet flies, nymphs, and spinners were equally common in their use, while dry fly fishing was the least preferred method.

The national anglers survey also showed that the remote headwater tributaries of the Oamaru and Kaipo were exceptionally highly valued for large trout and scenery, while the Hautapu was highly valued for large trout (Richardson *et al.,* 1984). The Ripia was classified as a highly valued wilderness fishery with exceptional solitude and scenic beauty. The Waipunga is an accessible scenic and recreational fishery of high usage and inter-regional significance. Other data also indicated that the Hautapu and Te Hoe tributaries were highly valued for their large trout (Teirney *et al.,* 1982).

Recent though incomplete data for the 1994/1996 national angling survey indicates 3,773 angler days were spent on the Mohaka (Unwin & Brown, 1998). This popularity made the Mohaka the third most fished river in the Hawke's Bay Region, behind the Tukituki and Tutaekuri Rivers respectively (Unwin & Brown, 1998).

The Mohaka River is far further from the main urban centres of the Hawke's Bay region, both the Tukituki and Tutaekuri can be reached with a short drive from Hastings or Napier. The Tukituki also flows next to the major township of Waipukurau. This emphasises the Mohaka River's importance as a trout fishery as people are prepared to travel considerable distances to fish it.

7.5. Angler Access

7.5.1. Upper Reaches

The upper reaches of the Mohaka River flows through both the Kaimanawa and Kaweka Forest Parks, which are under Department of Conservation jurisdiction. The lower section of the Mohaka's upper reaches can be easily reached from Pukititri Road, Pakaututu Road and Mohaka Road (H.B.F.G.C., 1996). Above these points there is no public road access to the Mohaka River, and the only access is by foot (via a public walkway to the Oamaru and Kaipo confluence) or air. Richardson *et al.,* (1984) in their study of Hawke's Bay rivers did not consider the headwaters of the Mohaka accessible. No vehicle access is granted through Poronui Station to the river within the public land. Poronui Station runs a commercial hunting and fishing lodge that has captured the use of large areas of the Taharua and upper Mohaka Rivers.

7.5.2. Middle Reaches

The middle reaches of the Mohaka are considered accessible by many anglers (Richardson *et al.,* 1984). The middle reaches of the Mohaka can be accessed from numerous points (Richardson *et al.,* 1984). The roads either side of State Highway five bridge on the Napier-Taupo Road, McVicars Road, and Waitara Road give good access (H.B.F.G.C., 1996). Pokukura Road from Tutira, leading to Waitere (which is opposite the Te Hoe junction), gives good access - as does Willow Flat Road (H.B.F.G.C., 1996).

7.5.3. Lower Reaches

The lower reaches of the Mohaka River are generally very accessible with numerous roads ending at its banks. The State Highway two bridge crosses the Mohaka River just upstream of the river mouth (H.B.F.G.C., 1996).

7.6. Associated Recreational Activities

The recreational value of the Mohaka River from State Highway five to the sea is of a high standard in a national survey of water recreation carried out by Egarr & Egarr, (1981). Within the same survey, the middle reaches (State Highway five to Willow Flat) were rated impressive. The upper reaches were rated moderate due to access restrictions and the lower reaches were rated moderate, due to unchallenging water for rafting and canoeing (Egarr & Egarr, 1981).

In 1986 – 87 The Department of Conservation carried out a survey using hut book data within the Kaweka Forest Park (Mohi, 1990). It was found that from 22 huts a total of 5,215 bunk nights were used (Mohi, 1990). The survey showed that one hut on the Mohaka River was the highest used hut with 869 bunk nights (17% of the total bunk nights) the highest percentage of any of the huts within the park (Mohi, 1990). The Te Puia hut offers the greatest recreational diversity of fishing, hunting, rafting, canoeing, picnicking, camping, tramping, swimming, and bird watching. It is believed that the Mohaka River is the focal point for this particular huts high use (Mohi, 1990).

7.6.1. Zoning

The Mohaka River can be divided into three distinct zones based on ease of road access for water based recreation (MoC, 1990, refer to Map 2).

1. <u>Upper Reaches</u> - Upstream of the State Highway five bridge including six major tributaries. The main access is via Pakaututu Road. Otherwise access is very difficult.
2. <u>Middle Reaches</u> – From State Highway five downstream to Willow Flat. Access is along Pohokura Road to Te Hoe. Below the Te Hoe River confluence, access is limited. The Waipunga River flows southward alongside State Highway five to its junction with the Mohaka River.
3. <u>Lower Reaches</u> – From Willow Flat downstream to the mouth. Access is generally easy.

7.6.2. Scenic Enjoyment

One of the outstanding features of the Mohaka River is its scenic beauty, widely appreciated amongst water-based recreational users. The scenery of the Mohaka and its tributaries ranges from narrow steep sided valleys with waterfalls, to open terraced river flats and rapids, with large areas of manuka, fern, pasture, exotic forest and lowland beech forest (Water and Soil Miscellaneous Publication, W.S.M.P 1986). Many people believe that some of the most scenic areas on the river occur within the Maungataniwha Gorge and in parts between the State Highway five bridge and the Te Hoe junction with the Mohaka River (MoC, 1990). Other scenic features of the Mohaka include:

i) The 30m high Waipunga Falls on the Waipunga River produce a spectacular display in a native manuka/kanuka setting over steep, broken ignibrite (MoC, 1990).
ii) The distinctive "Loop" or ox-bow meander at the confluence of the Mohaka and Waipunga Rivers. Continuing uplift could create a cut-off or large, ox-bow lake in the future (MoC, 1990).
iii) The "Organs" which are a distinctive ridge of sharply pointed mudstone pinnacles, located on the true Right Bank of the "Loop" (MoC,1990).
iv) The section of the river from the Te Hoe confluence to Willow Flat which is littered with enormous boulders (MoC, 1990).
v) The Mohaka viaduct rail bridge, which spans the river just upstream of State Highway Two. It is the highest bridge in New Zealand standing at 277.67m long and 96m high (MoC, 1990).

7.6.3. Canoeing

The Mohaka River is one of the most popular white water river systems in the North Island and is almost as popular as the Rangitikei, Manawatu and Motu Rivers (Egarr & Egarr, 1981). The Mohaka River presents a range of water conditions that are suitable for all skill levels and experience (Egarr & Egarr, 1981). Canoeing has been increasing in popularity since the early 1970's (Egarr & Egarr, 1981). Department of Conservation staff surveyed the Hawke's Bay Canoe Club in 1988, which listed the Mohaka River as one of the most preferred and popular rivers (MoC, 1990). The reasons given were:

i) Good, easy sections for beginners, as well as excellent sections of higher grade water for intermediate to advanced paddlers.
ii) Proximity to Napier and Hastings.
iii) Good access to the river.

Local canoeists tend to travel to the river to canoe then return home all in the same day (MoC, 1990).

7.6.4. Rafting

The Mohaka River as a rafting destination is extremely popular with numerous commercial rafting ventures using the Mohaka River. "Riverlands Adventures" operating on the upper and middle reaches put through 200 users in November 1988 and 150 per month from December to February (MoC, 1990)

"Riverlands Adventures" have a lodge site between Pakaututu and State Highway five and provide commercial rafting trips catering for, trekking, angling, hunting, and tramping for up to 100 users per week in the summer (MoC, 1990).

The most popular rafting sections are from below the State Highway five bridge to Willow Flat. Rafting companies operating on this section stay overnight at Te Hoe (MoC, 1990)

The Waipunga River is rafted during high flows 12 – 15 times per year, with eight users per trip. Approximately half of these users are non- commercial (McVicar, 1990).

7.6.5. Other Activities

The Mohaka River is not considered to be well suited to power boating (MoC, 1990). However due to the limited areas of suitable power boating water available within the Hawke's Bay, the river does receive some use (MoC, 1990). Boating is allowed on the Mohaka River from the sea mouth to 1.6km above Pakaututu bridge, except during the period from 1st March - 31st August to protect trout spawning (MoC, 1990). Boating above this point is prohibited to protect trout spawning areas and angling areas (MoC, 1990).

Tramping, camping, and hunting for deer and pigs are often associated activities and are very popular along the Mohaka River (WSMP, 1986). Many hunters also fish large areas of the upper river as they combine fly-in hunting trips with fishing. Thus hunter access is of significance to the Mohaka fishery. Trampers, campers, and hunters commonly use the stretch of river from the Mangatainoka confluence to the Pakaututu bridge (WSMP, 1986). Below State Highway five good access is taken advantage of mainly by trampers, campers, and anglers (MoC, 1990).

Swimming is only a minor use of the Mohaka River, being most popular below the State Highway two bridge (MoC, 1990).

Tubing (floating down the river on a rubber tube), pack floating, and gorge tramping are not common but are known to occur (MoC, 1990).

8.0 THREATS TO THE FISHERY

8.1. Water Abstraction

Any major water abstraction or discharge has the potential to significantly alter the ecological balance of the Mohaka River and its tributaries (MoC, 1990). Many invertebrate species are susceptible to unnatural fluctuations in river flows (Hynes, 1976). Water abstraction have been shown to degrade river systems in a number of ways including, loss of in-stream habitat, elevated water temperatures and increased summer algal blooms, all of which may affect the benthic invertebrate communities (Harding *et al* 2000). The Mohaka river does not currently have a minimum flow as the river is hugely under allocated. Although water abstractions are currently not a major issue on the Mohaka River they may become so in the near future with large-scale dairy conversions taking place in the Taharua catchment. In 1999 a water take of $140m^3$ per day was permitted from the Taharua River for one such conversion. Irvine (1984) found that during stream fluctuations invertebrate drift rates within the water column increased. However, after three weeks of varying flows Irvine (1984) discovered benthic invertebrate numbers within the study stream decreased. This decrease in invertebrates could reduce trout growth rates (Kreutzweiser, 1990), or possibly reduce trout densities (Irvine, 1984). To maintain the Mohaka fishery, Fish and Game need to advocate for monitoring to ensure that these takes do not exceed their consents and to ensure when appropriate that a suitable minimum flow setting process is begun.

8.2. Exotic Forestry

Exotic forestry throughout New Zealand is increasingly seen as a threat to our many watercourses. Hawke's Bay is no exception with many of its river catchments containing large areas of exotic forest. This is particularly evident within the Mohaka catchment.

Removal of forest cover has the potential to adversely affect such in-stream values as water quality, temperature, and potential habitat (MoC, 1990; Harding *et al* 2000). Riparian vegetation is important in providing shelter that macro-invertebrates require (Collier, *et al.*, 1997). Invertebrates are the essential first step in the food chain for many species including trout (Hynes, 1976). The removal of cover can affect water temperature, which is critical to the survival of invertebrates (MoC 1990; Harding *et al* 2000).

Both mature exotic forest and native forest in New Zealand have broadly similar rates of rainfall interception and evapotranspiration, thus stream flow regimes within exotic and native catchments are also very similar (Fahey and Rowe 1992). Due to these similarities few studies in New Zealand have been able to find significant differences between stream benthic fauna of mature native and exotic forests (Harding & Winterbourn, 1995; Friberg & Winterbourn, 1996; Harding *et al.,* 1997). However, most impact on streams associated with exotic forestry occurs during, and directly after logging (Fahey and Rowe, 1992). At this time the evapotranspiration levels are reduced to similar levels to those experienced under pastoral conditions (Fahey and Rowe, 1992). Hence water yield increases and streambeds expand for several years until a new plantation re-establishes (Fahey and Rowe, 1992).

There are numerous factors that may contribute to increased sediment loads within streams after a forest is harvested. First, channels may expand due to the increased runoff, thus accelerating stream-bank erosion (Harding *et al* 2000). Secondly, the slopes that were once protected by forest cover are exposed to the effects of erosion from wind and rainfall (Harding *et al* 2000). Thirdly, the construction of roads within logging areas increases the area of erosion prone land (Harding *et al* 2000). One study estimated that forestry roads could increase sediment loads in streams by 4000 – 8000% in granite catchments (Harding *et al* 2000). Lastly debris dams left after the forestry activity can be mobilised during flooding releasing a large amount of sediment that had settled behind these dams into the stream system (Harding *et al* 2000). This sediment input increases the risk of streambed sedimentation and can reduce invertebrate habitat and the stability of surface sediments (Harding *et al* 2000).

In a study carried out by Quinn and Halliday (1999) it has been found that harvesting of exotic forests can have dramatic effects on the benthic fauna of stream depending on the harvest technique used. In streams where a 20m riparian buffer zone of mature trees was left there was no observed changes in: stream temperature, water clarity, sediment particles, periphyton biomass, and invertebrate density. In contrast where no riparian buffers were maintained there was substantial changes in habitat and invertebrates. Within the streams with no buffers the following changes occurred, Indexes of Biotic Integrity (IBI) declined dramatically, substantial bed aggradation occurred, and the proportion of streambed covered by silt doubled. Invertebrates were also severely affected, although invertebrate density did not change the community composition was altered dramatically. *Deleatidium* spp. that pre harvest dominated the stream were eliminated and replaced by sediment tolerant Dipterns and Chironomids.

It has been shown that sedimentation of streambeds through forestry activity can have dramatic effects on stream benthic fauna (Quinn & Halliday, 1999; Irvine, 1984; Collier, *et al*, 1997). This decrease in invertebrates may have different effects on a fishery. Kreutzweiser (1990) illustrates the first possible effect. It was found that a reduction in invertebrates resulted in a slower growth rate for trout, thus the trout population was made up of smaller fish. The second possible effect will be a reduction in trout density. Irvine (1984) found that where invertebrate numbers are low so to were trout densities, even when there was an excess of trout habitat. Clearly sediment loading into the Mohaka River through forestry activity needs to be kept at a minimum if the fishery is to be maintained at a continuously high level. This means keeping inorganic sediment input at a rate that does not reduce the benthic macro-invertebrate communities.

Hayes 1999

8.3. Dairy Conversion

Land that was once primarily used for dry stock grazing is now being converted for dairy farming. The farming community has recently discovered that previously marginal dairying country can be successfully dairy farmed by applying high inputs of nitrogen to improve and lengthen the growing season (Taylor & Smith, 1997). Between 1990 and 1995 nitrogen application rates have increased threefold, mainly due to dairy farming (Taylor & Smith, 1997). In the Taharua River valley poor soil quality and cool temperatures have previously made dairy farming marginal. However, through applications of very high rates of nitrogen rich fertiliser the pasture growing season has been extended. This has meant that dairy farming in this area is now an attractive economic venture.

This fertiliser application and subsequent stock effluent management has the potential to cause eutrophication and degrade water quality (Environment Waikato, 2000; Quinn, 2000). Effluent from dairy milking shed can produce an increase in bacteria, phosphorus and nitrogen and potentially toxic ammonia in streams through runoff (Quinn, 2000). Environment Waikato (1998) produced a study which showed that the volume and strength of effluent from 6000 dairy farm sheds is the equivalent of the five-day biochemical oxygen demand of about one million people. This is likely to only be a small proportion of the total effluent discharge of these dairy farms as the cows only spend a small proportion of their day in the dairy milking sheds.

Phosphorus and nitrogen increases can result in increased algae and weed production within waterways (Byers & Quinn, 1999). When large amounts of periphyton is present it tends to degrade the available habitat for invertebrates such as *Deleatidium* spp. which indicate high water quality under M.C.I.'s (Quinn 2000, Stark 1985). At the present time periphyton weed production in the Mohaka is low (See table 1) so there is no noticeable affect of the dairy conversion in the Taharua valley.

However the dairy conversion has only recently been put in place thus any affects will need time to become apparent. For this reason any large dairy conversions within the Taharua River valley poses a threat to the Mohaka fishery if they are not managed correctly. If nutrient input reaches a level where invertebrate numbers are degraded then the fishery may suffer the following consequences, reduced trout growth rates (Kreutzweiser, 1990), and reduced trout densities (Irvine, 1984). At the time of the consent process, Fish and Game advocated that the following steps be taken to ensure nutrient input is minimalised:

- That all-permanent waterways be fenced off and riparian buffers be encouraged.
- All riverbed disturbance work occurs outside the fish spawning months of May - September.
- No refueling of machinery to occur in the watercourses.
- No uncured concrete to be used within the watercourse.

- M.C.I. monitoring is undertaken at two-yearly intervals.

Source: Environmental Management Services 1999. Taharua Valley Dairy Conversions Consents Application. Napier

8.4. Pastoral Development

It has been found that pastoral development alters many aspects of stream habitat (Davis-Colley 1997). Studies have found that plant removal increases instream water temperatures (Rutherford *et al.,* 1997), increases solar input, thus encouraging plant growth (Quinn *et al.,* 1997) and altering stream morphology (Davis-Colley 1997). Pasture streams also often have increased nutrients and sediment supply (Smith *et al.,* 1993). These changes can become too extreme for many stream invertebrates and cause stress within the stream's invertebrate community (Odum *et al.,* 1979). Hopkins (1976) found that in pastoral streams mayflies and caddisflies were replaced by species such as chironomids, which are more adapted to algal growth and poorer water quality.

Quinn *et al.,* (1992) found that intensive grazing by stock along stream-banks can decrease *Deleatidium* and *Helicopsyche* spp. six-fold. This is due to bank trampling by farm stock, which increases inorganic sediment settlement on stream substrates (Quinn *et al.,* 1992). Intensive riparian grazing along the waters edge also removes plant cover, which creates shading for streams (Quinn *et al.,* 1992). When this cover is removed it encourages algal growth (Quinn *et al.,* 1992).

Pastoral development tends to go hand in hand with nutrient enrichment particularly from nitrogen and phosphorous (Smith *et al.,* 1993). This nutrient input tends to encourage periphyton growth where light, flow and sediment regimes are suitable (Byers & Quinn, 1999; Quinn *et al.,* 1992a). When large amounts of filamentous periphyton is present it tends to degrade the available habitat for 'cleanwater' species such as *Deleatidium* spp. (Quinn 2000).

It has been found that agricultural typically increases sediment levels within streams (Quinn, 2000). This increase in sediment generally comes from increased catchment and stream-bank erosion, drain clearance, and farm animal activities (Quinn 2000; Quinn *et al,* 1992). This impacts on stream invertebrates in the following ways. Firstly, reduced epilithon production due to light scattering by sediment in the water column (Quinn 2000). Secondly, by abrasive effects through a coarser bedload on invertebrates (Quinn 2000). Thirdly, reduced food quality due to suspended sediments (Ryder 1989). Finally, smothering of the streambed by inorganic sediments (Quinn 2000). A decrease in invertebrate numbers has been found to reduce trout growth rates (Kreutzweiser 1990), or reduce trout densities (Irvine 1984).

The lower Mohaka River is more susceptible to this threat as most pastoral farming takes place in the lower catchment (H.B.C.B. & R.W.B 1986). The Taharua valley in the upper catchment of the Mohaka may become increasingly threatened with the recent dairy conversions in the area.

8.5. Gravel Extraction

Although gravel extraction is not a major issue on the Mohaka relative to other Hawke's Bay rivers, some extraction does occur (H.B.R.C 1994). Thus there are some threats associated with the practice to the Mohaka fishery. Gravel extraction on the Mohaka generally takes place below the Te Hoe River junction (H.B.R.C 1994). The periods and rates of extraction at each site can vary annually depending on the outcome of negotiations between Hawke's Bay Regional Council and the Ngati Pahauwera Iwi Authority (H.B.R.C 1994). Gravel extraction carries with it numerous negative effects on stream ecosystems such as:

(i) Disruption of fish migration (H.B.C.B. & R.W.B 1986).
(ii) Increases in sediment load can settle and smother invertebrate life as well as stress fish (Quinn 2000; Ludecke 1988)
(iii) Fine sediments may also smother fish eggs and juveniles (Ludecke, 1988).
(iv) Depressions outside the river channel caused by gravel extraction may trap fish after a flood event (H.B.C.B. & R.W.B 1986).

For the above reasons gravel extraction from the Mohaka River needs to be monitored to ensure any adverse effects on the Mohaka fishery are minimal.

9.0 MANAGEMENT RECOMMENDATIONS

From the information gathered in preparing this inventory for the Mohaka catchment, it is possible to make suggestions on how Fish and Game could better manage the Mohaka River fishery.

- Fish and Game should be very active in protecting this magnificent river from any degradation from poor land use practices. To be sure of doing this, Fish and Game need to take on an active management role by being involved in any resource consent that may affect the fishery. Fish and Game should also advocate for improved riparian management through the available statutory planning process. With the Resource Management Act (1991) and the National Water Conservation Order (1992) for the Mohaka River, the legislative tools for protecting the Mohaka fishery have been put in place.

- Due to the large areas of exotic forest and dairy conversions within the Mohaka catchment, regional authorities (such as the Regional Council) need to stringently monitor water quality. Monitoring should take place in all catchments that have logging and dairying taking place. Sediment loading, nitrogen, phosphorus, faecal coliform and periphyton levels should be the focus of any such monitoring. This would allow for detection as early as possible of any negative effects logging activity or dairy conversions are having on water quality.

- Advocate for regular visits to the Mohaka River where it is known that logging or gravel extraction is taking place by local authorities (such as Regional Council) to ensure that all restrictions on these activities are being adhered too. The knowledge that local authorities may show up at any time may act as a deterrent to any illegal land use activities. Ensure that the Hawke's Bay Regional Council enforce consent conditions and prosecute breaches.

- Participate in future National anglers Surveys to assess angler use and impressions of the fishery. Participate in or conduct any future surveying to assess angler satisfaction and aspirations of the fishery, particularly the upper reaches.

- A comprehensive assessment of the spawning streams within the Mohaka catchment by Fish and Game would allow more informative decisions on angling season lengths. In particular streams found to have large spawning importance could have shorter angling seasons while less utilized spawning streams may have longer angling seasons.

- The drift diving program on the Mohaka River gives a good set of result for comparison of four sites on the upper Mohaka. It may need to be considered by Fish and Game that these sites only represent a small area of the entire catchment. Consideration may need to be given to diving the major tributaries of the Mohaka as well as in its middle to lower reaches. Although it is not anticipated that change is occurring now it would allow Fish and Game to detect any future trout population changes more efficiently. The data previously collected from the drift diving sites have given a good baseline for future comparison.

- Encourage Hawke's Bay Regional Council to monitor water quality to form a solid baseline of information. This information can then index the well being of the aquatic systems within the river. The monitoring should be from numerous sites along the Mohaka River and major tributaries to ensure thorough representation of the river is made. Such surveys need to be carried out at regular intervals (possibly every 6 months) so as to provide an insight to any possible trends that may occur due to seasonal variation and so forth.

- Consider a method of managing angler access in the catchment. Currently large areas of the upper catchment are privately owned and leased to businesses with access managed by them. Anglers should be surveyed to determine the depth of feeling with regards to being able to access these areas. Fish and Game then need to weigh up any interest in obtaining angler access to these areas against the cost of achieving that access.

10.0 CONCLUSION

This river inventory has described the Mohaka River and its entire catchment. It has identified the fauna within the river system as well as the aspects valued within the fishery. The inventory has reviewed both current and historical data and this has been included where appropriate. The inventory has reviewed any potential threats to the fishery found within the Mohaka catchment and where appropriate management recommendations have been made.

Physically the Mohaka River flows relatively steeply beginning at a height of between 1,000m to 1,200m above sea level. The Mohaka flows from steep beech forest in its upper reaches, through deep gorges in its middle reaches and finally through river terraces in its lower reaches before reaching the Pacific Ocean 135km from its source.

Land development within the Mohaka catchment is not as pronounced as many of the other river systems within the Hawke's Bay region. A large proportion of the catchment is still covered by native forest (55% land-cover). The main agricultural (25% land-cover) and forestry (15% land-cover) areas of the Mohaka are in the middle lower catchment. Most of this land development has tended to focus on the more accessible Southern side of the Mohaka catchment although some development has taken place in the Taharua River valley. This lack of development and its size has allowed the Mohaka to develop into a fishery of national significance.

The NWCO (1992) states simply that from Willow Flat to the Kaipo River and Oamaru River junction no construction, extraction, soil conservation, or river protection shall detract from the following:

(i) The outstanding trout fishery.
(ii) The outstanding scenic beauty of Mokonui Gorge.
(iii) The outstanding scenic beauty of the Te Hoe Gorge.
(iv) The outstanding amenity for water based recreation.

The NWCO (1992) has provided an excellent tool for protecting the Mohaka fishery.

Drift diving counts on the upper Mohaka have indicated that there is a good adult trout population within the Mohaka River. These fish tend to be of a good size, which reflects the availability and quality of habitat. The drift diving sites are limited if we want to know if the fish densities in the major tributaries have changed. For this reason Fish and Game may want to considered increasing it number of diving sites. Angler surveys have identified the Mohaka as both a nationally and regionally significant fishery. For this reason the Mohaka River is considered by many anglers to be the 'Jewel in the Crown' as far as Hawke's Bay fisheries are concerned.

The Mohaka River epitomises a fishery in a system where the relative quality and availability of habitat is high. This high quality habitat is reflected in a nationally significant wild fishery.

Physical access on the Mohaka varies greatly depending on which part of the river access is wanted to. Both the lower and middle reaches have been found through angler surveys to have excellent access with both State Highway 2 and 5 crossing the river and numerous side roads giving access. The upper reaches are considered to be difficult to access. There is little vehicle access and the river flows through privately owned land and the Kaimanawa and Kaweka Forest Parks.

The greatest threats to the Mohaka fishery are likely to come from sedimentation resulting from future forest harvest within the catchment and possible eutrophication and water takes from dairy conversions within the Taharua River Valley. Both these two types of land use have the potential to severely degrade the Mohaka fishery if they are not monitored regularly. For this reason guidelines and restrictions that are going to maintain the fishery need to be put in place.

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APPENDIX II

The Named Tributaries of The Mohaka River.

Oamaru River
Kaipo River
Taharua River
Waipunga River
Ripia River
Te Hoe River
Makahu River
Mangatainoka River
Mangatanguru Stream
Mangaroa Stream
Otupua Stream
Owhiria Stream
Ngakokaho Stream
Owharau Stream
Te Awaokaiwhaka Stream
Taraiki Stream
Poamoko Stream
Mangakurupatu Stream
Kakaponui Stream
Waitara Stream
Rangiwhakaharoa Stream
Matawhero Stream
Puneketoro Stream
Inangatahi River
Mangawhata Stream
Waiunutoki Stream
Mimihu Stream
Te Kohai Stream
Te Mimiohine Kaitangi Stream
Orakei Stream
Mangapapa Stream
Kakariki Stream
Mangapora Stream
Kateniha Stream
Pohuenui Stream
Ruakituri Stream
Waiwai Creek
Whenanui Stream
Tukitukipapa Stream
Arikanini Stream
Kokakowhaia Stream
Tutumaru Stream
Pakihikura Stream
Mangapikopika Stream
Mataotao Stream
Te Rapa Stream

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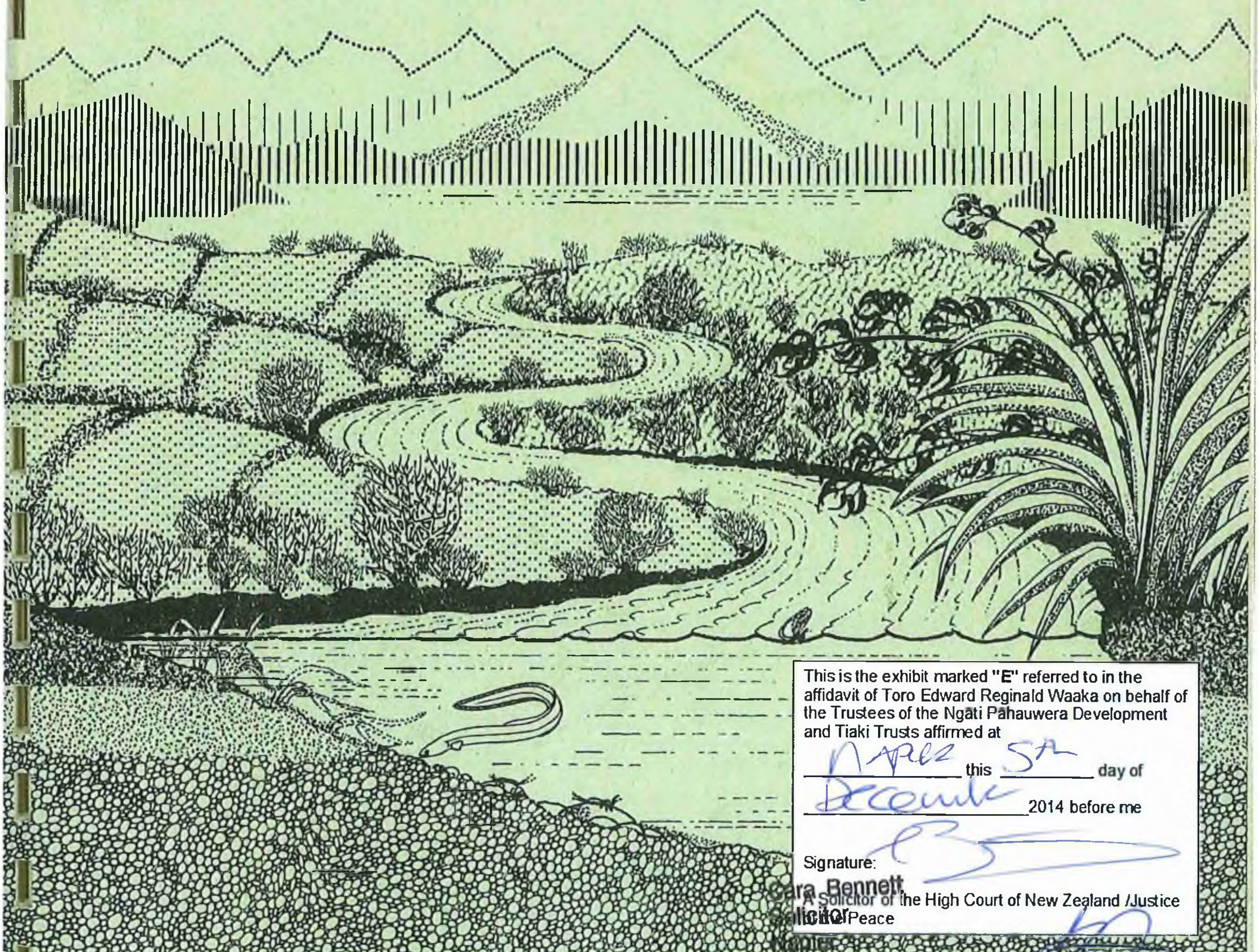
Distribution and habitats of fishes in the Mohaka River

Fisheries Environmental Report No.55



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Signature:

Cara Bennett
Solicitor
Napier

A Solicitor of the High Court of New Zealand /Justice of the Peace

Fisheries Research Division
N.Z. Ministry of Agriculture and Fisheries

ISSN 0111-4794

Fisheries Environmental Report No. 55

Distribution and habitats of fishes in the Mohaka River

by

R.R. Strickland

Fisheries Research Division
N.Z. Ministry of Agriculture and Fisheries
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TABLES

FIGURES

1. INTRODUCTION

The Mohaka River is widely recognised as providing an important recreational fishery. Results from a New Zealand-wide survey of anglers showed that the upper and middle reaches (between the confluence of the Oamaru and Kaipo Rivers and Willow Flat) supported a recreational trout fishery of national importance (Teirney, Unwin, Rowe, McDowall, and Graynoth 1982). In addition to the trout fishery, the river also has whitebait, kahawai, and eel fisheries. For canoeing and rafting, it has been described as one of the most frequently used rivers in the country (Egarr and Egarr 1981).

The electricity generation potential of the river has been recognised for many years (Galloway 1980) and in 1968 six dam sites were identified as being potentially feasible for power generation (Fig. 1). Exploratory work to assess this feasibility was initiated by Ministry of Works and Development (MWD) in 1980, and work has so far been concentrated on the three lower sites in the vicinities of Raupunga, Willow Flat, and the confluence of the Te Hoe and Mohaka Rivers.

Fisheries Research Division (FRD) considered it important to gain some understanding of the Mohaka fishery before any specific hydro-electric proposals were developed. Accordingly, a proposal requesting some financial support for studies on fish distribution, density, and habitats was submitted to MWD by FRD (Rowe 1982). A meeting was then convened by MWD to discuss the FRD proposal. Organisations represented at the meeting were: Ecology Division, Department of Scientific and Industrial Research; FRD, Ministry of Agriculture and Fisheries; Hawke's Bay Catchment Board; Hawke's Bay

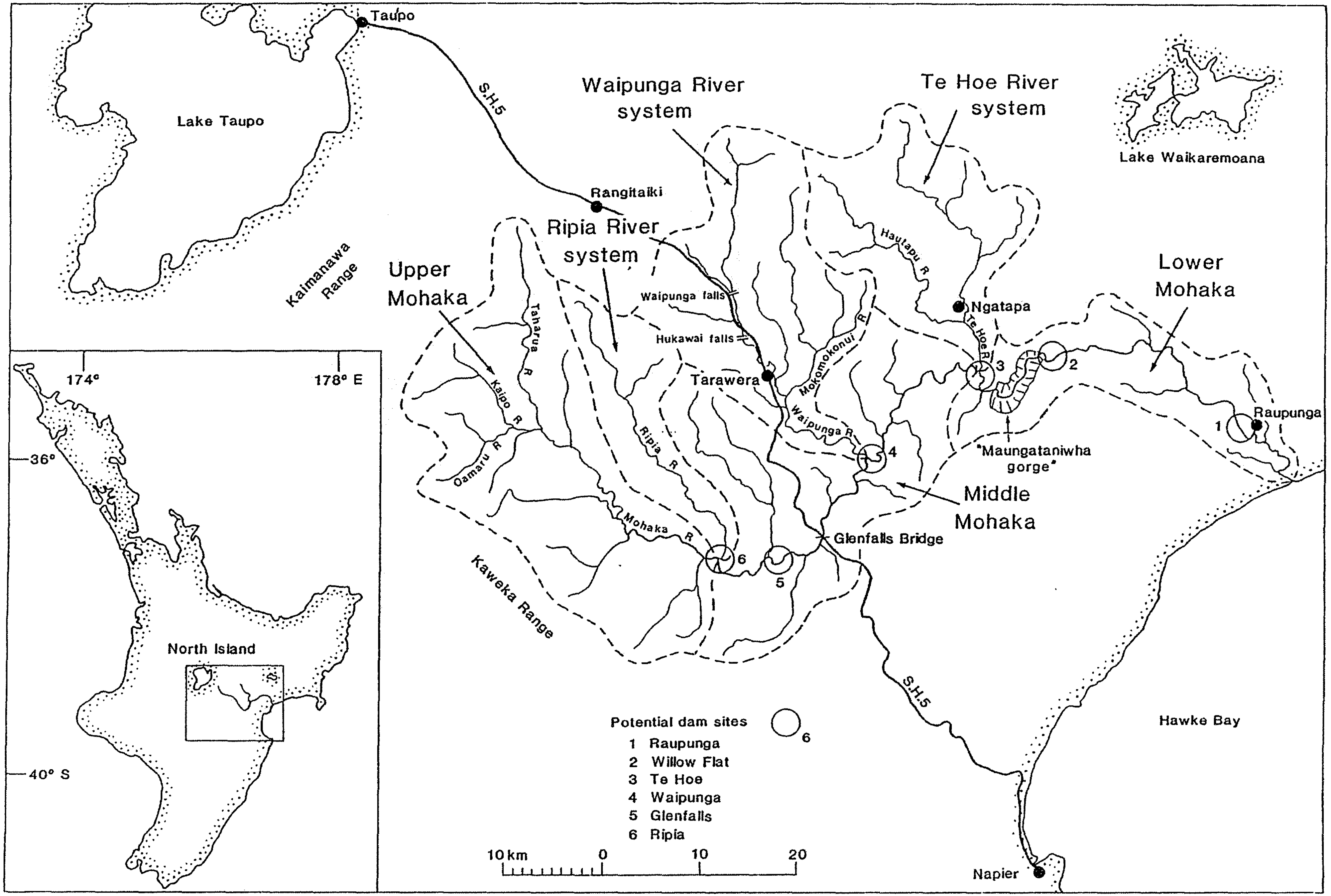

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FIGURE 1 Mohaka River system

Acclimatisation Society; Wildlife Service of the Department of Internal Affairs; New Zealand Electricity, and MWD.

It was agreed at this meeting that FRD should co-ordinate a survey of the river in February 1983 and have the results available by the end of 1983. It was estimated that by this time the feasibility of the engineering for hydro-electric development was likely to have been established. A working party was then to have been formed early in 1984 to discuss and plan any necessary field work for 1984-85.

Funds for helicopter charter and support services were subsequently made available by MWD, and field work in the Mohaka River was done from 31 January to 7 February 1983, and on 15-16 February 1983.

The basic aim of the survey was to provide a data base on fish in the Mohaka from which studies to assess hydro-electric development proposals in the river could be readily identified. To achieve this the following objectives were set:

1. Determine the species of fish present and their distribution throughout the Mohaka catchment.

2. Measure fish habitat variables.

3. Identify natural features of the river which limit fish distribution.

4. Provide a preliminary indication of some effects which hydro-electric development may have on fish.

5. Recommend additional studies required to assess possible impacts of hydro-electric development on the fish stocks, habitats, and fisheries.

2. STUDY AREA

The Mohaka River flows into Hawke Bay 50 km north of Napier. Its headwaters begin 25 km east of Lake Taupo in the north-eastern end of the Kaimanawa Range (Fig. 1).

Access to the Mohaka is limited to a small number of places, most of which are in the middle reaches, where public roads cross or run alongside the river. Access to remote areas of the catchment has been made possible in recent years by the use of aircraft and rafts.

For the purposes of this report the Mohaka River system was arbitrarily divided into upper, middle, and lower sections. The confluences of the Mohaka with the Ripia and the Te Hoe Rivers mark the boundaries for each section. The three major tributary systems, the Ripia, Waipunga, and Te Hoe, are treated separately.

2.1 Upper Section

From beech clad hills in the Kaimanawa Forest Park two small (15 km) headwater rivers, the Kaipo and Oamaru, rise and meet to form the Mohaka River. About a kilometre from its start the Mohaka is joined by a large tributary, the Taharua, and it then runs south-eastwards along the northern boundary of the Kaweka Range, picking up five other large tributaries on both banks. The last and largest of these tributaries is the Ripia River, which joins the Mohaka on its true left bank (Fig. 1).

Until it leaves the Kaweka Range, the Mohaka valley is dominated by fire-induced manuka scrub with tongues of beech forest on the upper slopes (Elder 1959) and scattered tussock and grass clearings along the valley floor (Fig. 2). The only exceptions to this are the Taharua

River, which rises at the south-west corner of the Rangitaiki Plains and flows for most of its 25-km journey through pasture land of Poronui Station, and the catchments of several tributaries in the lower Ripia, which have been modified recently for pine afforestation.

The bedrock in this headwater catchment is Mesozoic greywacke. Deposits of Taupo pumice and ash cover the bedrock in the Taharua and Oamaru catchments and for several kilometres of the Mohaka valley below these two tributaries.

2.2 Middle Section

After leaving the Kaweka Range the Mohaka turns northwards along the Mohaka fault zone, and in places the valley opens out into pasture land with scrub-filled gulleys (Fig. 3). A change in geology and landscape occurs in this section. The river's course cuts through papa (sandstones, siltstones, and mudstones of Tertiary age) and the immediate river valley is entrenched and has large sheer bluffs. The Waipunga and Te Hoe Rivers are the largest tributaries in this section.

2.3 Lower Section

Below its confluence with the Te Hoe, the Mohaka runs a turbulent 10 km east and north-east through a deeply entrenched gorge dominated by steep eroding papa bluffs above which are areas of scrub, cutover bush, and developed pasture. The gorge is referred to in this report as "Maungataniwha gorge" (Fig. 4).

After Maungataniwha gorge the river turns east again and the remainder of its course lies in a deeply entrenched valley which occasionally opens out to expose papa and shingle banks. Most of the tributaries of the lower reaches of the river enter it either through

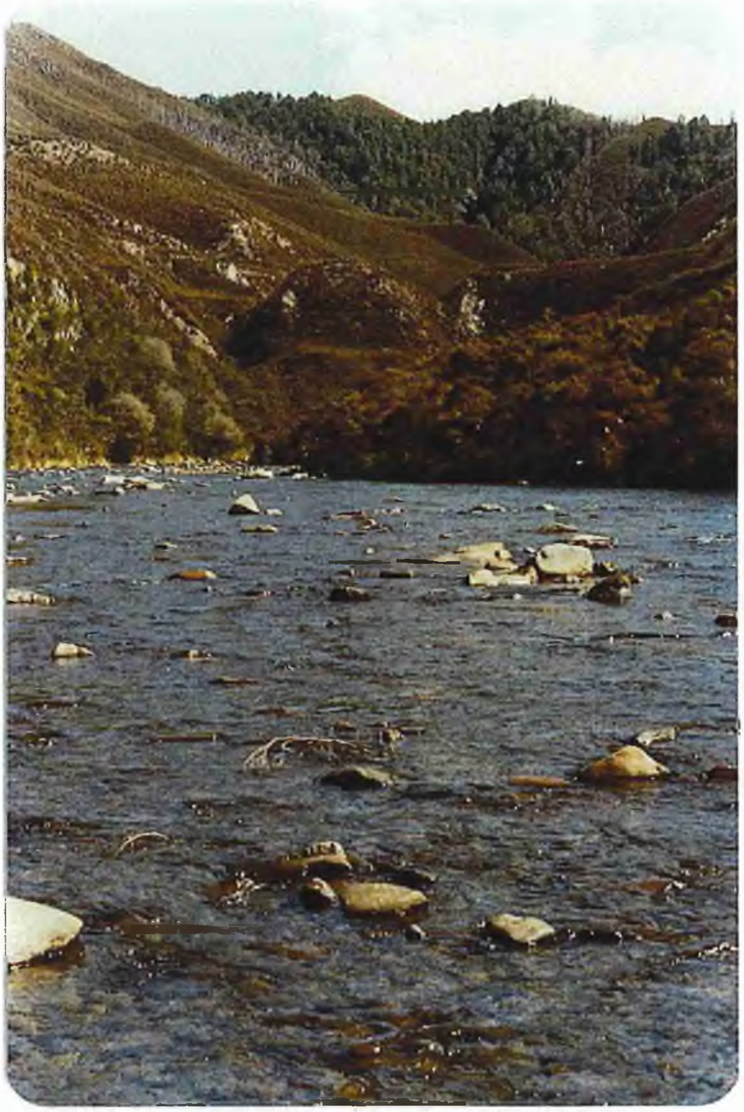

FIGURE 2. Upper section of the Mohaka River from opposite its confluence with the Otupua Stream and looking up the Mohaka Valley.

FIGURE 3. Middle section of the Mohaka River, looking down the Mohaka valley with the confluence of the Inangatahi Stream and the Mohaka at centre.

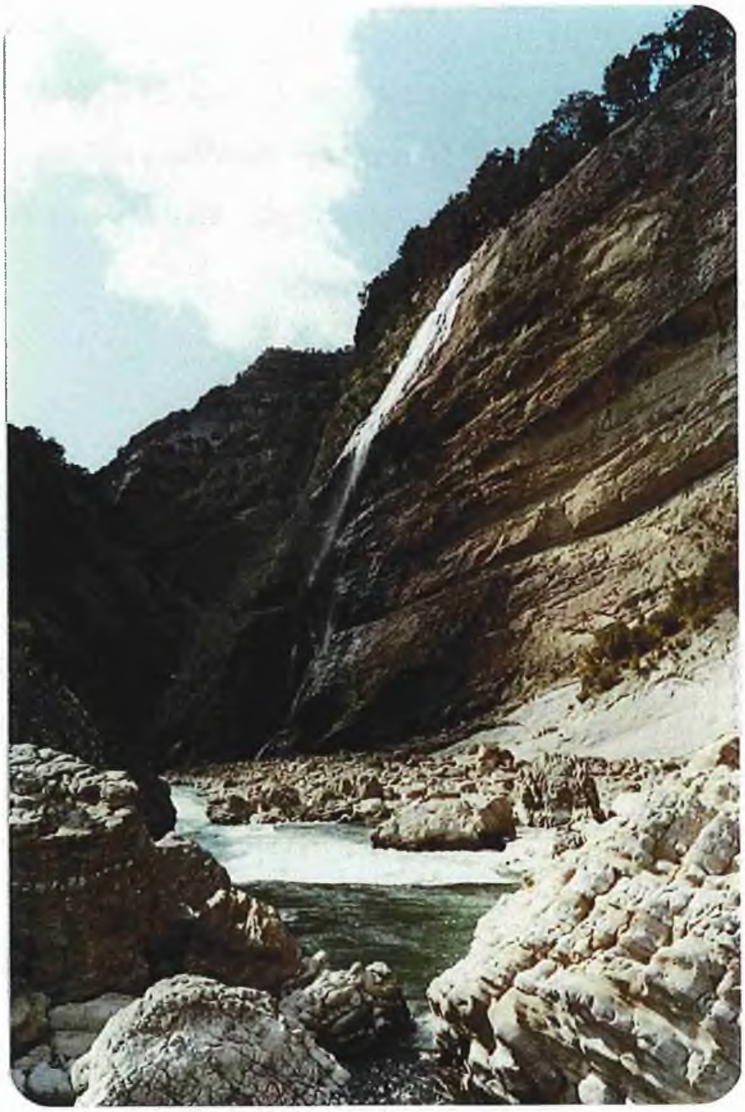

FIGURE 4. Maungataniwha gorge looking downstream, not far below the confluence of the Te Hoe and Mohaka Rivers.

deep and narrowly entrenched gorges, or as waterfalls over papa bluffs. Above the entrenched valley of the Mohaka, developed pasture dominates the flat terraced country, and remnant podocarp stands and scrub fill most of the steeper side valleys.

The Mohaka enters the sea through a large shingle bar which changes the river's course from either running parallel to the coast or flowing directly to the ocean, the course depending on the effects of storms and tides or floods.

2.4 Ripia River System

The Ripia River's 42-km course begins among fire-induced scrub, tussock, and monoao (*Dracophyllum subulatum*) south of the Rangitaiki Plains on a tongue of pumice and ash from the adjacent volcanic plateau. The river's course winds south-east out of open pumice country into a series of Mesozoic greywacke gorges where it is joined by numerous tributaries, which flow from steep unmodified beech forest, or from tussock and manuka scrub linked with the fire-induced areas of the Mohaka Valley.

Several braided sections and a delta have been formed on flood plains in the lower reaches of the Ripia. Pasture has been established in the valley and on the west bank, and the steeper country on the eastern side is all in young pine forest.

2.5 Waipunga River System

The Waipunga is the Mohaka's longest tributary (about 55 km). It begins in pumice country east of the Rangitaiki Plains and flows south through Kaingaroa State Forest before turning south-east at the foot of the Ahimanawa Range. Here, where it converges with State Highway 5 (S.H.5), the Waipunga and one of its tributaries, the Waiarua, join and cascade over an ignimbrite outcrop to form a 50-m waterfall, known as the Waipunga Falls (Fig. 5). This feature is catered for as a tourist attraction by a roadside car-park and viewing point. The valley's vegetation above this point is dominated by monoao and manuka scrub and large areas of recently developed pine forest. Large tracts of cutover podocarp forest on the higher slopes, ridges, and steeper gulleys also feature in the landscape.

Below Waipunga Falls the Waipunga enters a steep gorge and 4 km downstream of this it passes over the Hukawai Falls, which comprise several low chutes formed in ignimbrite. The Waipunga then runs alongside S.H.5 to just beyond Tarawera, where it opens out briefly and picks up on the left bank its largest tributary, the Mokomokonui River (18 km). The Mokomokonui's headwater tributaries all begin in unmodified mixed podocarp forest, but give way to cutover scrub and poorly developed pasture in their lower reaches.

Below Tarawera, poorly developed pasture and scrubland change to substantial areas of recently developed pine forest as the valley narrows again; after this the river turns east through a stretch of cutover mixed podocarp forest. Steep riverside bluffs of Mesozoic greywacke are a prominent feature in the lower gorge sections.

Finally, the Waipunga opens out into a mixture of scrubland and developed pasture before its confluence with the Mohaka.

FIGURE 5. Waipunga Falls. Monoao and scrubland, typical of the Waipunga's headwater valley, can be seen above and below the falls. (Only brown trout, which had been liberated, were found above these falls and the Waiarua Stream Falls (bottom left)).

2.6 Te Hoe River System

The Te Hoe River has the largest area of unmodified catchment of all the Mohaka tributaries. This river's 32-km course begins in beech forest in the southern Urewera National Park and runs south before turning south-east to flow through a long gorge dominated by many papa shingle slips. The end of this gorge is marked by a waterfall. The river emerges from the gorge to run through unmodified podocarp forest for about 6 km before it turns south again and runs through cutover forest. A large area on the eastern side above Ngatapa is being developed for pine afforestation.

At Ngatapa, developed pasture and young pine plantations dominate the west bank, and the east bank is a mixture of virgin and cutover podocarp forest and scrub. It is at Ngatapa that the Te Hoe River picks up its largest tributary, the Hautapu River.

The Hautapu River (38 km) is longer than the Te Hoe and begins near the source of the Waipunga River in pumice country, where large monoao flats have now been converted into pine forest. After it passes through an area of cutover forest the Hautapu winds south-east through a steep, eroding greywacke gorge clad in sparse podocarp forest. About 10 km through the gorge the Hautapu picks up several tributaries which drain unmodified beech and mixed podocarp forest. The river leaves the gorge at Ngatapa, and flows through an area of pasture and recently developed pine forest before it joins the Te Hoe.

From the Hautapu junction, the Te Hoe descends south through a deeply entrenched papa gorge. About a kilometre before its confluence with the Mohaka River, the Te Hoe opens out on to a large, farmed flat which ends in a wide alluvial gravel fan at its junction with the Mohaka River.

2.7 Catchment, Rainfall, and Hydrology

The Mohaka's total catchment area is 2400 km^2 and ranks eleventh in size in the North Island (Galloway 1980). The Waipunga catchment (464 km^2) is the largest tributary catchment in the Mohaka system. The Te Hoe (364 km^2) is the second largest, but has the largest area of unmodified cover of all the Mohaka catchments - about 180 km^2 comprising mainly mixed beech-podocarp forest.

The mean annual rainfall ranges from 2000-2600 mm in the headwaters of the catchments to 1400 mm toward the lower reaches and coastal region. A rainshadow effect caused by the Kaimanawa and Kaweka Ranges is evident in the upper reaches of the Mohaka, but precipitation is increased in the same area by annual snowfalls. In the middle and lower section droughts occur quite frequently during February and March when little or no effective rainfall occurs for up to 30 days duration.

Hydrology of the Mohaka River has been described by Arnold and Coulson (1981a, b). During times of low flow the catchment above Glenfalls contributes more than half the flow in the Mohaka River. Flows are gauged by MWD at Glenfalls and Raupunga where mean annual flows are 40 m^3/s and 78 m^3/s respectively. At Raupunga the Mohaka's catchment is 2370 km^2 which is similar in size to two other Hawke's Bay rivers, the Tukituki at Red Bridge and the Ngaruroro at Fernhill. However, the average number of annual flood peaks recorded at Raupunga is 19, whereas the Tukituki and Ngaruroro have more than 50 each (Beable and McKerchar 1982). The maximum recorded discharges in the Mohaka River were 795 m^3/s at Glenfalls and 1420 m^3/s at Raupunga in 1967.

Sediment loads carried by the Mohaka River have been estimated at Raupunga and Glenfalls by Adams (1979). Generally, less bedload, but more suspended and dissolved solid movement, occurs in the Mohaka River compared with other Hawke's Bay rivers, such as the Ngaruroro and Tukituki.

Annual temperature regimes for the Mohaka River and other Hawke's Bay rivers were reported by Mosley (1982). Compared with Ngaruroro and Tukituki River temperature regimes, the Mohaka River is cooler and has a shorter duration of maximum temperatures. Further data on flows, temperature, and pH are contained in section 4.4.4.

3. METHODS

The primary objective of the survey was to determine fish distribution in the Mohaka system. To achieve this objective electric fishing sampling sites were chosen to encompass as much of the system as possible and to ensure that a range of geological, vegetation, land use, and altitudinal zones was represented. Where possible, sites were chosen above and below fish distribution barriers such as waterfalls, and in several instances where the Maori names of streams implied the presence of fish, sites were also sampled. Before the survey, FRD aerial reconnaissance and MWD ground reconnaissance identified access difficulties and in several instances sites were relocated or deleted.

During the survey, six sites proved inaccessible and two streams were dried up, so alternative sites close by were chosen to replace them. A total of 73 sites was sampled throughout the Mohaka system (Fig. 6). Sample site map references and stream names are shown in Appendix I.

In the upper, middle, and lower sections there were 17, 14, and 11 sites respectively, 34 of which were on tributaries and 8 along the margins of the mainstem. In the Ripia, Waipunga, and Te Hoe systems, a further 7, 11, and 7 sites were located in tributaries, and 6 on mainstems. Of all the sites sampled therefore, 81% were located on fairly small tributaries within the Mohaka catchment. The many large pools and runs of the mainstem and larger tributary systems could not be sampled with electric fishing equipment. Therefore, habitat types which usually support adult trout, and shoals of smelt and whitebait, were not sampled during this survey.

At each sample site, a back-pack electric fishing machine was used to catch fish by fishing downstream to a hand-held seine net (Fig. 7). Although electric fishing was mainly qualitative, the length of stream fished was noted at each site. The area fished was calculated using the sample length multiplied by the average stream width. Where the stream was too wide to be effectively fished, the approximate width fished was used for the area calculation. A range of habitat types at each site was electric fished. Electric fishing was most effective in small streams because complete coverage of all habitat types could be achieved. In eight instances where sample sites were located in large streams or in the Mohaka's main channel the method was restricted to the margins or shallow reaches only.

At five sites in the lower reaches, collection of eels and common bullies was stopped once more than 20 individuals of each species were caught, and fishing effort then was concentrated on establishing the presence of any other species. As a result a greater area was sampled without recording further eels and bullies caught. However, the increase in area sampled was not substantial and species compositions and fish densities were considered representative of those sites.

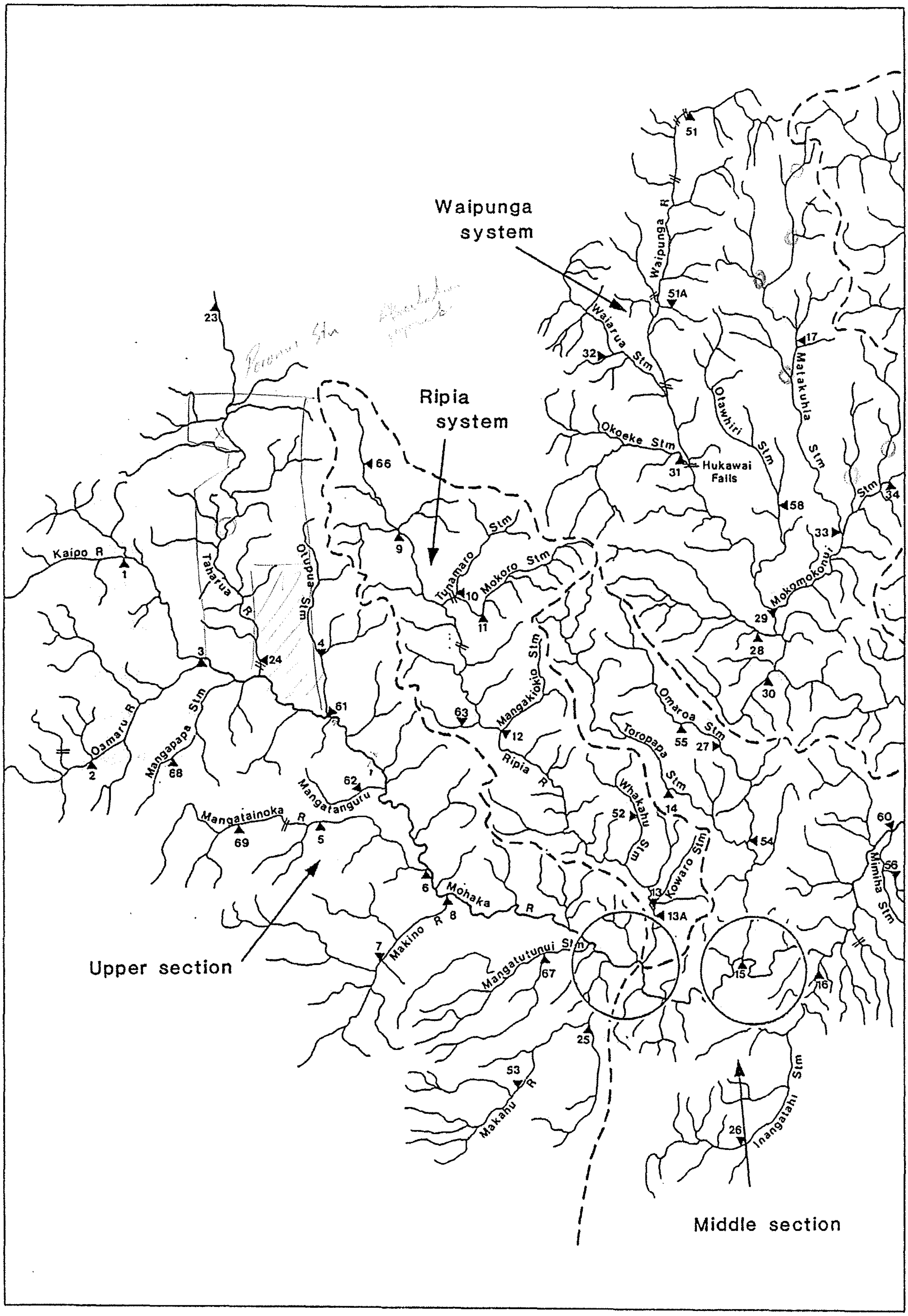

FIGURE 6. Location of sample sites.

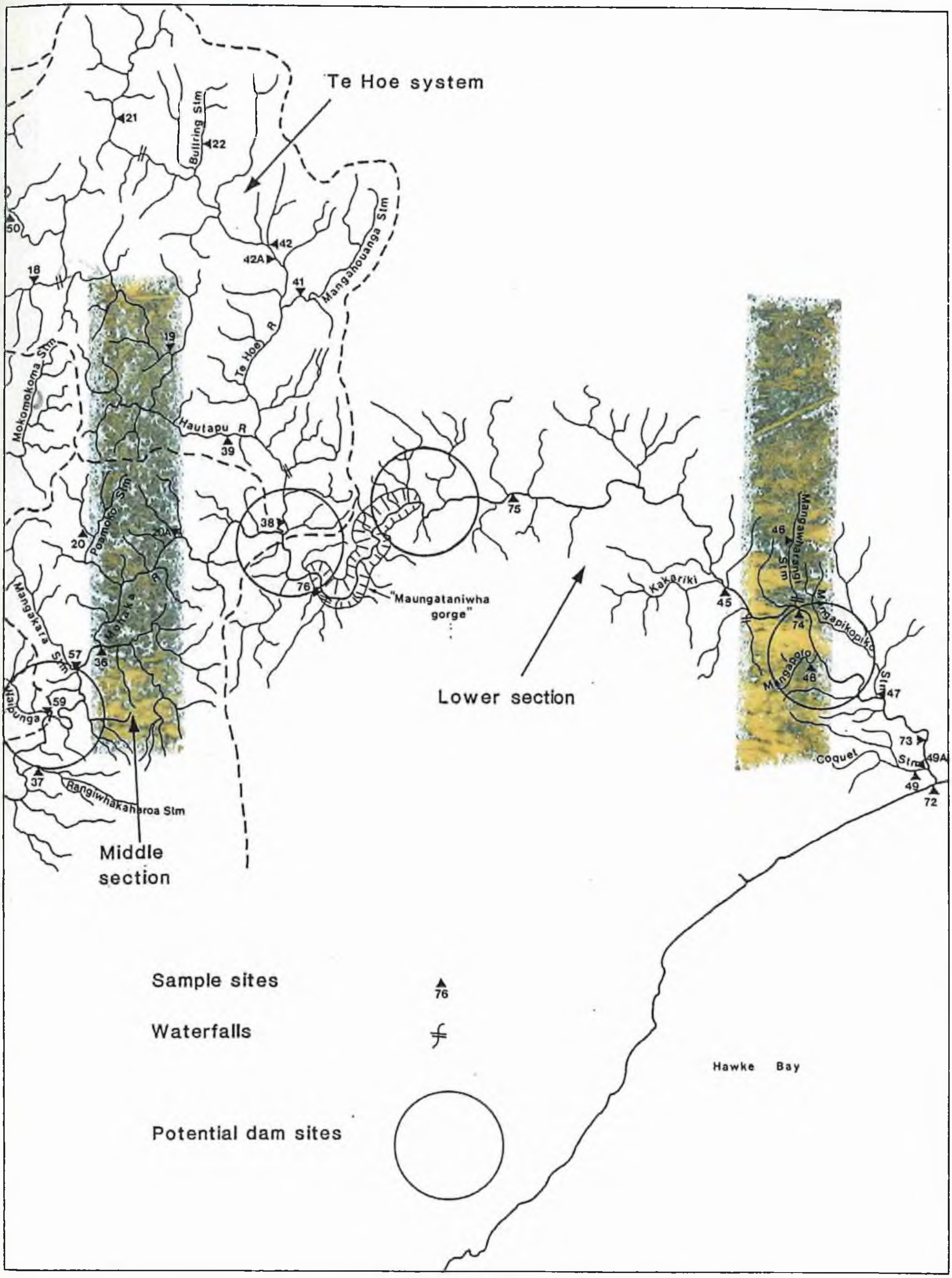

FIGURE 6 - *continued*.

FIGURE 7. An ideal stream for efficient back-pack electric fishing. Stunned fish were caught in the hand-held seine net. Unmodified native forest, a steep gradient, and a stream substrate dominated by boulders and rubble, made this site ideal for koaro (see section 4.5.3).

The catch at each sample site was held in a bucket containing benzocaine. Small fish (fish which fitted into a 1-ℓ container) were fixed and stored in a solution of 10% formalin. Large fish were killed, weighed, measured, and had their stomachs preserved in 60-70% ethyl alcohol at the end of each day. All small fish were weighed and measured, and had their stomachs removed for analysis at the Turangi laboratory. Fork length was measured to the nearest millimetre and weights were measured to the nearest gram. Trout stomachs and benthic samples were sent to Ecology Division, DSIR Hastings for analysis (McLennan and MacMillan 1984).

At each electric fishing site, habitat data were collected on the form shown in Appendix II. Full habitat descriptions were not made at all sites, particularly at those which could not be properly electric fished. Not all the habitat data collected were or could be used for this report. The following descriptions of methods apply only to those sites for which data have been used. All habitat measurements were made at the time of electric fishing.

All distances and widths were measured in metres with a tape measure. Depths were measured to the nearest centimetre with a graduated rod. Water temperature was measured in degrees Celsius with a total immersion mercury thermometer. A universal (wide range) indicator was used with a Hach colour comparator to measure pH. Temperature and pH measurements were made of flowing water.

Gradient was calculated by use of the trigonometric formula:

$$\text{gradient m/100m} = 100 \text{ m} \times \tan A$$

where A = the angle of elevation measured at water level over 100 m using a Suunto clinometer.

Embody's method (Lagler 1956) was used to calculate average velocity. By use of "Simpson's Rule", the area of cross-section was calculated from depths measured at 0.2- to 1-m spacings depending on stream width. Flows (m^3/s) at each site were then calculated by multiplying the area of cross-section by average velocity.

Percentages of substrate type, cover, macrophytes, diatoms, and algae were estimated over the area electric fished. Photographs looking upstream and downstream at each sample site were taken, and most sites also were photographed from the air.

For the analysis of field data, and for descriptive purposes, the Mohaka River system was divided into six areas (Figs. 1 and 6) as follows:

1. Upper section - the Mohaka River and all its tributaries above the Ripia River confluence
2. Ripia River system - the Ripia River and all its tributaries
3. Middle section - the Mohaka River and all its tributaries from its confluence with the Ripia River to its confluence with the Te Hoe River, but excluding the Waipunga River.
4. Waipunga River system - the Waipunga River and all its tributaries
5. Te Hoe River system - the Te Hoe River and all its tributaries
6. Lower section - the Mohaka River and all its tributaries below its confluence with the Te Hoe River.

4. RESULTS

4.1 Fish Species in the Mohaka River

Table 1 shows the species of fish caught during the survey and also includes a list of those species reported as being present in the estuary area by the Hawke's Bay Acclimatisation Society.

The most widely distributed fish caught during the survey was the long-finned eel, which occurred at 71% of the sample sites (Fig. 8). Brown trout and rainbow trout were the next most widespread fish and occurred at 51% and 39% of the sites respectively. However brown and rainbow trout were not always caught at the same sites; the frequency of co-existence of both species was 62%.

Numerically, brown trout dominated the catch (Fig. 9), and collectively both species of trout accounted for 50% of the total number of fish recorded. Long-finned eels were more widespread than trout, but overall their numbers were fewer.

Common bullies and short-finned eels were fairly abundant in the total catch. However, this may have been because large numbers of juveniles were sampled from sites in the lower reaches where, at this stage in their life cycle, these fish usually concentrated. Cran's bully, blue-gilled bully, and inanga were each recorded from single sample sites.

The largest numbers of fish were generally caught at sites where stream flow was less than 0.2 m^3/s and stream width was around 2.5 m. However, this may be an indication of the sampling efficiency of the

TABLE 1. Checklist of fish and crustacea in the Mohaka River.

Common name	Scientific name
Species caught during the electric fishing survey, February 1983.	
Long-finned eel*	*Anguilla dieffenbachii*
Short-finned eel*	*Anguilla australis*
Common smelt*	*Retropinna retropinna*
Koaro*	*Galaxias brevipinnis*
Inanga*	*Galaxias maculatus*
Rainbow trout†	*Salmo gairdnerii*
Brown trout*†	*Salmo trutta*
Torrentfish*	*Cheimarrichthys fosteri*
Blue-gilled bully*	*Gobiomorphus hubbsi*
Common bully*	*Gobiomorphus cotidianus*
Cran's bully	*Gobiomorphus basalis*
Crustacea	
Koura	*Paranephrops planifrons*
Shrimp*	*Paratya curvirostris*
Species reported by Hawke's Bay Acclimatisation Society as caught in the estuary area.	
Lamprey*	*Geotria australis*
Kahawai‡	*Arripis trutta*
Yelloweyed mullet‡	*Aldrichetta forsteri*
Grey mullet‡	*Mugil cephalus*
Black flounder*	*Rhombosolea retiaria*
Yellowbelly flounder‡	*Rhombosolea leporina*

* Migratory species.
† Introduced species.
‡ Estuarine species.

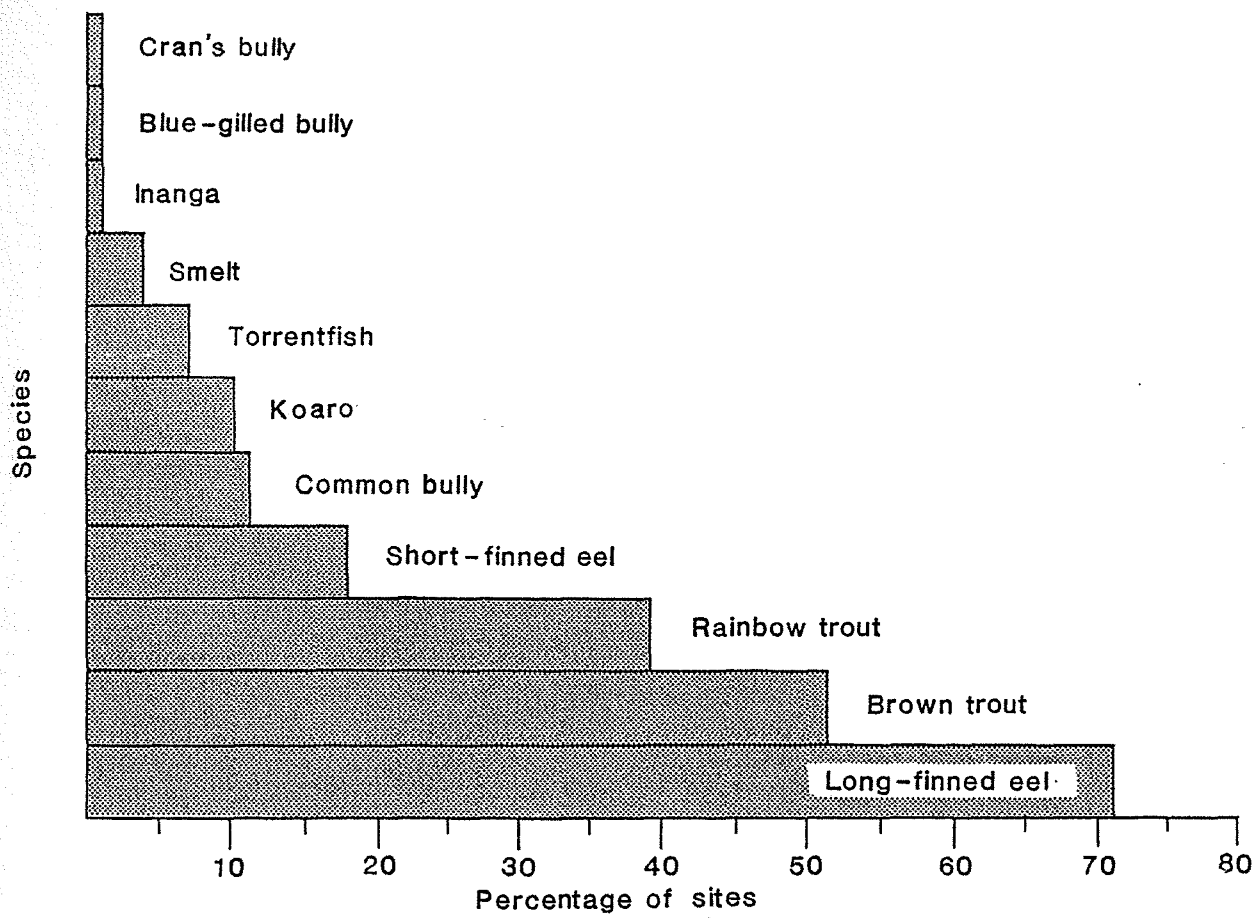

FIGURE 8. Frequency of occurrence of fish species in the Mohaka catchment, 1983.

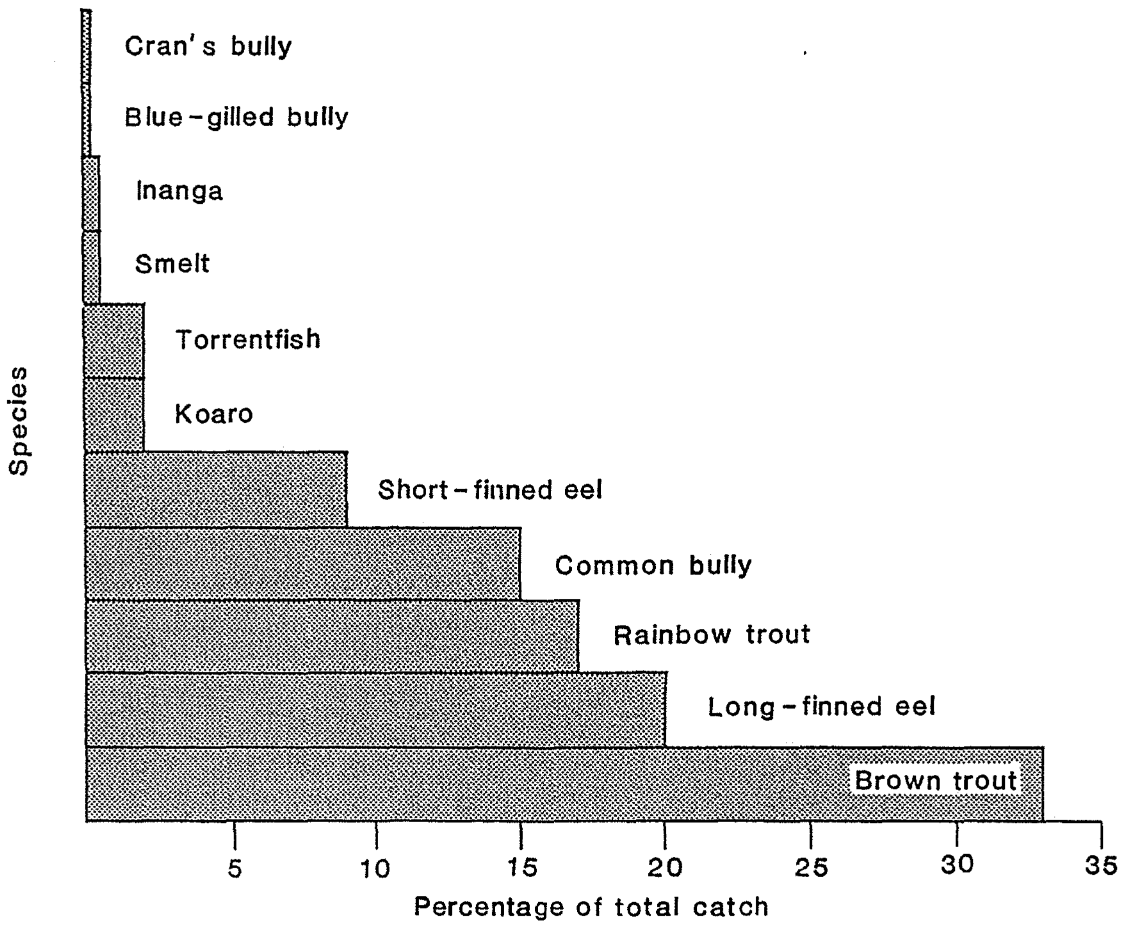

FIGURE 9. Percentage composition of fish species caught in the Mohaka catchment, 1983.

electric fishing machine in a stream of this size, rather than an indication of an optimum size of stream for these fish.

4.2 Upstream Migration of Fish

Figures 10 and 11 show densities of the more common migratory fish species recorded at increasing distances upstream. The six potential dam sites identified by MWD (Galloway 1980) are also marked in Figures 10 and 11 to show their differing potential effects on the distribution of the various fish species.

Densities of short-finned eels declined above the Maungataniwha gorge, the upstream end of which is near in the proposed Te Hoe dam site, whereas densities of long-finned eels appeared to increase above this point (Fig. 10). With the exception of two blue-gilled bullies, koaro was the only migratory fish species which was not caught below Maungataniwha gorge. Figure 11 shows that the highest density of koaro was found about 20 km above the gorge, but density declined upstream of this. The highest density of torrentfish occurred immediately below Maungataniwha gorge, but none was found above the gorge. High densities of common bullies occurred in the first 25 km of the river and only a single specimen was recorded beyond this, but it was above Maungataniwha gorge.

In Table 1, brown trout have been described as migratory fish because there is evidence that sea-run populations occur in New Zealand (McDowall 1978, Davis, Eldon, Glova, and Sagar 1983). In the Mohaka there is no evidence to show that trout migrate between the river and sea, but Hawke's Bay Acclimatisation Society have successfully operated traps to collect ova from both species of trout in several tributaries

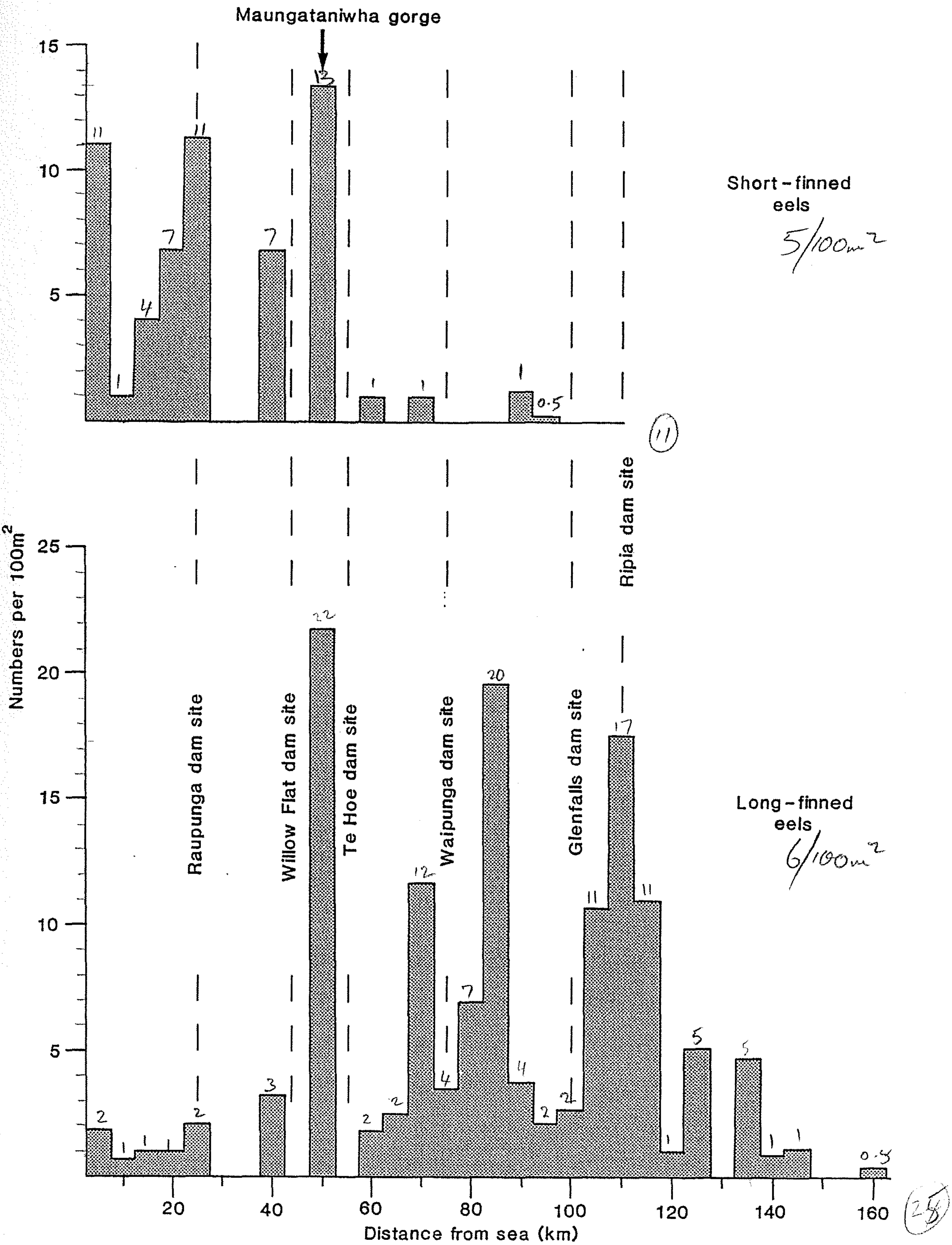

FIGURE 10. Density of eels in the Mohaka system.

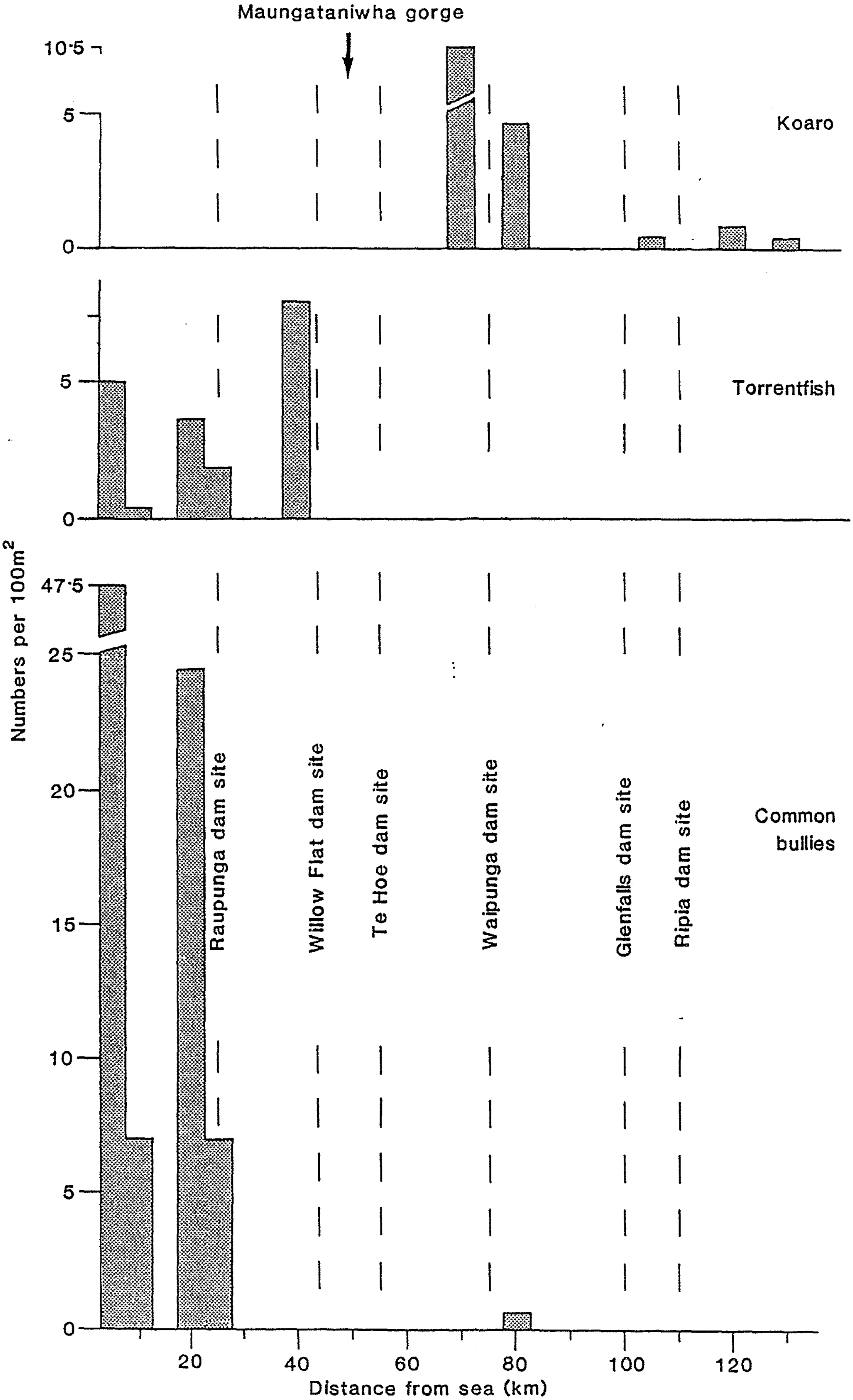

FIGURE 11. Density of some migratory fish in the Mohaka system.

of the Mohaka's middle section. This indicates that trout undertake spawning migrations within the Mohaka, but the extent of their movements is unknown.

4.3 Fish Densities

The average density of each fish species in each section is shown in Table 2. In all but the middle and lower sections, brown trout occurred in higher densities than any other fish. In the Waipunga River brown trout densities were greatest above Waipunga Falls (44 fish/100 m^2), where they were the only fish species recorded.

Rainbow trout occurred in their highest densities in the middle section and in Waipunga River. The combined densities of both trout species were the same in the upper and middle sections, but changed from predominantly brown trout in the upper section to predominantly

TABLE 2. Average densities of fish per 100 m^2 in various areas of the Mohaka River system.

Species	Total fish caught	Location: Upper	Ripia	Middle	Waipunga	Te Hoe	Lower
All eels		1.0	2.3	5.1	3.1	2.7	9.9
Long-finned eel	221	1.0	2.3	4.1	2.4	1.8	3.9
Brown trout	361	7.1	6.8	3.2	12.0	6.0	0.6
Rainbow trout	191	1.1	3.4	5.0	4.8	3.6	0
Short-finned eel	105	0	0	1.0	0.7	0.9	6.0
Common bully	160	0	0	0	0.6	0	12.3
Koaro	25	0.5	0	8.2	0.4	2.3	0
Torrentfish	20	0	0	0	0	0	3.7
Smelt*	5						
Inanga*	6						
Blue-gilled bully*	2						
Cran's bully*	2						

* Insufficient numbers caught to calculate densities.

rainbow trout in the middle section. The highest densities of both trout species combined were found in the Ripia and Waipunga systems.

Koaro were recorded in their highest densities in the middle section and occurred there in greater densities than any other fish species. However, koaro density in the middle section is based on a single sample site and may not have been typical for other streams in the middle section.

Long-finned eel densities were highest in the middle section. Similar densities occurred for long-finned eels in the lower section, but these were made up by high numbers of elvers at one site whereas those caught in the middle section represented a much broader range of sizes and sites (see section 4.5.1).

Short-finned eels occurred in high densities in the lower section only, as did common bullies. The densities of common bullies in the lower section were even higher than shown in Table 2, but because most were small many escaped through the mesh in our nets or were unaffected by the electric fishing machine. Nevertheless, common bullies occurred in the highest densities of any fish species in the Mohaka River.

4.4 River Characteristics and Fish Distribution

Physical characteristics measured and described at electric fishing sites, and other physical characteristics of the river which may affect fish distribution, are summarised below.

4.4.1 Profile and Gradient

The main channel of the Mohaka River has an even and gentle gradient for most of its course other than in the two gorge sections. Maungataniwha gorge is about 45 km from the sea and extends for about 10 km to just below the confluence of the Mohaka and Te Hoe Rivers; the second and smaller gorge is 125 km from the sea and runs for about 7 km to just below the Mohaka and Makino confluence (Fig. 12).

There are no waterfalls in either of these two gorges, but the severity of the long and continuous series of very turbulent rapids, particularly in Maungataniwha gorge, is likely to be a barrier to some migratory fish (see Figs. 10 and 11). There are significant waterfalls in the middle reaches of the Mangatainoka, the upper reaches of the Waipunga, and the upper reaches of the Te Hoe. These and other waterfalls are shown in Figure 6. Many of the smaller Mohaka tributaries have gradients which exceed 20m/100m at times, and these often enter the mainstem as waterfalls.

Most gradients measured at sample sites were around 2m/100m (Table 3). However these measurements may be biased towards low gradients, because sample sites were chosen where helicopter access was possible, and these sometimes concided with the only, or one of the few, clear and flat areas along a tributary's entire course. The highest mean gradient and the steepest gradient measured were in tributaries of the middle section of the Mohaka, and the lowest gradients were at sites in the Mohaka's lower section.

Table 4 shows that koaro, trout, and long-finned eels, which were found in their highest densities above Maungataniwaha gorge, were all from sites with similar gradient ranges. However, there were distinct

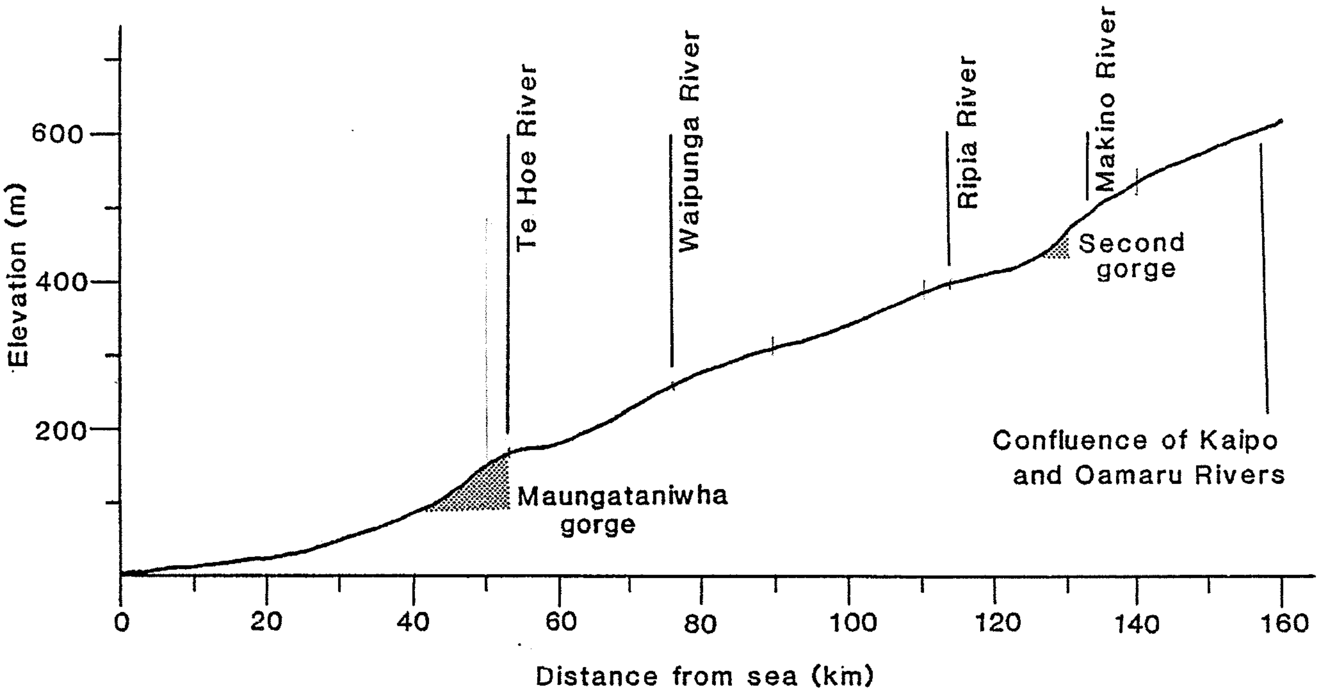

FIGURE 12. Bed profile of the Mohaka River. (Derived from NZMS 1:63 360 topographical map series).

TABLE 3. Mean gradient (m/100m) and gradient range at sample sites from six areas of the Mohaka system.

	Number of sites	Mean	Range Minimum	Maximum
Upper section	15	2.29	0.35	6.98
Ripia	8	2.28	0.43	4.36
Middle section	13	3.93	0.87	21.63
Waipunga	12	1.63	0.17	3.49
Te Hoe	9	1.99	0.87	4.37
Lower section	5	1.08	0.35	2.10

differences in the mean gradient at sites where koaro, trout, and long-finned eels occurred; koaro was found at sites with the steepest mean gradient, then brown trout, rainbow trout, and long-finned eels were found at progressively less steep sites.

Fish species found predominantly below Maungataniwha gorge (Table 4) were from sites with much lower mean gradients than those from sites above the gorge (Table 3). However, at least 13 sites above the gorge had gradients within the ranges shown for the four species listed at the bottom of Table 4. Only 1 common bully (less than 1% of the total catch of common bullies), and 13 short-finned eels (12% of the total catch of short-finned eels) were found at sites above Maungataniwha gorge.

TABLE 4. Sample site gradients (m/100m) for various fish species in the Mohaka River.

Fish species	Number of sites	Gradient: Mean	Gradient: Range Minimum	Gradient: Range Maximum
Found predominantly or only above Maungataniwha gorge				
Koaro	7	3.07	0.87	6.99
Brown trout	35	2.17	0.35	6.98
Rainbow trout	28	2.12	0.58	6.99
Long-finned eel	44	1.92	0.35	6.99
Found predominantly or only below Maungataniwha gorge				
Torrentfish	2	1.31	0.87	1.75
Short-finned eel	7	1.28	0.35	2.10
Common bully	4	1.18	0.35	1.75
Smelt	3	0.99	0.35	1.75

4.4.2 Substrate

A river's substrate components are generally dictated by the geological formation, gradient, and catchment cover the river or stream flows through. For example, a high silt and sand composition can be expected in the substrate when a stream flows through flat pumice country with sparse catchment vegetation, whereas bedrock, boulder, and rubble substrates without siltation are more commonly associated with steep gradients and a stable catchment and geology.

Table 5 summarises the substrate components measured at sample sites from six areas in the Mohaka system. Sites with gradients more than 2m/100m, in almost all instances had greywacke substrates composed of 60% or more bedrock or boulders and rubble. Bedrock substrates were a common feature in the papa country of the lower section of the Mohaka and at several sites in this area it was recorded as 100% of the substrate. Bedrock was also the main component in the substrate at several sites in the Mohaka's upper section where the river has cut through the pumice mantle and into the greywacke underneath.

TABLE 5. Mean percentage of substrate components from six areas of the Mohaka system.

Area	Silt 0.06mm	Sand <2mm	Gravel <64mm	Rubble <256mm	Boulder >256mm	Bedrock
Upper section	3	11	31	23	22	10
Ripia	4	21	27	21	26	1
Middle section	11	12	24	29	20	4
Waipunga	2	25	26	41	6	0
Te Hoe	2	10	34	35	17	2
Lower section	8	9	18	16	9	40

Most tributaries of the Mohaka's upper section had high percentages of gravel in their substrate, and the remainder of the substrate in these upper section areas was dominated by rubble and boulder combinations. The highest mean percentage of gravel in the substrate was found in the Te Hoe, where rubble and boulder combinations also dominated the remainder of the substrate.

Larger quantities of sand were found at Ripia and Waipunga sites than elsewhere in the system. This may have resulted from pumice country in the headwaters of both rivers. However, the percentage of silt in the substrate at sites in the Ripia and Waipunga was low even though large areas of both catchments had recently been developed for afforestation. There were large quantities of silt in the Mohaka's middle and lower sections because of the softer bedrock and more modified catchment of these sections.

Overall, sample sites had larger percentages of gravel and rubble (rarely less than 10%) than any other substrate component. Sand and silt were a common component of the substrate, but in most instances occurred in low percentages.

Table 6 shows the mean percentages of substrate components found at sites where each fish species occurred. Each sample site usually contained a variety of substrate combinations and some species were only caught from one particular combination, which sometimes represented only a small fraction of the total sample site area. Unfortunately such details could not be taken into account in a survey of this kind. The figures in Table 6 are therefore presented as a possible indication of general, rather than specific, substrate preferences for each fish species.

TABLE 6. Substrates associated with fish occurrence in the Mohaka River. (Values shown are means of percentages of substrate types at all sites at which each species occurred.)

Fish species	Silt	Sand	Gravel	Rubble	Boulder	Bedrock
Long-finned eel	4	12	27	31	20	6
Short-finned eel	7	7	23	23	10	30
Brown trout	3	14	27	29	19	8
Rainbow trout	2	10	31	36	20	1
Koaro	3	9	27	28	32	1
Torrentfish	-	2	5	20	23	50
Common bully	8	13	16	25	13	25
Smelt	10	11	17	13	15	34
Inanga*	30	30	40	-	-	-
Blue-gilled bully*	10	10	30	20	20	10
Cran's bully*	-	-	-	-	-	100

* Recorded at one site only.

4.4.3 Hydrology

Flows recorded at the permanent recorder stations at Raupunga (15 m^3/s) and Glenfalls (7 m^3/s) on the Mohaka River during the fish survey were some of the lowest flows so far recorded. The effect of these low flows on the pattern of fish distribution could have been quite severe. Several of the pre-chosen sample sites were completely dry and had to be excluded, and others which were sampled were obviously well below normal water levels because of the drought conditions. These conditions could have had one of two effects on fish normally inhabiting these sites: fish numbers could have been lower in samples collected from areas where fish had emigrated or perished because of the low flows, or sample sites could have contained abnormal congregations of fish because of the low flows. These effects were not apparent in the field, but further surveys to enable a comparison of fish densities at these sites under a range of flow conditions may show differences.

An indication of the size and flow of the streams sampled in six areas of the Mohaka is given in Table 7. The large range of flows and wetted widths in the upper section shows the variability in tributary size and flow found in the Mohaka's headwater catchment. The same also applies to the headwaters of the Waipunga and Te Hoe Rivers. Conversely, tributaries in the lower section were small in size and flow. Because of this, the habitat and abundance of some fish species in streams of the lower section are likely to be limited. The mainstem of the Mohaka River is not included in the figures shown in Table 7, but its size and flow in the lower section are likely to afford fish more suitable habitat than its tributaries in the same section.

4.4.4 Temperature and pH

Temperature and pH readings were made at all but two of the sample sites and are summarised in Table 8. Although a similar range of temperatures was sampled in each of the six areas, Table 8 shows a trend for temperatures to increase in a downstream direction. In the upper section, Waipunga, and Te Hoe, where most samples were taken from streams in or flowing from a bush catchment, mean temperatures were cooler than those from streams in other areas.

Mean temperatures of streams in the middle and lower sections of the Mohaka during the survey were consistent with normal temperatures recorded for February in the mainstem, at MWD recorder stations at Glenfalls and Raupunga respectively (Fig. 13), despite the drought conditions and low flows at the time.

All sample sites with a pH of 7.0 or less (acidic) were in streams which flow from bush catchments, and were also in the Taupo pumice and

TABLE 7. Summary of flows and wetted widths of streams at sample sites from six areas of the Mohaka system. (n = number of sites.)

	Flow (m^3/s)				Wetted width (m)			
	n	Mean	Minimum	Maximum	n	Mean	Minimum	Maximum
Upper section	16	0.565	0.024	2.568	17	6.9	2.2	15.0
Ripia	8	0.118	0.013	0.316	8	3.3	1.8	5.6
Middle section	10	0.216	0.032	0.771	13	4.7	1.0	13.7
Waipunga	11	0.497	0.011	1.561	12	7.4	1.2	27.7
Te Hoe	7	0.156	0.053	0.276	8	8.6	3.2	32.0
Lower section	4	0.061	0.006	0.172	5	3.7	1.2	6.3

TABLE 8. Summary of temperature and pH readings from sample sites from six different areas of the Mohaka system. (n = number of sites.)

	Temperature (°C)				pH			
			Range				Range	
	n	Mean	Minimum	Maximum	n	Mean	Minimum	Maximum
Upper section	17	13.5	9.1	22.0	17	7.4	6.4	8.2
Ripia	9	16.5	10.5	22.0	9	7.3	6.8	7.9
Middle section	14	16.7	11.3	25.0	14	8.2	7.0	9.0
Waipunga	12	14.2	10.0	20.5	12	7.7	6.8	9.0
Te Hoe	10	14.5	11.0	17.8	10	7.7	7.0	8.0
Lower section	10	19.3	14.0	25.5	9	8.6	7.8	9.0

ash zone which covers the top of the Mohaka's catchment from the Oamaru River north-east across to the Hautapu River. The remainder (and majority) of sites were in alkaline waters which had a maximum pH of 9.0. All but one of the sample sites with a pH of 9.0 were in the middle and lower sections of the Mohaka, below its confluence with the Waipunga. Such high pH values are likely to be attributable to erodable limestone outcrops which the Mohaka River cuts through in its middle and lower sections.

Although pH and temperature readings were taken at different times of the day, they indicate the tolerances which various fish species in the Mohaka system may have for pH and temperature. Table 9 lists the range of temperature and pH for sites where various fish species were found. Fish found at sites with the broadest range of both temperature and pH were long-finned eels, brown trout, and rainbow trout.

4.5 Ecology of Fish Species in the Mohaka River

Table 1 (section 4.1) lists the fish species and overall catch composition found in the Mohaka River system during the 1983 survey. Densities of some of the more common species are also given. The following section deals with each fish species individually and outlines important aspects of its ecology in the Mohaka River. Introductory notes on biology and life history are from McDowall (1978).

4.5.1 Long-finned eel (*Anguilla dieffenbachii*)

This fish is an indigenous species found throughout New Zealand, from estuarine habitats to as far upstream as physical barriers such as waterfalls allow. In many instances even waterfalls are no barrier.

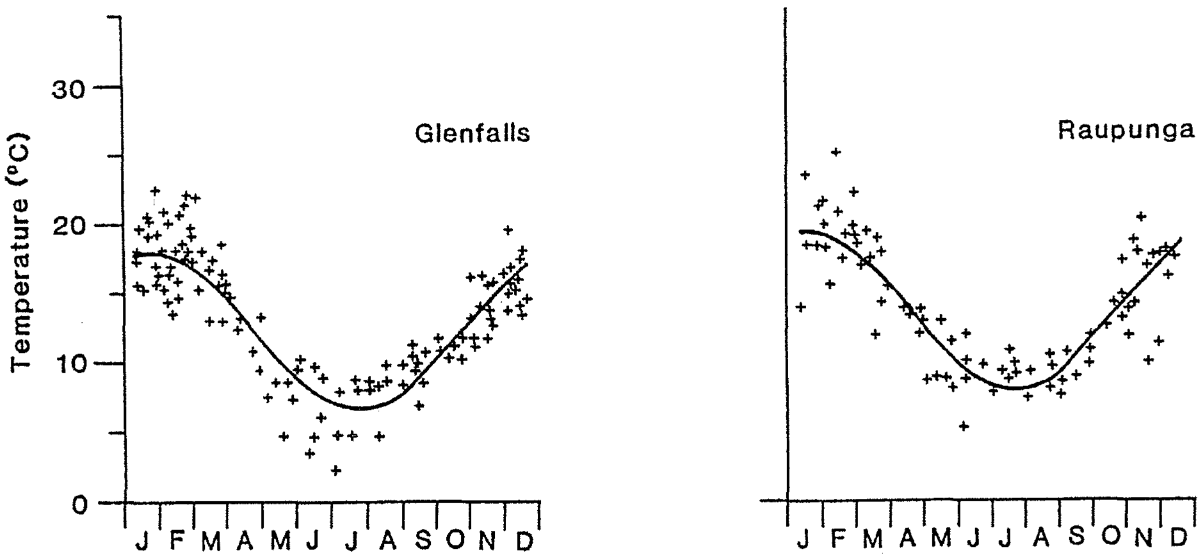

FIGURE 13. Mean daily temperature measurements and best-fit sine curves from MWD recorder stations at Glenfalls and Raupunga on the Mohaka River (from Mosley 1982).

TABLE 9. Range of temperature and pH for sites where various fish species were collected in the Mohaka River. Sample site readings were made only once and therefore daily temperature and pH ranges would be greater than those indicated by the survey figures. (*n* = number of sites.)

	Temperature (°C)			pH		
Fish species	*n*	Minimum	Maximum	*n*	Minimum	Maximum
Long-finned eel	49	10.5	25.0	48	6.4	9.0
Short-finned eel	13	14.7	25.5	12	7.6	9.0
Brown trout	36	9.1	22.0	36	6.4	9.0
Rainbow trout	28	10.8	22.0	28	7.0	9.0
Koaro	7	11.0	17.0	7	7.0	7.9
Torrentfish	2	16.1	22.4	2	8.0	9.0
Common bully	4	16.1	25.5	4	7.9	9.0
Smelt	3	16.1	17.5	3	7.9	9.0
Inanga*		16.1			7.9	
Blue-gilled bully*		14.7			7.6	
Crans' bully*		16.1			9.0	

* Recorded at one site only

Long-finned elvers are able to make their way over or around steep waterfalls provided there are damp rocks to enable them to adhere and climb. Adult eels migrate to sea to breed in late summer and autumn. The young return to fresh water during spring and by summer begin migrating upstream.

In the Mohaka system long-finned eels are the more widespread of the two eel species (Fig. 14), and waterfalls limit their distribution in only the upper reaches of the Waipunga and Te Hoe. Waterfalls on many of the smaller tributaries may stop long-finned eel migration, but at one site a single long-finned eel was found in a small tributary of the lower Mohaka above a steep waterfall (about 20 m high). The greatest distance from the sea that longfins were found in the Mohaka was 160 km, in the Taharua River. The distribution of long-finned eels throughout the Mohaka suggests that distance from the sea does not limit their distribution.

The highest densities of long-finned eels were from tributaries of the middle section (see Table 2). As has already been shown (see Fig. 10) most long-finned eels were found from Maungataniwha gorge upstream. However, in the upper section densities of long-finned eels above the second gorge (see Fig. 12), decreased to 0.5 eels per 100 m^2, which was similar to densities of longfins in the Ripia. Therefore, some feature of this second gorge may limit the number of long-finned eels migrating into the headwaters.

Physical characteristics of the middle section show that, relative to other areas, there are a large number of small streams, alkaline water, steep gradients, and coarse substrates. Long-finned eels were found in streams with temperatures and pH from the whole range of values

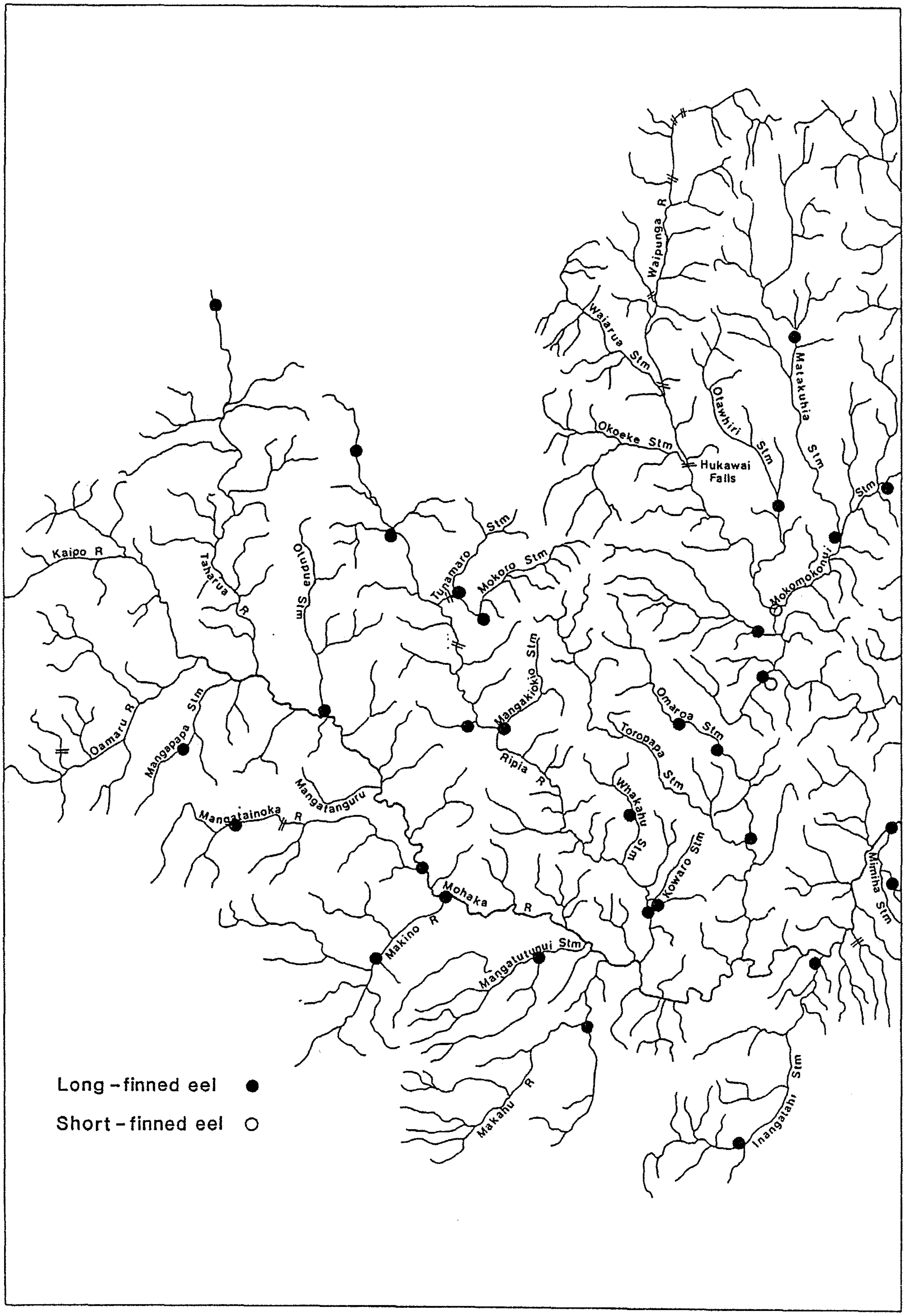

FIGURE 14. Distribution of eels in the Mohaka River.

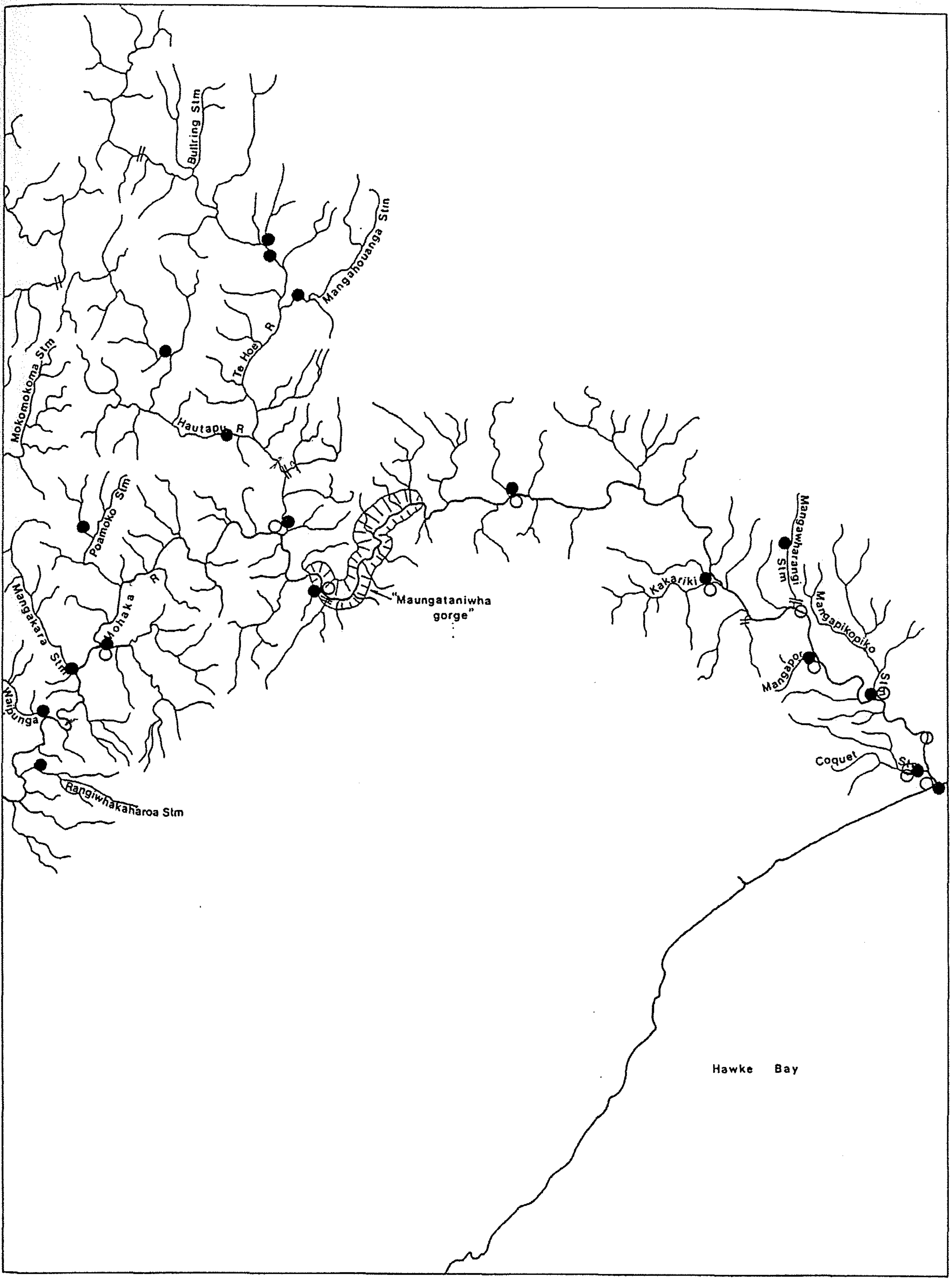

FIGURE 14 - *continued.*

measured during the survey. The greatest numbers were found in temperatures from 12°C to 20°C (mean 15.9°C) (Fig. 15). Figure 16 suggests that alkaline waters are likely to be preferred, because more than 90% of long-finned eels were recorded at sites with a pH greater than 7.

A preference by long-finned eels for substrate with a high percentage of coarse material and a low percentage of fine material is indicated in Table 6. This was also apparent during the sampling when it was noticed that longfins up to 60-70 cm were commonly fished from among coarse substrate, whereas eels of greater length were usually found in log and stick jams or underneath banks.

Length frequency distributions of long-finned eels above the lower section (Fig. 17) are similar, but the difference in mean lengths between the upper, middle, and lower sections (Fig. 18) indicates that lengths increase with distance upstream (an exception was one 64-mm long-finned eel found 109 km from the sea in Omaroa Stream). Large long-finned eels (greater than 60 cm) were found 140 km from the sea as often as they were found 70 km from the sea.

4.5.2 Short-finned eels (*Anguilla australis*)

The biology and life history of the short-finned eel is similar to that of the long-finned eel. Like the longfin they have the ability as juveniles to migrate great distances inland. Distribution of the two species overlaps, but shortfins prefer a more sluggish habitat than longfins and are consequently associated more with lakes and swamps or the lower regions of river systems.

In the Mohaka, shortfins were found in largest numbers in the lower section, no further than 50 km upstream, and most were below

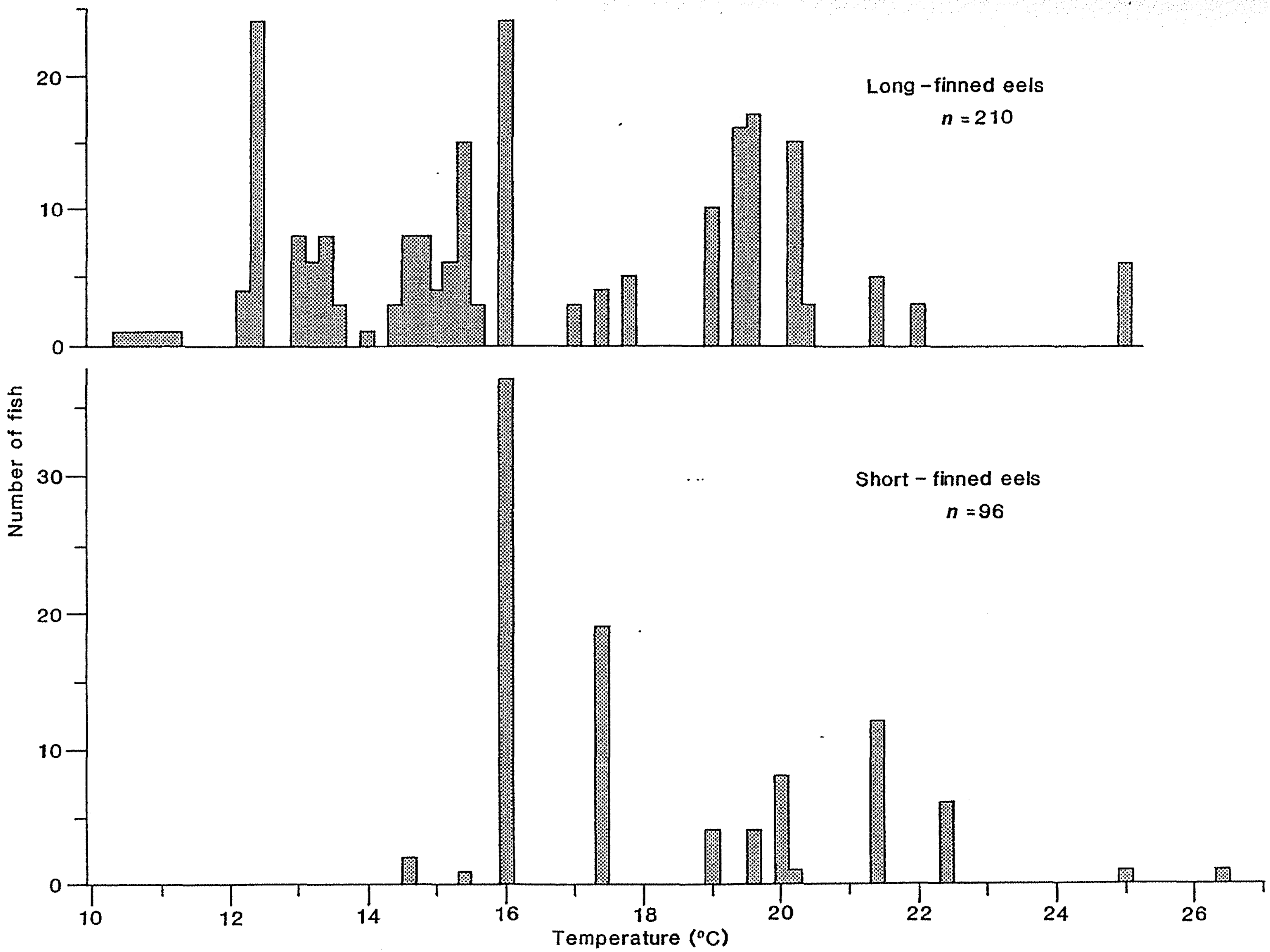

FIGURE 15. Frequency of occurrence of eels at different temperatures in the Mohaka River system.

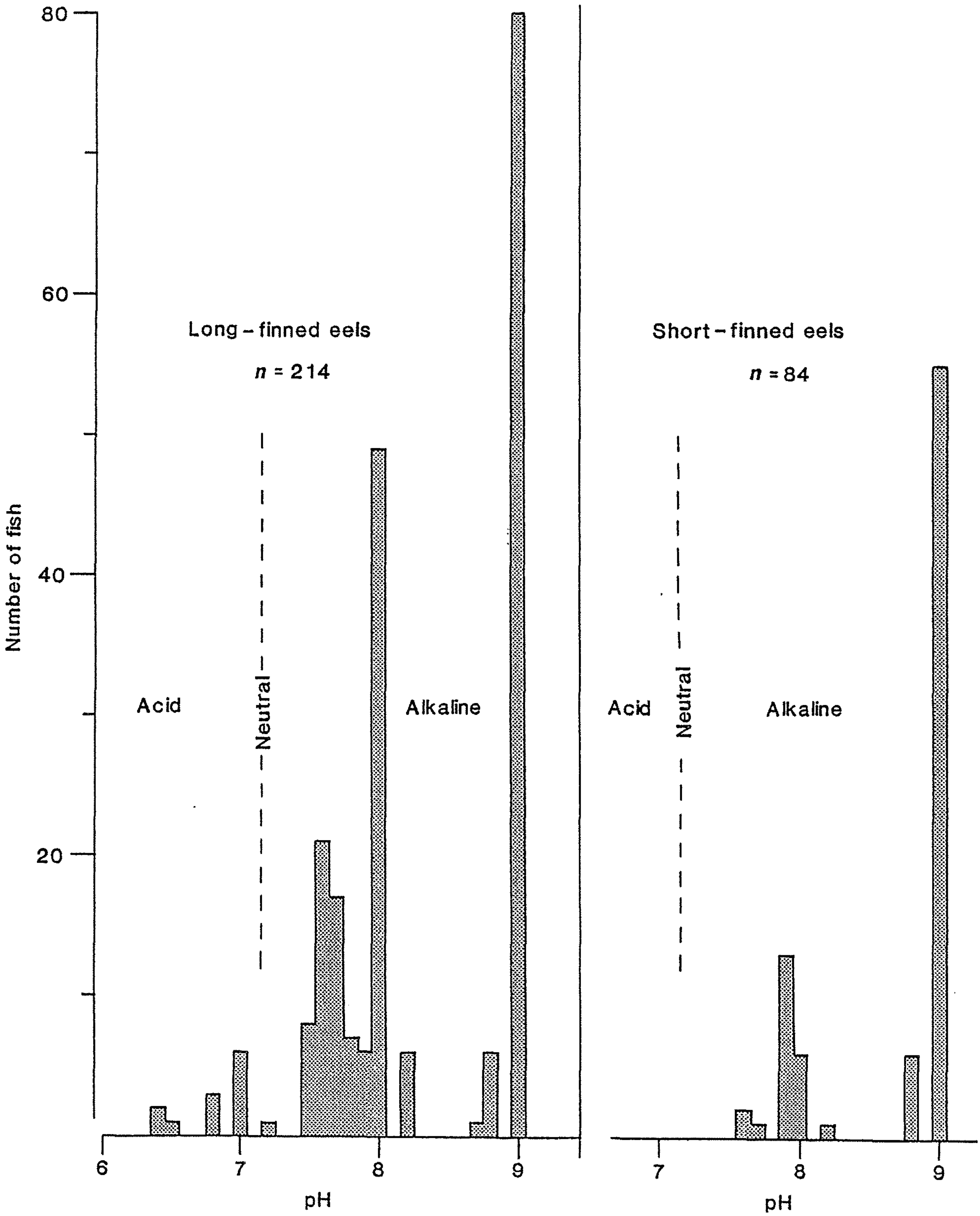

FIGURE 16. Frequency of occurrence of eels at various pH readings in the Mohaka River system.

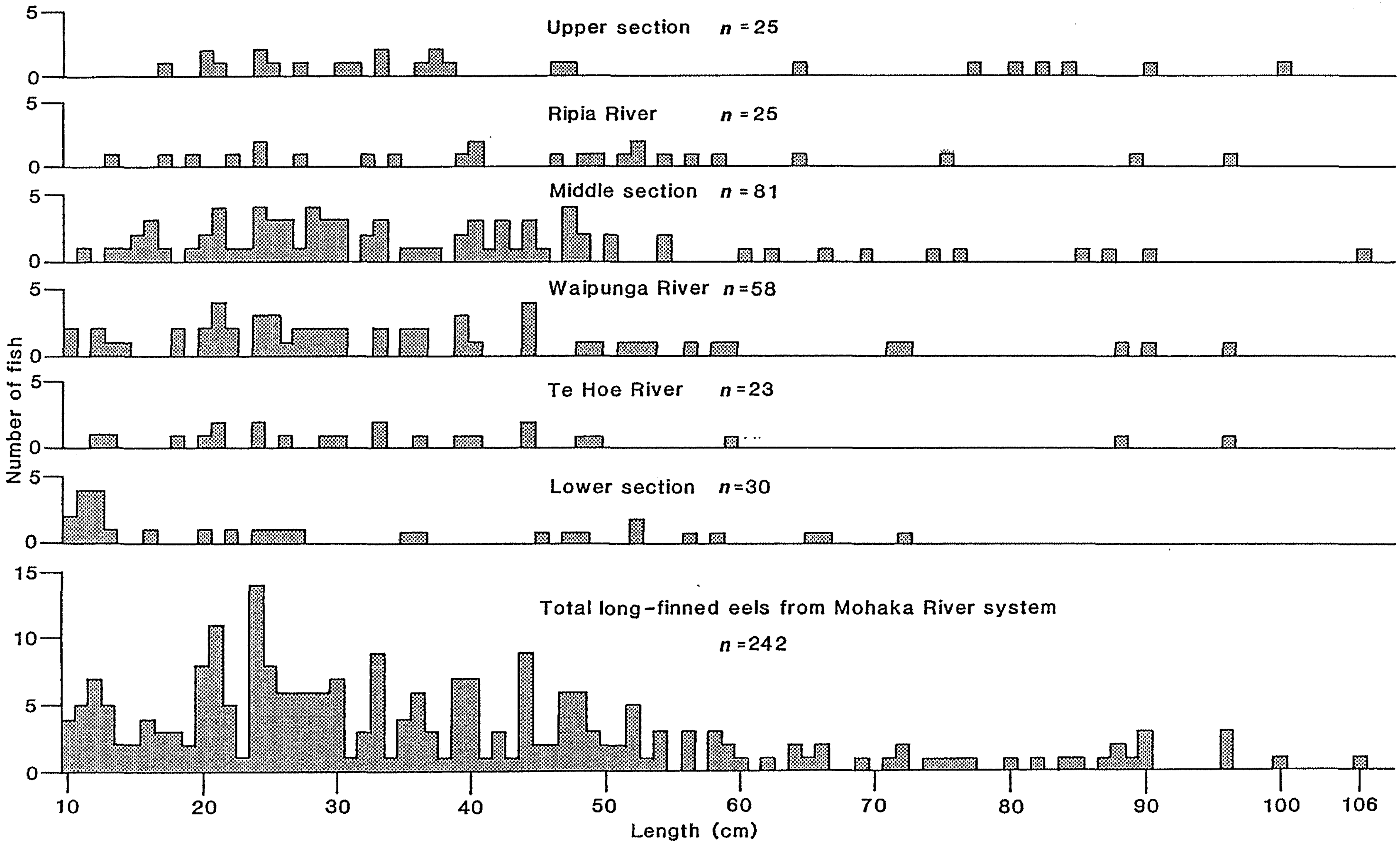

FIGURE 17. Length-frequency distributions of long-finned eels from various areas of the Mohaka River.

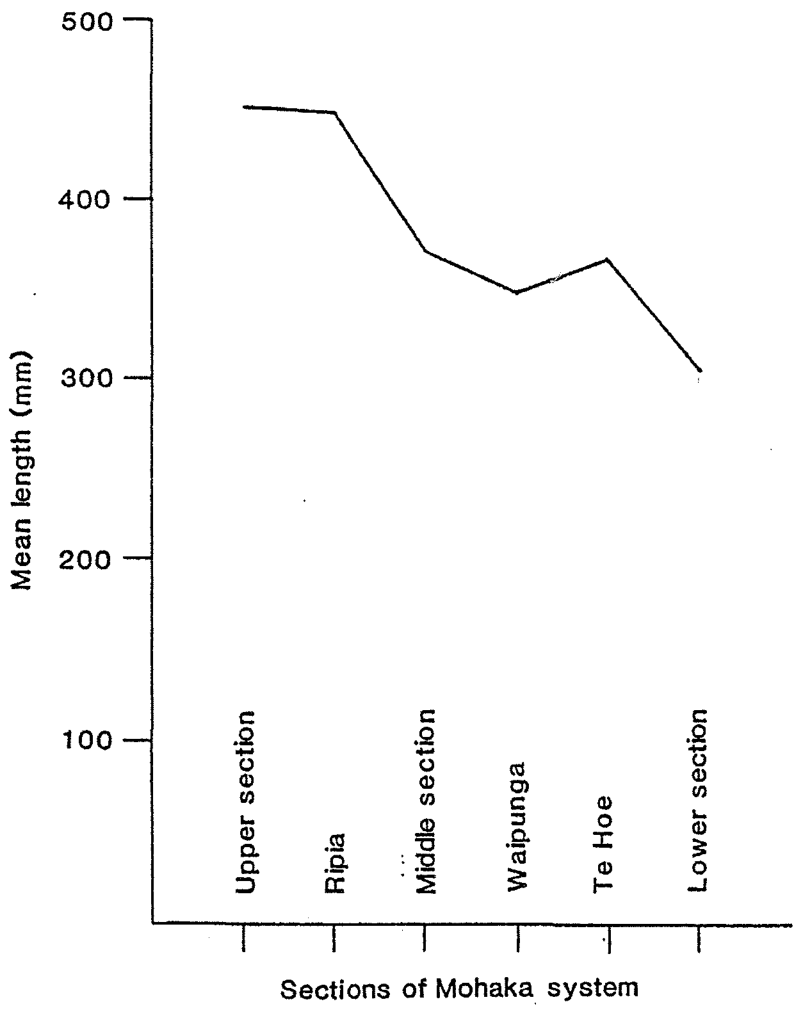

FIGURE 18. Mean lengths of long-finned eels from six areas of the Mohaka system.

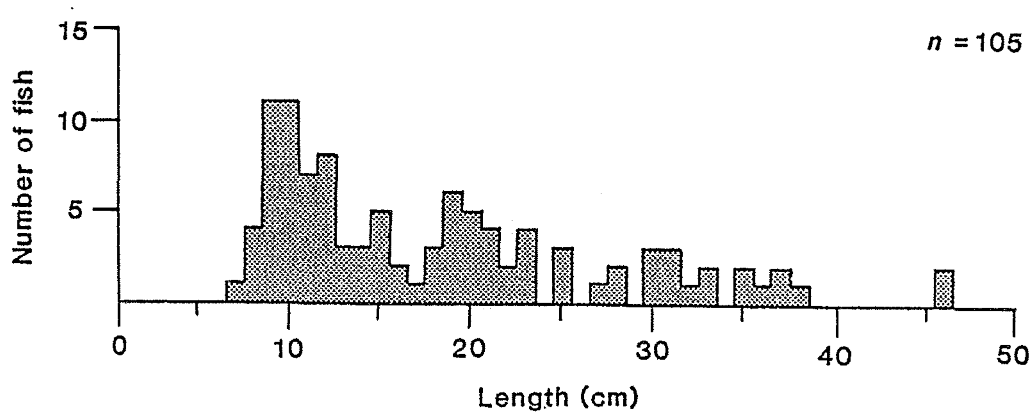

FIGURE 19. Length-frequency distribution of short-finned eels in the Mohaka River system.

Maungataniwha gorge (see Figs. 10 and 14). Only 12% of the total shortfin catch was found upstream of the gorge. Seventy percent of those found above the gorge were less than 12-cm long (possibly recent migrants) and the largest was 37 cm, which suggests that suitable adult habitat is lacking in the river upstream of Maungataniwha gorge.

Todd (1980) found that from three different locations in New Zealand shortfins migrated to sea at lengths of between 33.8 and 59.8 cm for males and between 48.3 and 102.4 cm for females. In the Mohaka (Fig. 19) only 10 shortfins were within the length range for migrating males and none was in the range for migrating females.

The confinement of almost all shortfins to the lower Mohaka, and the virtual absence of individuals within the length range for mature adults, suggests that adult habitat may be lacking in the river. However, sample sites in the lower Mohaka were confined to small tributaries and shallow margins of the main channel, and further sampling to include larger habitats in the lower river would be required to determine whether shortfin adults use this area.

Water temperatures from sites where shortfins were most frequently caught ranged from 16 to 22°C (see Fig. 15), which was the upper end of the temperature range of long-finned eel sites. Shortfins were found in waters with a pH range of 7.6 to 9.0 (see Fig. 16), but, as with longfins, they were recorded in greater numbers with increasing alkalinity.

Most shortfins were less than 30 cm and were caught in silt, weed, and gravel habitats. The largest number caught at any one sample site was in a small, shallow, and sluggish stream which had a solid papa substrate with pockets of silt and weed, and occasional clumps of rubble sized papa fragments, all of which were used as cover.

4.5.3 Koaro (*Galaxias brevipinnis*)

Koaro are found throughout New Zealand in the fast flowing bouldery streams of native forests. Juvenile koaro are the second most important species in the New Zealand whitebait catch (McDowall 1978). After being spawned in fresh water, koaro larvae are washed out to sea during autumn and return as whitebait about 6 months later. This migration to adult habitat often leads them great distances inland, and they are able to negotiate obstacles such as waterfalls.

In the Mohaka, a total of 25 koaro was caught - the smallest was 50 mm long and weighed 1 g, and the largest was 200 mm long and weighed 103 g. Koaro were found at only seven sites (Fig. 20) ranging from 69 to 127 km from the sea, but most were found 70 to 80 km from the sea (see Fig. 11). All these sites were above Maungataniwha gorge and the majority were in the Te Hoe system (Fig. 20), though the greatest density of koaro was found in the middle section (see Table 2). Although koaro formed only 2% of the total catch (see Fig. 9), and were present at only 10% of the sites sampled (see Fig. 8), they were the next most widely distributed fish after both species of trout and long-finned eels.

Trout and eels were also caught at all but one koaro site, and because only one koaro was caught at this site the physical features recorded there were not necessarily characteristic of koaro habitat. It was assumed that the site where the highest density of koaro was found would be closer to the optimum habitat for koaro than any other site in the Mohaka. Therefore, physical features at this site which were different from the physical features of other sites were assumed to be features characteristic of koaro habitat.

Table 10a shows selected habitat measurements of all sites where koaro were found. Sites 20 and 22 contained the highest densities of koaro; 8 and 5 per 100 m^2 respectively. At the remaining sites koaro densities were less 2 per 100 m^2.

A feature which sites 20 and 22 had in common, and which was noticeably different from other koaro sites, was their steep gradient. A preference by koaro for steeper gradients than those preferred by other Mohaka fishes is shown in Table 4. Factors which all koaro sites had in common, with two exceptions, were an unmodified bush catchment and coarse substrates. Table 6 shows that the occurrence of koaro in the Mohaka was associated with a high percentage of boulders in the substrate and Table 10a shows that the highest density of koaro was found at a site which had a higher percentage of boulders in the substrate than any other site. Table 10b lists all the Mohaka sites which had gradients similar to or steeper than sites 20 and 22 and also sites which had substrate combinations similar to sites 20 and 22. Each of these sites is listed in the table in order of their similarity to sites 20 and 22, based on habitat features which appeared to have importance, (gradient, substrate, catchment, and surrounds).

Although the sites in Table 10b appear to have a general similarity in physical features to sites 20 and 22, subtle differences were recorded which may have accounted for the absence of koaro. For example, site 2 appeared to have most of the habitat features of site 20, except that it was twice the distance from the sea and had lower water temperature and pH. The other sites in Table 10b all have at least three features that are different to the features which make sites 20 and 22 so similar as habitat. (Site 22 is shown in Figure 7.)

No koaro were found at any of the sample sites in the lower section and neither were any habitat features similar to those at sites

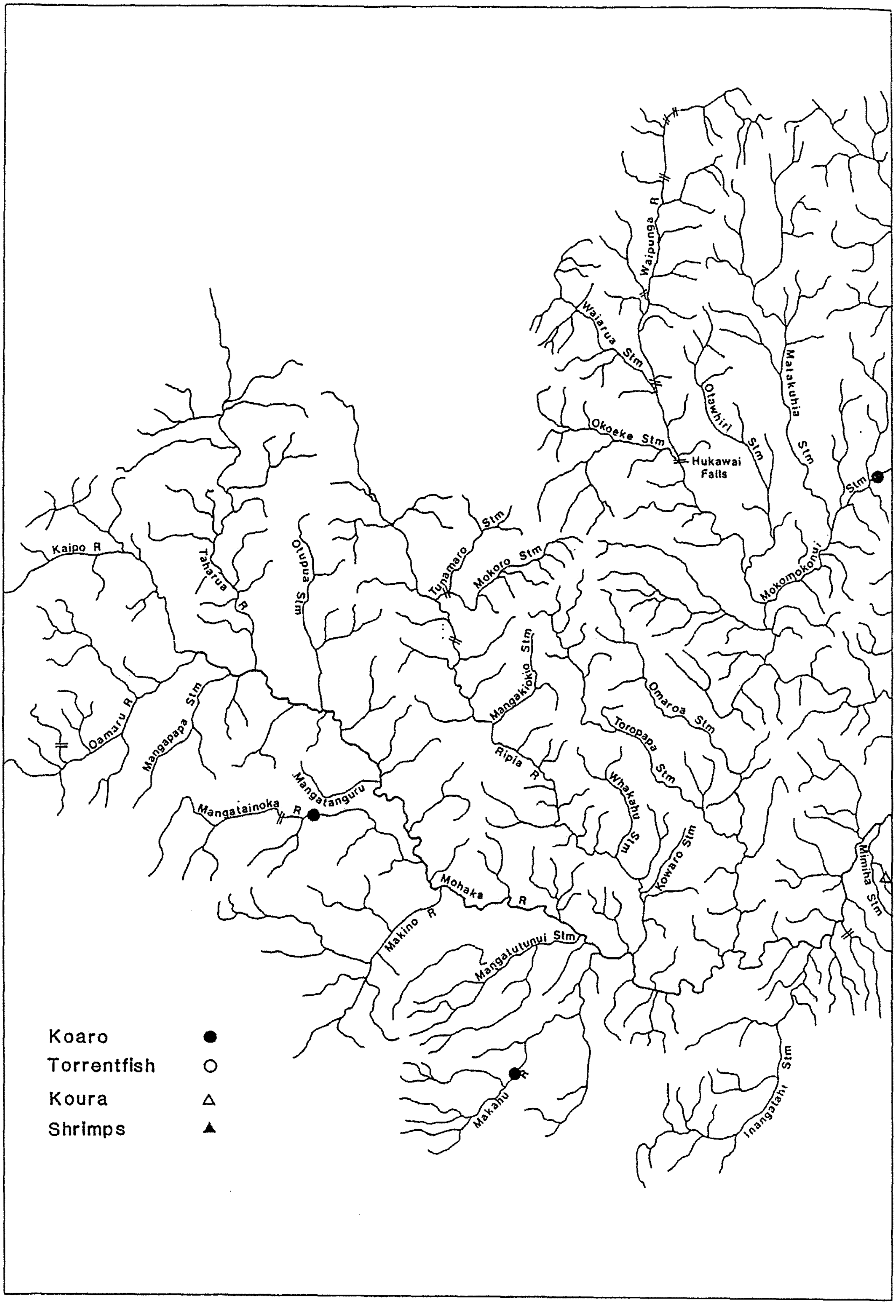

FIGURE 20. Distribution of koaro, torrentfish, koura, and shrimps in the Mohaka River system.

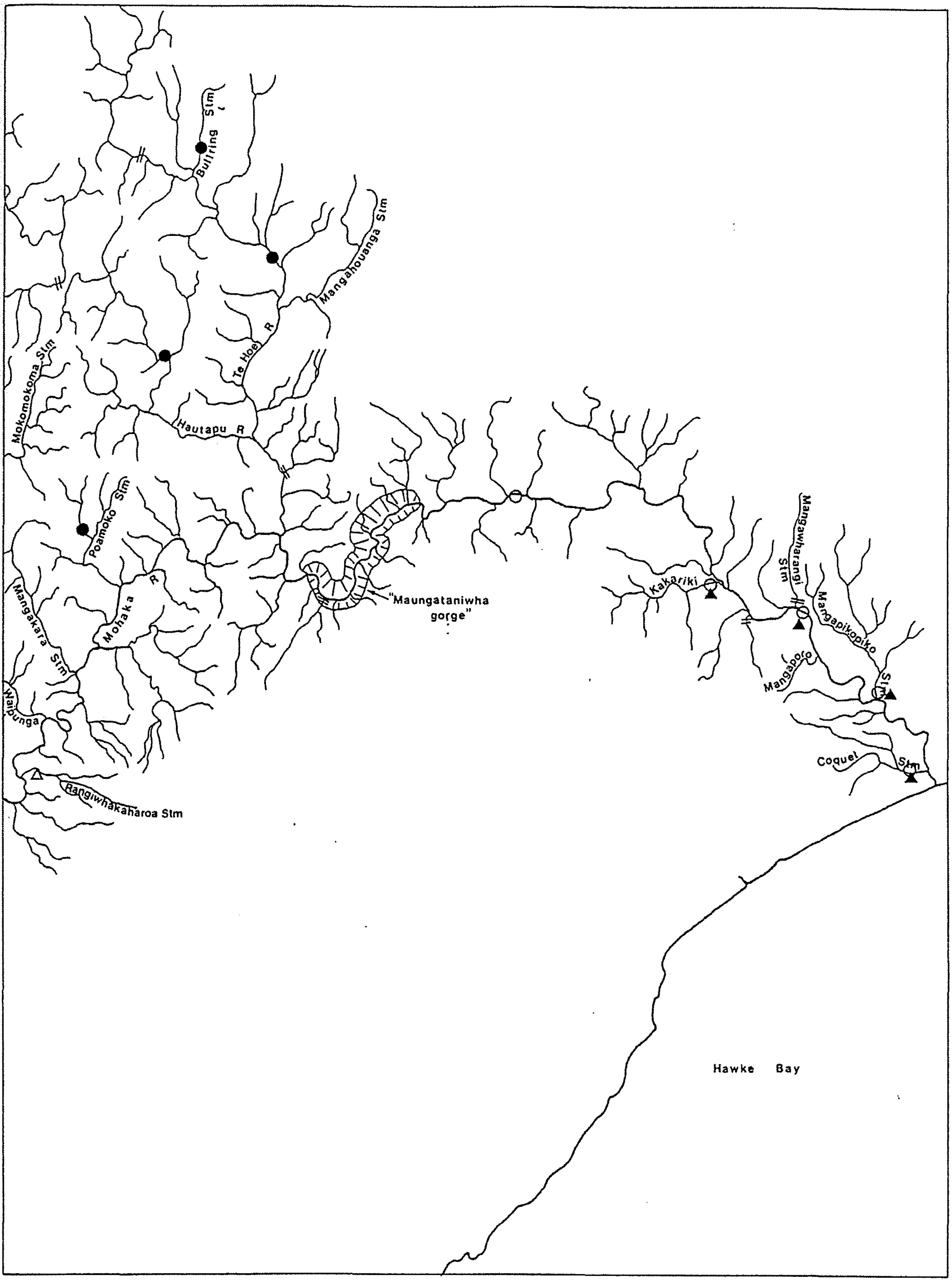

FIGURE 20 - *continued.*

TABLE 10.

(a) Habitat features at sites in the Mohaka River system where koaro were found.

Site No.	Catchment and surrounds	Density (No./100 m^2)	Distance from sea (km)	Gradient (m/100m)	Temperature °C	pH	Substrate % silt	% sand	% gravel	% rubble	% boulder
5	Unmodified bush, closed aspect	0.5	127	1.75	11.5	7.0	0	10	30	30	20
19	Unmodified bush, open aspect	0.5	69	0.87	15.6	7.7	10	10	15	20	45
20	Unmodified bush, closed aspect	8.0	70	6.99	11.3	7.6	0	5	20	25	50
22	Unmodified bush, semi-enclosed aspect	5.0	78	4.37	11.0	7.8	0	10	20	30	40
34	Modified bush and pasture, open aspect	0.5	101	1.39	14.8	7.9	0	5	25	50	20
42A	Unmodified bush, open aspect	2.0	70	1.75	15.4	7.6	0	15	60	20	5
53	Unmodified bush, semi-enclosed aspect	1.0	117	4.36	17.0	7.2	10	10	20	20	40

(b) Habitat features at sites in the Mohaka River system where koaro were not found, but where habitat features were similar to those at sites 20 and 22.

Site No.	Catchment and surrounds	Density (No./100 m^2)	Distance from sea (km)	Gradient (m/100m)	Temperature °C	pH	Substrate % silt	% sand	% gravel	% rubble	% boulder
2	Unmodified bush, closed aspect	0	146	6.98	9.1	6.7	0	0	30	20	50
37	Modified pasture, open aspect	0	81	6.12	19.7	9.0	10	10	10	15	55
12	Unmodified bush, closed aspect	0	122	4.36	14.9	7.6	0	5	40	25	30
63	Unmodified bush, open aspect	0	124	2.62	15.2	7.0	5	10	10	25	50
7	Unmodified bush, semi-enclosed aspect	0	123	2.10	14.5	7.5	0	10	20	30	40
20A	Modified bush and scrub, open aspect	0	62	21.63	19.8	7.8	10	20	10	20	30

20 and 22 (see Tables 3 and 5). This survey found low numbers of koaro in the Mohaka, but sampling of specific habitat types was not possible because of access limitations (see section 4.4.1). More detailed information on the distribution and abundance of koaro would require considerably more field work.

4.5.4 Torrentfish (*Cheimarrichthys fosteri*)

The torrentfish, as its name implies, lives in swift water habitats, generally in the lower reaches of river systems. Its life cycle requires a marine phase during its larval stage, after which juveniles enter fresh water (in spring). In the Mohaka it appears that torrentfish distribution is confined to the lower section, because none was found above Maungataniwha gorge (see Figs. 11 and 20).

A total of 20 torrentfish was captured and these ranged from 31 to 94 mm in length. Overall, torrentfish comprised 2% of the total catch and occurred at only 7% of the sites, but in the lower reaches they occurred at 45% of the sites.

Habitat measurements were made at only two of the five sites where torrentfish were caught and therefore provide little indication of this species' preference for any particular habitat feature or combination of features. However, in general torrentfish were caught in swift and broken water among fragmented papa rubble and boulders. Gradients, substrate, temperature, and pH at torrentfish sites where measurements were taken are shown in Tables 4, 6, and 9.

Torrentfish are found in similar habitats to blue-gilled bullies (McDowall 1978, Davis *et al.* 1983) and so it seems reasonable to assume that both species may have a similar ability to swim and to penetrate upstream. It is assumed that torrentfish are better able to negotiate fast water than common bullies, and the mean gradient for sites where torrentfish were found was greater than that recorded for common bullies (see Table 4). Therefore, because both blue-gilled and common bullies were found above Maungataniwha gorge (Fig. 21) there is some likelihood that torrentfish are present above the gorge, but were missed during the survey.

4.5.5 Common bully (*Gobiomorphus cotidianus*)

River populations of common bullies can be found throughout New Zealand, usually in the quieter reaches of rivers and streams. Adult life is spent in fresh water but after hatching from eggs the larvae are washed out to sea. During spring and early summer juveniles migrate from the sea back into fresh water and may penetrate considerable distances inland.

The distribution of common bullies in the Mohaka River appears to be confined to the first 21 km from the sea (see Fig. 11). The gradient of the Mohaka follows a gentle rise in the first 20 km from the sea, but between 20 and 30 km upstream there is a marked increase in gradient which continues to increase upstream past Maungataniwha gorge (see Fig. 12). Common bullies were found at sites in the lowest of the gradient range sampled (see Table 4). A single common bully was found 75 km from the sea at the mouth of the Waipunga River (Fig. 21).

In the lower section of the Mohaka, common bullies were present in higher densities than any other species (see Table 2), but because of their limited distribution they occurred at only 11% of the sample sites (see Fig. 8), and made up only 15% of the total catch (see Fig. 9).

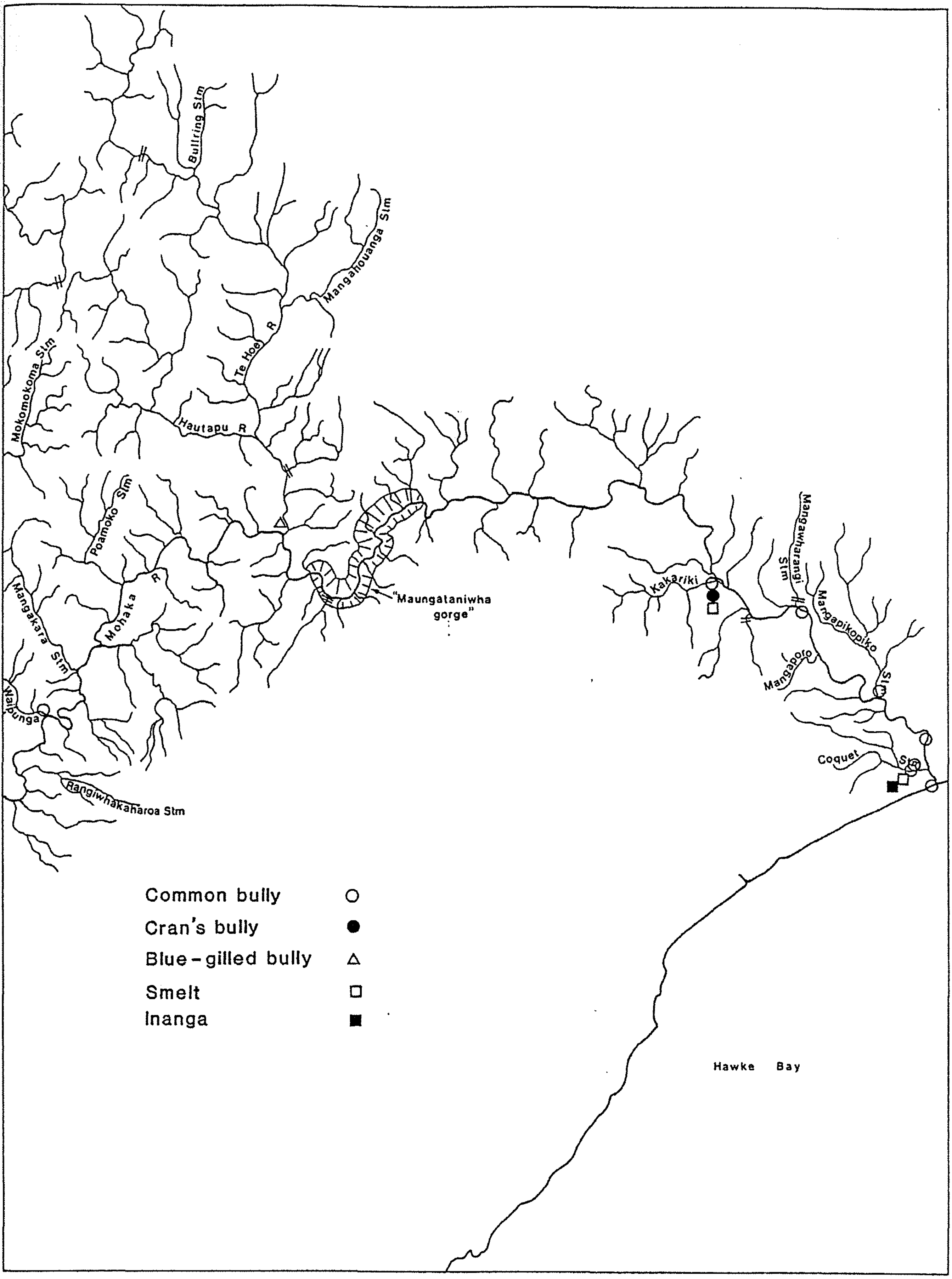

FIGURE 21. Distribution of bullies, smelt, and inanga in the Mohaka River system.

Sites at which common bullies were found had a variety of substrates, and any preference that the species may have had for a particular substrate component, or combination of components, was not found. However, the sites where common bullies were found commonly had slow meandering runs and still shallow margins. The temperature and pH range for these sites were typical of sites in the lower section (see Tables 8 and 9).

Length-frequency distribution of common bullies sampled is shown in Figure 22. Small juvenile bullies (less than 30 mm) were observed more frequently at sites closest to the sea, but they were not often caught because they were less affected by the electric fishing machine than larger fish. Apart from the specimen found 75 km from the sea, the length-frequency distribution of bullies larger than 30 mm appeared to be unaffected by distance upstream.

4.5.6 Blue-gilled bully (*Gobiomorphus hubbsi*)

The biology of the blue-gilled bully is similar to that of the common bully, but its preferred habitat is swift flowing water of gravelly streams and rivers, similar to that of the torrentfish.

In the Mohaka, blue-gilled bullies were found at a single site 55 km from the sea in the Te Hoe River (Fig. 21). They were caught along the margins of the river among rubble in swift and shallow water, and they were 70 and 79 mm long. These were large adults, and the 79 mm specimen is 2 mm longer than the maximum recorded by McDowall (1978).

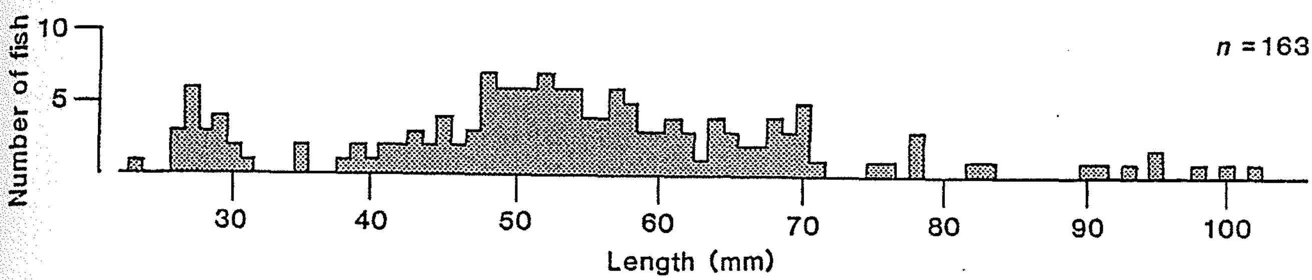

FIGURE 22. Length-frequency distribution of common bullies in the Mohaka River.

4.5.7 Cran's bully (*Gobiomorphus basalis*)

Cran's bully is mainly a river dwelling species and does not have a marine phase in its life cycle.

In the Mohaka, Cran's bully was found at a single sample site 21 km from the sea in the Kakariki Stream (Fig. 21). It was found in a sluggish area of the stream which was devoid of cover except for small fractures in the papa substrate. The two Cran's bullies caught measured 67 and 70 mm in length.

4.5.8 Common smelt (*Retropinna retropinna*)

Common smelt are found around the coast of New Zealand and in streams and rivers that can be reached from the sea. They are most often encountered in lowland rivers during spring and summer when large shoals move in from the sea. Spawning takes place in fresh water and larvae are washed out to sea.

In the Mohaka, the furthest upstream that smelt were found was 21 km, in the Kakariki Stream (Fig. 21). They were found at only two sample sites and represented barely 1% of the total catch (see Fig. 9). Because sampling did not include pools in the main river, where smelt would probably have been found shoaling, smelt abundance in the Mohaka's lower section was probably far greater than that indicated by the numbers found during the survey. Smelt lengths ranged from 64 to 98 mm.

4.5.9 Inanga (*Galaxias maculatus*)

The juvenile of this fish is the most important species in the New Zealand whitebait catch (McDowall 1978). It is a fish of lowland coastal rivers and, like other members of this family, spawns in fresh water. Larvae are washed out to sea and juveniles migrate into fresh water as whitebait.

In the Mohaka inanga were found only in the immediate coastal region of the river at one site 2 km inland from the sea (Fig. 21). The catch of inanga represented less than 1% of the total catch. It is very likely that more inanga would have been collected if pools in the Mohaka's lower section had been sampled. Like smelt, inanga are normally a shoaling fish likely to be found in pool habitats in the lower reaches of the river. Inanga lengths ranged from 64 to 81 mm.

4.5.10 Brown trout (*Salmo trutta*)

Brown trout are widespread throughout New Zealand and are one of two introduced trout species found in the Mohaka River. The first liberation of brown trout in the Mohaka took place during 1878 in the Taharua River and was followed in the 1890s by another liberation which included the stocking of the upper Waipunga River (Wellwood 1968).

During the 1983 survey, brown trout were found widely distributed throughout the Mohaka River system (Fig. 23). They occurred at 51% of the sample sites (see Fig. 8) and were the most abundant species in the total catch (see Fig. 9). Most of the total catch of brown trout came from headwater reaches of the Mohaka River where they were the most abundant species (see Table 2). Brown trout were recorded in their lowest densities in the middle and lower sections of the Mohaka. The

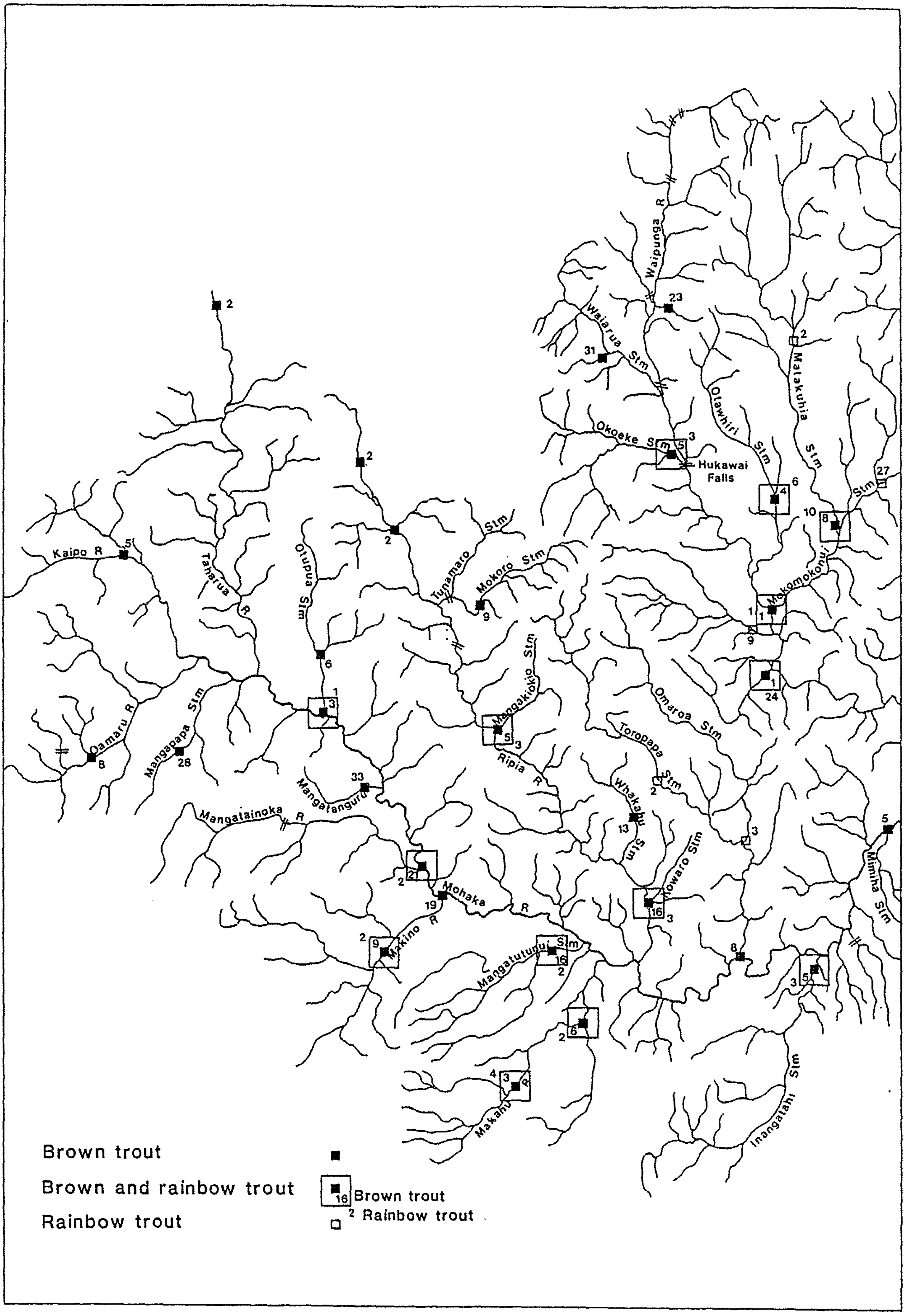

FIGURE 23. Distribution of brown trout and rainbow trout in the Mohaka River system.

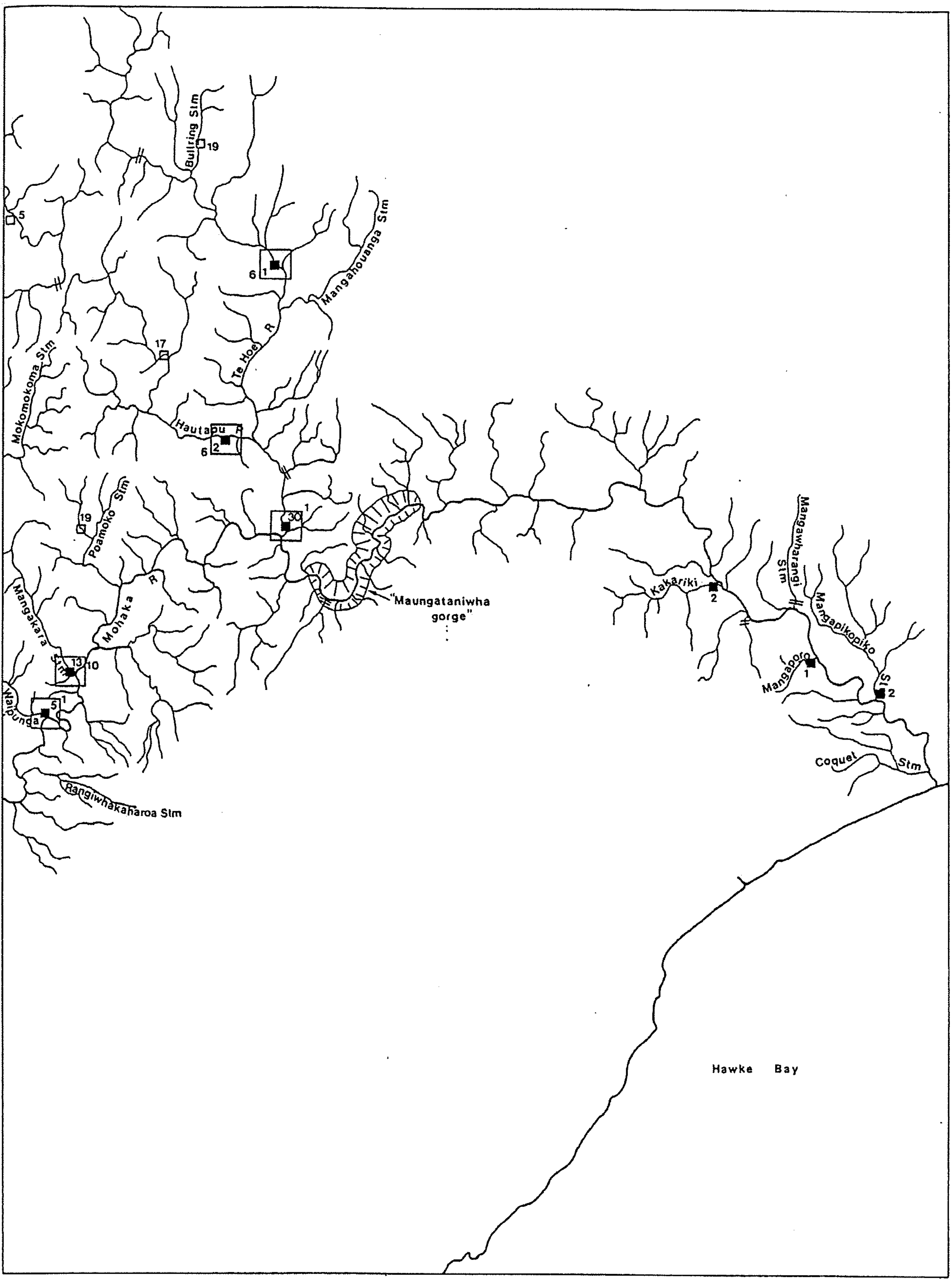

FIGURE 23 - *continued.*

highest density of brown trout was found in the Waipunga River (see Table 2) where a very high average density of 44 per 100 m^2 was recorded above Waipunga Falls. Below Waipunga Falls average brown trout density was only 1.4 per 100 m^2.

Because sampling was concentrated on the smaller tributaries, all but three brown trout were less than 20 cm long. Though ages were not determined, most brown trout taken were assumed to be juveniles and yearlings; the smallest caught were in the 3-4-cm length class and came from two sample sites in the Waipunga River above Waipunga Falls (Fig. 24). Brown trout in the 4-5 cm length class were caught in the Ripia River and upper section of the Mohaka, and in every instance occurred at sites where no rainbow trout were caught. Modal length of brown trout was lowest in the upper section, but increased downstream (Fig. 24). The increase in modal length of brown trout, especially from the upper section to the middle section, corresponded with a distinct decrease in brown trout density from the upper to the middle sections (see Table 2).

Habitat features specific to each species of trout were derived from measurements at sites where only one species of trout was collected (Table 11). Brown trout only were located at 18 sites, whereas rainbows alone occurred at only 9 sites. A comparison of the range of each habitat feature in Table 11 indicates that brown trout may be less specific in their choice of habitat than rainbow trout.

Brown and rainbow trout occurred together at 19 sites. Brown trout densities were greater at 13 of these sites, rainbow trout densities were greater at 5 sites, and densities were equal at 1 site (Table 12).

Table 12 shows that brown trout occurred in their highest densities when they were the only trout species, and in their lowest densities

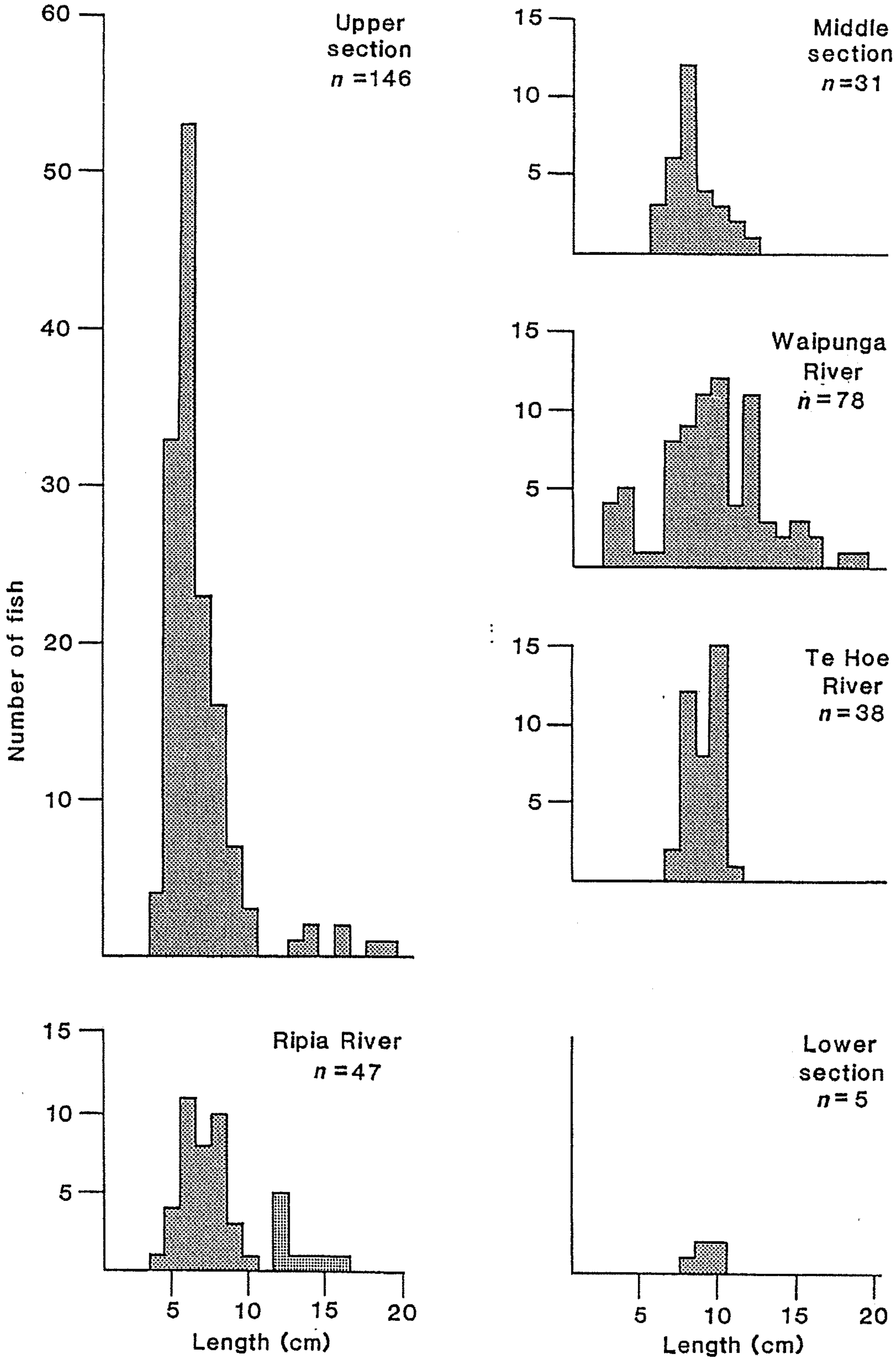

FIGURE 24. Length-frequency distributions of brown trout smaller than 20 cm from six different areas of the Mohaka River system.

TABLE 11. Habitat measurements from sites in the Mohaka River system where only one species of trout occurred.

Habitat data*		Brown trout Mean	Minimum	Maximum	Rainbow trout Mean	Minimum	Maximum
Temperature (°C)		13.8	9.1	20.2	13.2	11.0	15.6
pH		7.4	6.4	9.0	7.5	7.0	7.9
Flow (m^3/sec)		0.230	0.006	0.663	0.284	0.085	0.662
Gradient (m/100m)†		2.36	0.52	6.98	2.33	0.87	6.99
Average wetted width (m)		4.6	1.2	15.0	5.6	2.2	9.0
	(Silt	4	0	40	1	0	10
	(Sand	18	0	100	8	1	15
Substrate	(Gravel	24	0	87	33	15	60
%	(Rubble	20	0	50	35	20	60
	(Boulder	17	0	70	22	0	50
	(Bedrock	16	0	100	0	0	0

* Habitat data for brown and rainbow trout shown in tables elsewhere in this report include data from sites where both trout species occurred.

† Gradient was measured at only 16 brown trout only sites.

TABLE 12. Mean density of brown and rainbow trout for various associations of the two species in the Mohaka River system.

	Number of sites	Mean density of brown trout (No./100 m^2)	Number of sites	Mean density of rainbow trout (No./100 m^2)
Brown trout only	18	10.1	-	-
Rainbow trout only	-	-	9	4.5
Brown and rainbow trout (B + R)	19	4.2	19	3.0
B + R but higher density of B	13	5.6	13	1.4
B + R but higher density of R	5	1.4	5	7.4
B + R in equal density	1	0.2	1	0.2

when rainbow trout were present. Therefore, if brown trout were less specific than rainbow trout in their choice of habitat, the decrease of brown trout density in the presence of rainbow trout was probably due to some form of competitive interaction between the two trout species. A similar interaction between brown trout and other species, particularly long-finned eels, was indicated in areas where brown trout densities were high and other species low, and vice versa (see Table 2). Further examination of these interactions will require more data collection.

Other than in Table 11, habitat differences for each trout species association were not analysed, because some associations were found in only a few sites. However, in general, streams where both trout species were present together were larger in mean width and flow and had higher mean temperatures and pH than streams where only one species of trout occurred.

4.5.11 Rainbow trout (*Salmo gairdnerii*)

Introduction of rainbow trout to the Mohaka River probably occurred about 1900 (Wellwood 1968). The 1983 survey of the Mohaka found that distribution of rainbow trout was concentrated in the middle section (Fig. 23). Rainbow trout were not found in the lower section and densities were low in the upper section (see Table 2). However, records in the New Zealand Forest Service's Oamaru hut books indicate that large rainbow trout have been caught by anglers in the vicinity of the Kaipo and Oamaru confluence, which is further upstream than the upper limit of rainbow trout distribution shown in Figure 23.

Rainbow trout comprised 17% of the total catch, slightly less than half the catch of brown trout (see Fig. 9). The average density of rainbow trout (3 per 100 m^2) was half the average density of brown trout (6 per 100 m^2) (from Table 2). The highest densities of rainbow trout were in the middle section and lower half of the Waipunga (see Table 2). The lower Waipunga (below Hukawai Falls - see Fig. 6) is essentially part of the middle section as it is not separated by waterfalls or steep gradients and joins the Mohaka midway through the middle section.

As with brown trout, all but three rainbow trout collected were less than 20 cm long. The smallest rainbow trout were in the 4-5 cm length class (Fig. 25) and were found in the same section as the highest densities of rainbow trout (see Table 2). Modal length of rainbow trout was highest in the upper section where rainbow trout density was lowest, but where brown trout density was high. This is the converse of the trend shown by brown trout.

Table 12 shows the highest mean density of rainbow trout was in the presence of a low mean density of brown trout: it appears that rainbow trout are less affected by the presence of brown trout than browns are by the presence of rainbow trout.

Habitat variables at sites with rainbow trout only were confined to a narrower range than those at sites with brown trout only (Table 11). Even in the presence of a low density of brown trout, habitat variables for rainbow trout were confined to a similar narrow range. Compared with brown trout, rainbow trout presence was associated with specific substrate types (Table 11) and in particular gravel and rubble combinations of not less than 15 and 20% respectively.

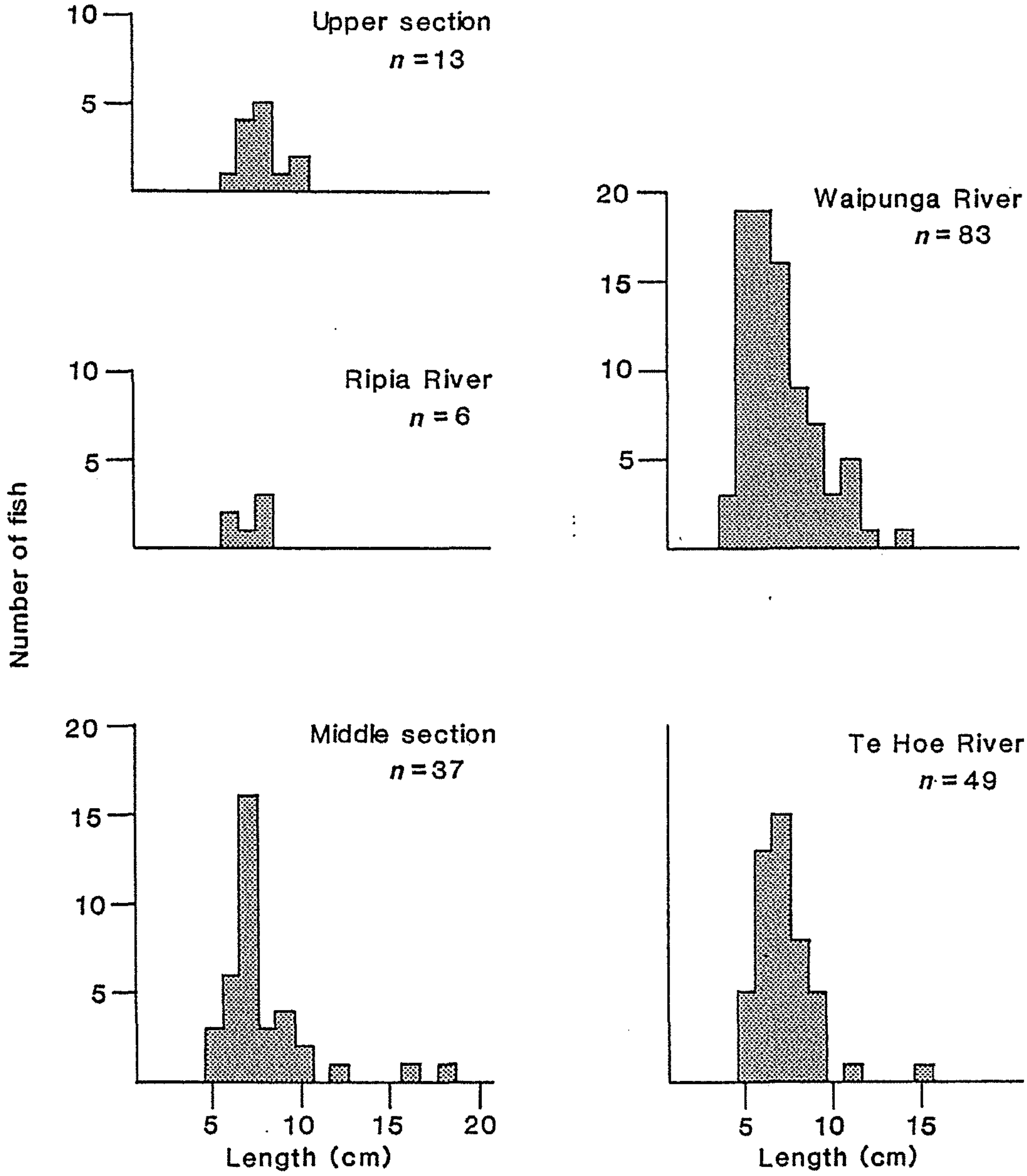

FIGURE 25. Length-frequency distributions of rainbow trout smaller than 20 cm from different areas of the Mohaka River system.

5. DISCUSSION

The Mohaka's extensive catchment contains many large tributaries all of which join the Mohaka in the top two-thirds of the river's course. In the lower third, the river enters a gorge (Maungataniwha) which appears to contribute in a major way to the observed distribution, diversity, and density of fish species in the Mohaka River.

The 1983 survey established the main fish species present in the river, and the main features of their distribution, and collected some data on their habitat. The three most abundant species in the Mohaka River were long-finned eels, brown trout, and rainbow trout.

Owing to the developed catchment and papa country through which the lower river flows, tributaries of the Mohaka's lower reaches lack the range of physical characteristics present in upstream reaches. However, the diversity of fish habitat in the upper reaches was not utilised by a corresponding diversity of fish species. In fact, it was in the first 21 km from the sea that the greatest diversity of fish species was found (or has been reported). The number of species appeared to decrease upstream with the increase in river gradient. Gradient was highest in Maungataniwha gorge, above which were found migrant species known for their ability to negotiate natural obstacles such as rapids and waterfalls. Densities of stronger swimming species were greater above the gorge, whereas below it densities of weaker swimmers were greater. The decline in density and diversity of native fish fauna above Maungataniwha gorge could be due to the nature of the gorge or to interactions between trout and native fish. Resolution of this issue could be important in understanding how the fish community functions and therefore be an important aspect of hydro-electric impact assessment.

The most abundant species found in the Mohaka above Maungataniwha gorge were trout. Because almost all the sample sites were in the Mohaka's tributaries, where streams were small enough to wade and electric fish, nearly all the trout sampled were fish less than 20 cm long, and were probably juveniles. However, sightings of large trout in pools of many of the larger headwater tributaries were made from the air and banks. Adult trout appeared to be confined to deepwater habitats in the main channel of the Mohaka and its larger tributaries. High densities of juvenile trout found in small tributaries indicate that adult trout must at some stage move into these areas to spawn. Fish trapping by the Hawke's Bay Acclimatisation Society has shown that trout move about the system during the spawning season. Therefore, it is important that areas of the Mohaka where trout spawn, and where significant densities of juveniles are reared, are not isolated from the fishery which they support.

Tributaries of the Ripia, middle section of the Mohaka, Waipunga, and Te Hoe Rivers all supported significant densities of rainbow trout juveniles. If rainbow trout recruited from these areas support a fishery elsewhere in the Mohaka, dams placed across the path of their movement would downgrade the quality of the Mohaka fishery.

Although the trout fishery is not confined to the middle section of the Mohaka, there are indications that this section is the most important. Based on angling information, Wellwood (1968) reported that brown trout predominated in the Mohaka above Pakaututu (the upper section), but for nearly all the river downstream brown and rainbow trout were present in about equal numbers. Despite the predominance of juvenile trout sampled in the 1983 survey, the trout species composition and distribution found supported Wellwood's findings. Wellwood (1968) also reported that rainbow trout were more easily caught than brown trout and this is reflected in composition of the Mohaka angling catch (83% rainbow and 27% brown trout) reported by Graynoth (1973). If the species composition and distribution of juvenile and adult trout were similar throughout the Mohaka system, the middle section, which supported the highest density of juvenile rainbow trout, is also likely to support the highest density of adult rainbow trout. Therefore, rainbow trout abundance combined with easy access for anglers indicates that the middle section is the most exploited and important area of the Mohaka trout fishery. Results from a national survey of river anglers by FRD (Richardson, Unwin, and Teirney 1984) showed that, despite the higher level of use and catch rate in the middle reaches, the Mohaka's headwaters were the most highly valued section of the river, because wilderness qualities, scenic beauty, and large trout were rated highly.

Of the Mohaka tributaries, density of juvenile trout was highest in the Waipunga, then the Ripia. Data from FRD's National River Angling survey show that these two tributaries were also the most popular with anglers (L.D. Teirney pers. comm.). Twice as many anglers as fished the Ripia fished the Waipunga, which is accessible in the middle reaches from S.H.5. Good catch rates of fairly large trout were reported from both tributaries, which indicates that the tributaries support stocks of adult trout as well as the juveniles sampled in this survey.

Current knowledge about the distribution of trout throughout the Mohaka system highlights the need for a better understanding of several aspects of trout biology; for example, brown and rainbow trout interactions, patterns of (and reasons for) movement of each life stage within the Mohaka system, and the interrelationship between tributary and mainstem habitats.

Several results show an association between the absence of some species and the abundance of another. For example, only brown trout were found above Waipunga Falls and occurred in their highest densities there. As a corollary to this, brown trout densities decreased in the presence of rainbow trout and long-finned eels.

Burnet (1968) showed that the removal of eels may increase numbers of trout, but not necessarily increase the return to the angler or the quality of trout. Further investigation in the Mohaka may show that the quality of the trout fishery in the middle reaches is partly dependent on the presence of eels in those reaches. Such an association would be jeopardised if the construction of dams excluded eels from these reaches.

Short-finned eels were not found above the second gorge and the density of long-finned eels in the upper section decreased to a quarter of the density at which they occurred in the middle section. Jellyman (1977) reported that in large river systems some eel elvers may take several years to migrate upstream to adult habitats, and that their ability to climb declined after they had grown to a length of 12 cm. In the Mohaka system the size of long-finned eels increased with distance upstream; there was a distinct increase in size from the middle to upper sections. Apart from the 40-60-cm length class of longfins, a small, but representative, selection of all length classes was sampled from the upper section. However, a comparatively large proportion of longfins in the 40-60-cm length class was found in the middle section. The accumulation of 40-60-cm-long longfins in the middle section may have resulted from the rapid early growth of these eels which reduced their upstream migration chances at obstacles such as rapids. Therefore the nature and situation of the second gorge in the Mohaka River and the size of eels before they arrive at this gorge, may be all that causes a decline in eel densities from the middle to the upper section. A series of dams constructed in the Mohaka could stop eels migrating into the system above the dams, and only those eels less than 12 cm would stand a good chance of climbing a dam. A further migration check would occur for eels which increased in length between dams or other migratory obstacles.

A recreational eel fishery occurs in the Mohaka (L.W. Spooner pers. comm.), but its extent and the existence of a commercial fishery are not known. To establish the importance of eels in the Mohaka, other than perhaps their role in maintaining a balanced trout population, eel fisheries in the Mohaka will need to be investigated in detail. The importance of other fisheries such as kahawai and whitebait will also need to be investigated. The whitebait fishery will be of particular concern if the main species in the catch is koaro, because dams constructed in the Mohaka between the sea and middle section could prevent koaro whitebait from reaching their adult habitat. Such an impact on the life cycle of koaro would eventually exclude it from the system unless a lake population became established, but this would not support a fishery in the Mohaka's estuary.

If the Mohaka's whitebait fishery is based on inanga, the other galaxiid found in the Mohaka, its ecology in this system would need to be investigated (only six inanga were caught in the present survey).

The data base provided by the Mohaka fisheries survey has resulted in some appreciation of how this river fishery functions. From this information, areas requiring further investigation have been identified. Some of the possible impacts of hydro development on the fishery have been discussed, but a more detailed assessment is dependent on knowledge of specific development proposals.

6. RECOMMENDATIONS

The following recommendations are for the working party which may be formed to decide on further fisheries investigations related to impact assessment of hydro-electric developments on fish in the Mohaka River. Work which should be ongoing if development proposals are imminent are prefixed by an A. Work which is dependent on knowledge of a specific development proposal is prefixed by a B.

A1 Determine the presence and level (or potential) of commercial, recreational, or Maori fisheries present in the Mohaka. Identification of these fisheries is an important prerequisite to any further work because it will enable both fisheries managers and developers to allow for them in future investigations and proposals.

A2 Sample, by drift diving and netting, large pools and deep water areas of the Mohaka system. These areas could not be sampled during the 1983 survey, but constitute a large proportion of the river system and are therefore likely to provide significant habitat for several fish species. Results from such an exercise should identify the species, size composition, distribution, and density of fish occupying this type of habitat in the Mohaka.

B3 Investigate the movement of trout in the Mohaka system. Results should identify which movements occur (for example, spawning, feeding, recruitment of juveniles, sea-run fish) and examine differences between the two species. Such an investigation would be a major undertaking, but its extent would depend on the sites proposed for hydro-electric development.

B4 Determine density and size distribution of eels, particularly in trout waters, so that if dams are built the need for eel passes can be assessed.

B5 Whichever galaxiid(s) is(are) significant in the whitebait catch (identified by 1 above), further investigation of adult distribution and important habitat areas will be required to evaluate the effect that dams would have on the Mohaka's whitebait fishery.

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APPENDIX I. Sample site map references.

Sample Site No.	Map Reference		Name of Stream
1	N113	688958	Tikitiki/Kaipo
2	N113	673852	Oamaru
3	N113	728907	Kaipo/Oamaru
4	N113	791906	Otupua
5	N113	788821	Mangatainoka
6	N113	844797	Mangatainoka
7	N113	822749	Makino
8	N113	856783	Makino
9	N113	831973	Ripia
10	N113	862943	Tunamaro
11	N113	876931	Mokoro
12	N113	886869	Mangakiokio
13	N114	966775	Kowaro
13A	N114	965774	Ripia
14	N114	973839	Toropapa
15	N114	013751	Puneketoro
16	N114	054749	Inangatahi
17	N104	024095	Matakuhia
18	N104	117095	Pukahanui (Right branch)
19	N104	189059	Hautapu (Left channel)
20A	N114	192959	Mangakurupatu
20	N114	142967	Poamoko
21	N104	159184	Te Hoe (Upper)
22	N104	205175	Te Hoe trib. (Bull Ring)
23	N103	735098	Taharua
24	N113	758905	Taharua
25	N114	932718	Anawhenua
26	N124	014655	Inangatahi
27	N114	005858	Omarowa
28	N114	022923	Stoney
29	N114	031933	Mokomokonui
30	N114	030901	Waione
31	N104	979015	Okoeke
32	N104	942064	Waiarua
33	N114	066975	Matakuhia (Mth)
34	N114	089998	Mokomokoma
35	N114	143872	(Not sampled - dried up)
36	N114	162918	-
37	N114	119837	Rangiwhakaharoa
38	N114	250970	Te Hoe
39	N104	215015	Hautapu (Side channel)
40	N104	236025	(Not sampled - inaccessible)
41	N104	252085	Mangahouanga (Hook)
42	N104	240119	Te Hoe tributary
42A	N104	243112	Te Hoe
43	N114	318982	(Not sampled - inaccessible)
44	N115	443996	(Not sampled - inaccessible)
45	N115	483939	Kakariki
46	N115	523943	Mangawharangi
47	N115	568879	Mangapikopiko
48	N115	541892	Mangaporo
49	N115	586840	Coquet
49A	N115	586841	Mohaka
50	N104	101133	Pukahanui tributary

51	N104	985193	Harakeatanemate
51A	N104	975088	Waipunga tributary
52	N114	957823	Whakahu
53	N123	898689	Makahu
54	N114	017812	Omarowa
55	N114	991869	Omarowa
56	N114	095789	Mimiha tributary
57	N114	138888	Mangakara
58	N114	031992	Otawhiri
59	N114	123864	Waipunga
60	N114	094818	Mohaka
61	N113	794878	Otupua
62	N113	813837	Mangatanguru
63	N113	866871	Ripia tributary
64	N114	917816	(Not sampled - inaccessible)
65	N115	482942	(Not sampled - dried up)
66	N103	812031	Ripia
67	N114	906754	Mangatutunui
68	N113	716857	Mangapapa
69	N113	750819	Mangatainoka
70	N114	090883	(Not sampled - inaccessible)
71	N113	870734	(Not sampled - inaccessible)
72	N115	598829	Mohaka
73	N115	596858	Mohaka
74	N115	528925	Mohaka
75	N115	374986	Mohaka
76	N114	268939	Mohaka

APPENDIX II. Habitat data sheet

MOHAKA RIVER SURVEY

STATION NO._____ DATE______ TIME______ OBSERVER __________

FISHING METHOD & TECHNIQUE_____________ VOLTAGE_________ DISTANCE________

TEMP.______°C pH_______ BENTHIC SAMPLES YES/NO WATER SAMPLES YES/NO

WATER CLARITY Clear Opaque Turbid

GRADIENT (/100m)_____ POOLS/100m_____ POOL LENGTH_____ _____ _____

WIDTH_____ _____ _____ _____ _____

BANKFULL WIDTH_____ _____ _____ _____ _____

THALWEG DEPTH: Riffle_____ Run_____ Torrent_____ Pool_____

SUBSTRATE (% in reach sampled)

Silt (0.06mm)	Sand (<2mm)	Gravel (<64mm)	Rubble (<256mm)	Boulder (>256mm)	Bedrock

COVER (% in reach sampled)

Deep water	Rubble	O'hang bank-veg	Submerged logs	Boulders	White water	
						small large

MACROPHYTES (% coverage of bottom)

0	1-25	26-50	51-75	76-100

DIATOMS/ALGAE (% coverage of bottom)

0	1-25	26-50	51-75	76-100

DISCHARGE____________

Distance (m) ____

Depth (cm) ____

Head (mm) ____

or Seconds ____

COMMENT ____

AERIAL DATUM ____

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"G"

Cultural Health Assessment of the Mohaka, Waikari and Waihua Rivers

Photo of Anaura Stream Survey

Ngati Pahauwera Development & Tiaki Trust.

Toro Waaka

This is the exhibit marked **"G"** referred to in the affidavit of Toro Edward Reginald Waaka on behalf of the Trustees of the Ngati Pāhauwera Development and Tiaki Trusts affirmed at

Napier this 5th day of

December 2014 before me

Signature:

Cara Bennett
Solicitor
Napier

A Solicitor of the High Court of New Zealand /Justice of the Peace

Contents

Map of wider catchment area of the Waikari, Mohaka and Waihua Rivers.

Map compliments of HBRC

1. Acknowledgements

The Ngati Pahauwera Development & Tiaki Trust would like to acknowledge the information provided by those who are no longer with us as well as acknowledge the contribution of Ngati Pahauwera whanau today. The Cultural Assessment team included Darren Botica who supported the team site observation in both the physical and spiritual dimension. Shane Gilmer provided the water sample analysis and environmental science input. Reka Joe added Ngati Pahauwera local mahinga kai and site access knowledge. Maurice Babbington provided water safety procedures and aided water sample collection. Toro Waaka incorporated the Ngati Pahauwera historic, cultural and environmental perspective.

The Trainers for the Cultural Health Index were Kuki Green and Rangi Spooner who also contributed to the final report review. They have had formal training in this model, used this model in other reports and modified it for practical use. We acknowledge the high level of cooperation from The Hawkes Bay Regional Council, Hans Rook of The Department of Conservation, Pan Pac and land owners for both information and access to sites over their land. The information in this document remains the property of the Ngati Pahauwera Development & Tiaki Trusts.

1.1 <u>Mihi</u>

Ko te Amorangi ki mua

Ko te Hapai o ki muri

Ko te tuturutanga mahi pono

o te Maori motuhake

E nga whakatipuranga e ai te ki"

E kore e ngaro te kakano I ruiruia mai ki Rangiatea.

Tena Koutou, Tena Koutou, Tena Koutou

Puritia ki te aka matua

Puritia ki te rama o Uru te ngananga

Mo te oranga o Papatuanuku, te ukaipo o nga Iwi katoa.

Mauri ora.

Karakia

Tihei mauri ora

Behold the cough of life.

Tihei uriuri

May our descendants live on

Tihei nako nako

May our hopes be fulfilled

Ka tau haha te papa e takoto nei

Ka tu ka tu haha te rangi e tu nei

We acknowledge the earth that stretches before us and the heavens above.

Whakarite, kia rite

Ko ia rukuhia manawapou roto

Ko ia rukuhia manawa pou waho

Let the ritual be performed

Place the sacred stones within and without.

Whakahoki te taonga ki te taonga.

Return that which makes the precious item precious.

Whakahoki nga waiora a Tane ki nga wai katoa.

Reinstate the waters of spiritual renewal and life to all water.

Aue kia eke, Eke panuku

Surmount the obstacles and make progress

Whano Whano

Explore effective approaches

Haramai te toki

Cut a path forward

Haumie, Hui e Taiki e

Make alliances and proceed united in purpose.

1.2 Executive Summary

The report critically reviews the health of the waterways within the catchments of the Mohaka, Waikari and Waihua rivers from a Ngati Pahauwera Cultural perspective using an adaption of the Cultural Health Index methodology. This review includes 8 sites on the Waikari, 6 sites on the Waihua and 16 sites on the Mohaka Rivers.

The river catchment description highlights the fragile nature of the catchment given the nature of the soils and climate. The lack of suitable land cover on farmed areas and the large scale logging operations has contributed to high levels of siltation that in turn has decimated the aquatic ecosystem.

The section on cultural values provides an understanding of why Ngati Pahauwera considers their cultural interests are highly compromised by the present state of the rivers. Iwi members were interviewed and their observations were included to support the findings of the report.

The Cultural Health Index (CHI) assessment forms filled out for each site provides an environmental snapshot of the site and provides the basis for recommendations regarding site restoration. The CHI assessment measure A confirms that all sites assessed are traditional sites and are considered by Ngati Pahauwera to have cultural value despite the adverse impact of land use on mahinga kai values. Ngati Pahauwera is committed to the restoration of the mahinga kai potential of each site so have not applied the 0 measure regarding non future use.

1= Unhealthy		3=Marginal		5=Healthy

The above measure when applied to all rivers indicated the cultural health of the rivers was below 3. In all cases the water was unsafe to drink and there were no sightings of fish species. No birds associated with mahinga kai other than Pukeko were sighted. Some sites were further assessed after a two week interval to identify variation over the period.

The Cultural Assessment identifies issues adversely affecting the cultural health of the rivers as a lead into discussions with the Crown and the Hawkes Bay Regional Council to identify river restoration solutions. The CHI assessment identifies examples of ineffective regulatory measures and monitoring and has made recommendations to encourage collaborative initiatives to arrest the catchment collapse in the Waikari, Mohaka and Waihua rivers.

1.3 The Report Findings identified

The Waikari, Mohaka and Waihua rivers are taonga of inestimable value to Ngati Pahauwera and the wider community.

Restoring the mauri ora of these rivers is critical to the Cultural, Social and Economic survival of Ngati Pahauwera.

The mauri ora of the Waikari, Mohaka and Waihua catchments are compromised by adverse land management practices.

In the case of the Mohaka River much of the adverse impacts occur in tributaries well upstream of the Ngati Pahauwera area of interest.

The Cultural Health Index model is a useful starting point but has a limited context given Ngati Pahauwera think a Cultural Health Assessment needs to be informed by all available knowledge.

Erosion and siltation in the catchments has contributed to critical levels of water quality.

Pollution and siltation of waterways has made the water unfit for human consumption.

Mahinga Kai opportunities are limited as siltation and pathogen accumulation from stock pollution continues to destroy the fisheries habitat and balance of aquatic life.

Gravel extraction in the lower part of the Mohaka river has destroyed the whitebait recruitment areas.

The Cultural Health Assessment interviews identified the need to widen current assessments of the land use impact to include research on the impact of long term application of 1080 and herbicide as well as assess the impact of radiation from phosphates imported from Christmas Island or any other site of nuclear testing.

There is a need to assess the nature of the environmental impact of high velocity overhead pylons and associated magnetic field over the Mohaka River and its tributaries.

The current state of the rivers suggest that insufficient regard has been had to the information the Hawkes Bay Regional Council has accessed from consultation hui, Iwi planning documents or Cultural advisory documents it has commissioned.

The monitoring of the health of the three rivers by the Hawkes Bay Regional Council over the past ten years has been limited

Regional Councils are conflicted between Community driven values and Resource Management responsibilities. The commitment of resources allocated by The Hawkes

Bay Regional Council to effectively implement sustainable land management practices in the catchment areas is inadequate.

The stewardship of our Natural resources may be better managed by an Independent Regional Environmental Health focused agency

There is no collective Change Management Strategy to arrest catchment collapse by regulatory authorities and stakeholders

River restoration initiatives by Ngati Pahauwera would be as totally ineffective if the projects were not part of a collaborative stakeholder strategy.

1.4 Report Recommendations

There is a need for a collaborative approach by regulatory authorities and all river stakeholders to identify strategic goals that can form the basis of a memorandum of commitment to establish policy to avoid remedy and mitigate adverse impacts on the river catchments.

A Project Initiatives Group is established of all river stakeholders to instigate stakeholder workshops to discuss and improve the integration of strategic and operational functions of river restoration planning and river restoration projects.

The Project Initiatives Group discusses the observations of the report and initiates a review of policies and processes currently engaged in a bid to arrest catchment collapse and loss of fisheries habitat.

That the redeveloped policies and processes are performance assessed and audited to encourage improvement and eliminate inconsistencies.

Research and analysis of water samples in future Hawkes Bay Regional Council monitoring is extended to identify the presence of pathogens, hormones, or adverse chemical presence in waterways that were not within the investigative scope of this report.

A series of reports are resourced to inform decisions on collaborative approaches to habitat protection and fisheries restoration.

Further research is required of the best approach to develop and protect breeding grounds of whitebait within the salt water influence upstream of the Mohaka River.

Further research is required in the Kakariki reserve area for an eel enhancement reserve.

Further water sampling is required on the Rivers to identify seasonal characteristics and change associated with water quality.

2. Terms of Reference

Ngati Pahauwera and the Crown have agreed a Cultural Health Assessment should be completed on the Waikari, Mohaka and Waihua Rivers[1] and the Crown has provided a fund to contribute to the implementation of recommendations from that study." The objective of the Cultural Health Assessment is to determine the nature and extent of the environmental degradation in the River catchments from an Ngati Pahauwera perspective. This Cultural Health Assessment will draw on all practical knowledge available to Ngati Pahauwera and the information interpreted using a Cultural Health Index framework.

The Cultural Health Assessment should not limit itself in terms of where it draws its knowledge from. Just as Britain does not define its culture at the point of time it interfaced with Maori. Nor should Maori consider having a culture defined and frozen at a specific time. All Culture is shaped by external forces and our modern sources of information are expansive.

The surveys have been limited to daytime observations and the testing of water samples limited to Turbidity, Conductivity and Ph.

The assessment will provide the basis for determining what projects if any should be undertaken to assist with restoring a healthy river environment. This statement should be read in conjunction with other contemporary reports on the current health of the rivers.

2.1 River catchment description.

The vegetation of the area has been extensively modified since European settlement with huge clearances of Manuka, Kanuka, Kahikatea, Matai, Miro, and Totara in the upper reaches with Tawa, Kanuka, Kaimahi and Rewarewa in the mid and lower slopes [2] Some small remnants of native reserves remain with much of the area converted for forestry or grazing land. Whilst there are examples of wise land management on some farms the grazing land tends to be devoid of trees with slips on steeper country and water courses that are still open to damage and pollution

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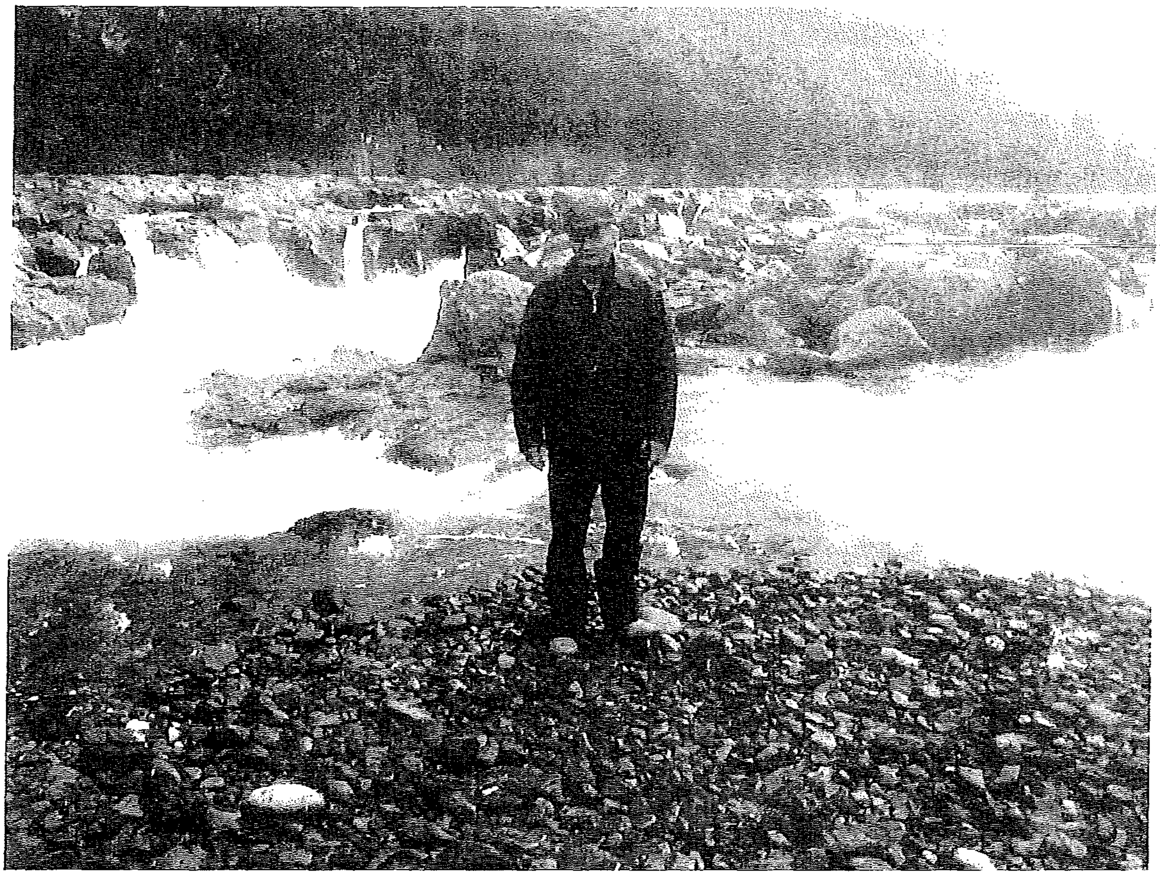
[1] Letter from the Crown dated 20 August 2008.

[2] Wright, Mathew: Farming in the Mohaka State Forest, 1860 – 1950, p. 3

from stock. Some of the tree planting of exotic species and the tracks to maintain them is contributing to the collapse of the banks and the trees falling into the streams and rivers.

The catchment of the Mohaka begins outside of the Ngati Pahauwera rohe in the Kaimanawa Ranges where the Oamaru River joins the Kaipo River to form the Mohaka.



The Mohaka River above the Taharua confluence.

Eight other rivers flow into the Mohaka before it reaches the Te Hoe river junction. Each of these rivers adds its own set of problems to the Mohaka in the form of erosion and pollution. The prominent example is the Taharua River that originates in the southwest Rangitaiki Plains. There is serious pollution from large scale conversion of land to dairy farming in the Taharua Catchment. Dan Joe, a Ngati Pahauwera Trout Fishing Guide on the upper Mohaka, said that prior to the establishment of the dairy units in the Taharua Catchment that he caught on an average of 12 trout a day with his customers. Today he would be lucky to catch two. He considers pollution from the diary farm effluent, fertilizers and hormones to be major contributors to the demise of aquatic species in the river. [3]

(2009) Photo of an unfenced waterway and dairy effluent on a farm that feeds the Taharua River.

The Hawkes Bay Regional Council has engaged with all stakeholders who are involved in creating the problem, or are affected by the problem. The intent is to effect changes that will address the adverse impacts on waterways. Ngati Pahauwera commends this positive approach as the point has already been made that one part of the Catchment can have adverse downstream effects on the health on the river below.

South of the Taharua there are large areas of pine forestry. The milling of forestry has contributed to large movements of surface soil that ends up as silt in streams and rivers. This is also true in parts of the Waikari and Waihua rivers. When the Mohaka enters the proximity of the Te Hoe tributary it is fed by water from the Maungaharuru ranges and Mangataniwha to form a number of entrenched tributaries that flow through the undulating surrounding lands to the

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[3] Interview with Dan Joe. Jan 2011 Interview.

coast. The course of the river in this area is similar to the Waikari and Waihua rivers where the upper reaches have steep banks.

Major floods in the Mohaka have been recorded in 1897, 1910, 1914, 1924, 1936, 1938, 1985, and Bola in 1988[4]. The two floods in 1988 gave flows of 2204 and 1920 m^3/sec which is over 25 times that of normal flow. [5] Hamish McLean a farmer at Kakariki on the Mohaka River said the recent Jan 2011 flood levels on his farm exceeded the flood levels of Bola by at least three metres.[6]

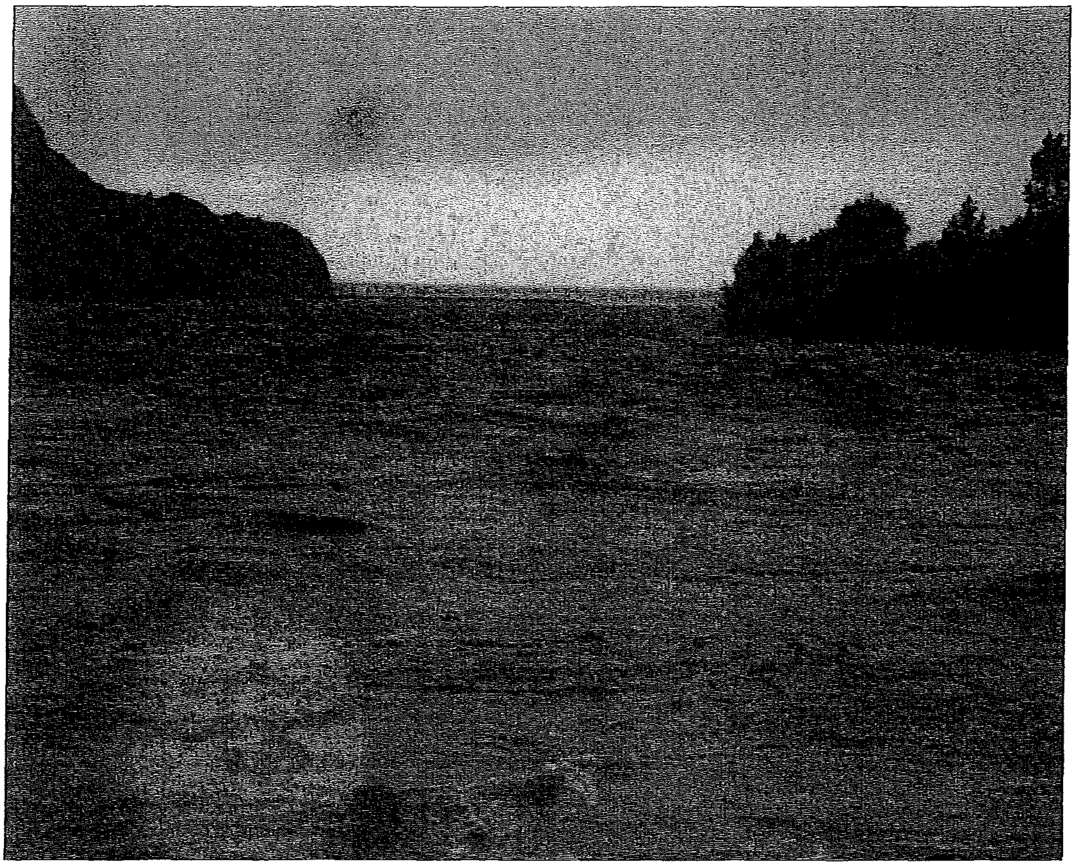

Photo of the Mohaka River in flood. Taken looking towards the Mohaka River mouth 24/1/2011

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[4] George Thomson. . Preliminary Report on the Mohaka River Valley below the Waipunga Junction. Report for Donna Hall and David Hurley. 14/12/90. p. 13

[5] Ibid.

[6] McLean. H. Feb 2011 interview.

The land bordering all three rivers in the research area is papa rock covered by a soil containing a mix of volcanic ash, yellow pumice sand from volcanic eruptions mixed with sandy loams and silts derived from fine and coarse grained rocks.[7]

The geology and soils are highly prone to erosion and small soil disturbances by machines making tracks for farm access or forest access can soon turn into major erosion sites. This is a serious localised problem not helped by the climate patterns which includes very high rainfall at different times of the year.

There have been many floods since Cyclone Bola and catchment collapse has been compounded by the failure of council's to address the issue of bad land management practices. Since the major flooding of Bola in 1988, Ngati Pahauwera must ask the question "what has changed since then in the regulatory approach and monitoring by the Hawkes Bay Regional Council to avoid, remedy and to mitigate land management practices that do not have regard for regular heavy rainfall and flooding?"

2.2 River Catchment Management Responsibilities.

The Crown's role of Environmental Governance and Management at a regional level falls within the responsibilities of the Hawkes Bay Regional Council. Regional Councils are democratically driven with strong rural lobby groups. In the past environmental interests have been sacrificed for political expediency where there has been investment in projects for community support and capital gain with a lesser focus on environmental gain. Ngati Pahauwera has sought engagement with the Regional Council and the Ministry of Environment over the last two decades through The Ngati Pahauwera Iwi Resource Management Plan, and numerous Consultative meetings and contributions to Environmental and Cultural Advisory documents.

Ngati Pahauwera has maintained its position of Rangatiratanga and as Kaitiaki has developed a working relationship and made agreements with the Hawkes Bay Regional Council on issues regarding Shingle management and Haangi Stones on the Mohaka River. The Ngati Pahauwera Deed of Settlement with the Crown has established co-governance arrangements between Ngati Pahauwera and the Hawkes Bay Regional Council that will form the platform to develop policy and processes for improved river catchment management.

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[77] Wright, Mathew: Farming in the Mohaka State Forest, 1860 – 1950, p. 2

3. Ngati Pahauwera

Ngati Pahauwera is the Karangatanga or name under which a confederation of over 120 traditional hapu rallied for collective interests in the pre European contact period. These hapu lived within an area known as Te Rohe o Kahu o Te rangi. This area extended from the Esk River Mouth inland to Te Haroto across to Maungataniwha and followed the course of the Waiau River downstream and crossing near Ohinepaaka to the coast north of the Waihua River.

The bulk of the Ngati Pahauwera lands were alienated from the respective hapu resulting in a lesser involvement by Ngati Pahauwera with the land and waterways over the last century.

The issue of river rights and management came to a head in 1989 with hearings under the Planning Tribunal following an application for a Water Conservation Order to be placed on the Mohaka River. This led to the lodging of a Waitangi Tribunal Treaty Claim by Ariel Aranui and a twenty year struggle to get a Deed of Settlement. One result of this was the development of a co-management regime with the Hawkes Bay Regional Council on resource management matters relating to rivers.

3.1 The Cultural Imperatives of Ngati Pahauwera.

Culture in its broadest sense describes cultivated behaviour that provides a community of interest with symbolic structures, values, patterns of human behaviour, and activities that are embraced as normal. The culture and values of Ngati Pahauwera today are influenced by both traditional and contemporary influences and needs.

The traditional cultural values of Ngati Pahauwera continue to be reinforced in Korero tawhito, Waananga, Waiata, Haka, Tauparapara and Pepeha on Ngati Pahauwera Marae. The value of water to Ngati Pahauwera has been influenced by ancient reference points passed down in Waanaga.

> Ka noho a Io i roto i te aha o te ao
>
> He pouri te ao he wai katoa
>
> Io the Supreme Being resided amidst water and darkness

After long periods of darkness and thought the universe and life as we know it was conceived and created. All that was created was linked by a common whakapapa or genealogy and as such we inherited responsibilities to take care of and respect our interdependent extended family. Ngati Pahauwera Iwi recognises there is but one spirit in all things. **Kotahi te wairua i roto i nga wa katoa.**

Io created Papatuanuku and Ranginui, the primeval parents. The children of Ranginui, and Papatuanuku lived in between their embracing parents in a world of darkness. Their children forced Ranginui to separate above Papatuanuku to let in light.

In their grieving, the tears of the separated parents provided life giving waters for the heavens and earth. These tears channeled into tomo, streams, rivers, lakes and the sea. The tears of both parents provided the mauri ora or life giving and the health restoring elements of water.[8]

Ngati Pahauwera has been handed down an ethic of respect for the environment and our wider whakapapa. In that respect our tipuna said "**I am the river and the river is me.**"

Ko au te awa. Ko te awa ko au[9] The pepeha or tribal sayings serve a dual purpose in that they make a statement about what is important to Ngati Pahauwera and reinforces the spiritual, genealogical and interdependent relationship of the heavens, the waters, the land, the food and the people.[10]

He Mano whetu ki te rangi

He mano kahawi ki te moana

He mano tangata o Tureia hei Tiaki kai mau.

One thousand stars in the sky

A thousand kahawai in the ocean

A thousand men of Tureia to care for you.

[8] Waaka.T.E.evidence Wai 199.
[9]George Hawkins Wai 119 evidence.
[10]Evidence of Ramon Joe. Ngati Pahauwera Waananga.

Tangitu ki te moana

Maungaharuru ki uta

Mohaka te awa

Ko Ngati Pahauwera te iwi

Tangitu in the ocean
The rumbling mountain range inland

Mohaka is the river

Ngati Pahauwera are the people.

These pepeha do not just describe features on the land they inform us of places within which the mauri ora was implanted. The mauri ora of birds was implanted in the Maungaharuru ranges and the mauri ora of fish in Tangitu. The spiritual element and Karakia are fundamental to the cultural practices and values of Ngati Pahauwera. Our cultural heritage was passed down from atua to our ancestors and down to us through Kaumatua and Kuia and is called **Nga taonga tuku whakarere iho**. These gifts from atua include **te mana o te whenua and te mana o te moana.**[11]Mana in this sense means the elements gifted by Io and placed in Papatuanuku that provides the life sustaining bounties of the whenua (land) and the moana (Sea or lake).[12] "Our ancestors discovered the mana. They found mana in the hills, in the rivers, and that is why we battle for their return."[13]

Kaumatua Charlie King stated, "[Mana] that thing is the psychic force within us...our mana is derived from the river. Without the heritage of the river we are nobody. To us the river is spiritual; there is spirituality in all things. People go and talk to the river.[14]"

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[11] Ramon Joe. Ngati Pahauwera Tohunga arai and Kaitiaki.
[12] Rev Maori Marsden. Waananga at Pirinoa, Wairarapa.
[13] Canon Huata, paras 24-31 Closing submission. Wai 201
[14] Charlie King ,P 3-4,Document B27 Kaumatua evidence

One name for tipuna who remain with us as spiritual guardians is Taniwha.[15] "I used to know every bend on the river. On every bend we were told there was a Taniwha". He piko he Taniwha, He piko he Taniwha."[16] Gifts from atua and tipuna include cultural knowledge and intangible beliefs as well as the collective heritage items you can see, smell, feel, hear and touch.

The responsibility of Ngati Pahauwera as Tangata Kaitiaki is to maintain the Mauri ora or life sustaining state[17] and strength of the resource through Karakia and management that encourages restraint, appreciation and respect for the taonga.[18] The desirable state for water is wai ora or life sustaining waters as opposed to a state of wai mate or water that causes illness. Rahui were used as restrictions on resources and were enforced by the tino rangatiratanga of hapu. In other cases Tohunga arai[19] used delegated powers and authority from atua to imbue persons, places or things with tapu so they would be respected. Transgressions were punishable by atua.

In recognition of our genealogical connection and interdependent relationship with the environment Ngati Pahauwera maintains a role as tangata kaitiaki and holds to the exercise of rangatiratanga that is required to maintain and enforce a protective role over our taonga. This includes our rivers and natural resources. This responsibility falls to the leaders of the respective hapu of Ngati Pahauwera that occupied the river catchments.

Associated with our responsibility to the taonga is the responsibility to manaaki manuhiri. Land loss has limited the role of those who are unable to exercise ahi kaa. For some members the land loss has created a culture of caution and suspicion of the Crown in its many forms.

Ngati Pahauwera culture today is expressed and preserved in te whakapono me te aroha, karakia, te mita o te reo, Nga mahi i mahana ai nga marae, Nga mahi tiaki taonga, nga mahi o te ra, hui, tangi, whakapapa, whaikorero, korero pakitara, korero purakau, korero tawhito, mannakitanga, nga tohu o nga tipuna, tikanga, kawa, mahi a ringa, waiata, haka, whakairo and many other ways.

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[15] T. Waaka. Wai 119
[16] See evidence of Mokopuna Te Kahu. p3. W.S.C. ACT.[253/90]
[17] Ariel Aranui. Mohaka River WT report . p 11.
[18] Cracknell M, Waaka T, Waste Management Doc. Ministry of Environment.1992
[19] Ibid. Tohunga arai have a specialist expertise in Resource Management.

3.2 Occupation of the Catchment areas

Ngati Pahauwera tradition and early Crown survey maps show that occupation by Ngati Pahauwera on the lands that make up the river catchments has been continuous and extended into the extremities.

Maori Land Court records note that the location of pa, kainga, mahinga kai, wahi tapu and other taonga was widespread in tributary areas that fed into the rivers. The confluence of these tributary areas will be the focus of the Cultural Health Assessment. Many of the physical features of occupied sites have been modified or erased from the landscape due to modern cultivation machinery, stock impacts, erosion and natural flooding events

In the past, population growth and land clearance put stress on natural resources.

Iwi soon recognized their survival was dependent on maintaining the mauri ora (healthy state) of natural resources and the need to follow nga haroto o Uru Te ngananga. (The rules to maintain environmental balance)[20] This contributed to the practices that ensured resource use was aligned to sustainability.

Archaeologists Susan Forbes and Warren[21] Gumbley suggest that until the early or mid nineteenth century the population was relatively dense with competition for resources necessitating defenses around living areas and food storage pits and/or the location of sites hidden or difficult access places.[22]

Within the Ngati Pahauwera cultural landscape, some discrete archaeological patterns emerge. Bain 1992 notes that "The results of this survey between Kakariki and Te Hoe indicate a clear pattern of settlement associated with known river crossings. Where the Mohaka River can be crossed, settlement is concentrated, and it was sparse in the intervening areas although the landscape might suggest suitable sites."[23]

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[20]Cracknell M, Waaka T. Waste Management Document. Ministry of Environment
[21]Susan Forbes and Warren Gumbley, "Ngati Pahauwera Rohe: Archaeological Survey," (1996).

[23] Pam Bain, "Mohaka River Archaeology Survey," ed. Conservation (unpublished report, 1992). p 10

4. The Traditional Resources in the River Catchments used by Ngati Pahauwera

The ancestors of Ngati Pahauwera occupied the Iwi rohe for over a thousand years. After a few sharp lessons they learnt that if the people were to avoid famine and loss of important species for future survival, natural resources needed to be managed in a sustainable manner. This meant developing an intimate knowledge of the value and use of every plant, fish, or section of land or waterway, that could be utilised and when they should be best utilised.

Each hapu had a number of cultivation areas, a number of fishing and food gathering areas. This mobile way of life (rekereke) also enabled resources to regenerate and the mauri ora of the area to be revitalized.[24] The localised Ngati Pahauwera saying is **taku reke reke taku turangawaewae**[25]or otherwise expressed **ko ratou pa ko nga rekereke.** Where their heels take them is where they make their living or stand. Another expression is "**Kainga tahi kainga mate. Kainga rua kainga ora".** In short if you rely on one place for your sustenance you will die.

If you did not regularly utilise an area or resource your right to do so would be considered mataotao or gone cold and someone else would use it and make claims to it. A constant principle of occupation was ahi ka roa[26] or observable long- term use of the land typified by the smoke from your fire. The concept of Te ahika roa took into account the fact that people needed to move to where food resources could be best utilized at different times of the year. When Missionary William Williams visited Mohaka on 14/12/1843 he found no one there. [27]"Proprietal interests pertained to resources, not land blocks and people owned usufructs not territories."[28] The extent of use rights also varied between the different classes of the people.[29]

The resources utilized included:

[24] Cracknel M, Waaka T.Waste Management Document. Ministry of Environment
[25] Waaka A. Waaka T. Tahi Rau Tau o te Marae o Mohaka 1986.
[26] Tom Gemmell in discussion.
[27] Porter. Turanga Journals P 267
[28] Durie, 1994
[29] Butterworth.WSCA

- Trees such as Ti Kouka and Karaka were planted in plantations close to water. There are examples of areas dense with Ti Kouka in damp areas in the Waikari area that may be remains of these ancient orchards. Foods were gathered seasonally from trees and plants in the form of fruit, berries, pith, fronds and leaves. Ferns provided piko piko (fronds) and aruhe (roots), a staple food. Plants provided medicine, dyes and glues. Different plant leaves were utilized for rope making, net making, garments, bedding, mats, pikau, kete, art and entertainment like poi and kites.[30] Logs were floated downstream for building materials, [31]for housing, waka, palisades, pa tuna, carving, trade,[32] fires weapons, traps, hunting spears and tools. Raupo rafts and Waka or canoes were used on the river for fishing and transport[33]

- Land was cultivated and planted in kumara, taro, uhi, hua, kamokamo, puha, korau, and taewa. Vegetables like taro were reliant on damp soils and roots from water plants like raupo provided a good source of carbohydrates.

- Birds are reliant on healthy water and eat the insects and small fish in and on the verges of the streams and rivers. Birds were hunted for food, feathers and skins for garments. The principal forest birds sought for food were the wood pigeon (kereru), Titi (mutton bird)[34], parrots (kaka), ducks,[35] parson bird (tui, koko), parakeet (kakariki), bell bird (kokomako), wood hen (weka), ducks, huia, quail and kiwi. The Maungaharuru area was the most important bird snaring area. "We lived at Arakanihi when there were no birds, but when birds were plenty we went inland".[36] Rats, bats, insects, grubs, and worms were also part of the Iwi diet.

- Mohaka haangi stones are a taonga to Ngati Pahauwera and were heated with fire and used for earth ovens. Mohaka Harara, Taupunga, Opunga is a name of different types of stones and is symbolic reference to the unity of the different hapu and whanau. Tom Gemmell says Harara referred to a brittle stone. Stones were also used for paths

[30] These plants included Flax, Pingao, Kiekie, Ti kouka, and Raupo
[31] Evidence. Thomson G, WSCA.
[32] NMB 40, P137
[33]NMB 40,P57
[34] Tunupo is a place identified as a ahi titi
[35] Whio hutia on the river refers to a place where the blue duck was caught or plucked.
[36] NMB 2, 38, P.364.

anchors, weapons, tools, walls, tuahu. Shingle and sand were used for seed raising, improving drainage and retaining heat loss in soils.

- Mud or paru was used for dyes,[37] medicine and insulation of housing.[38]
- Ika wai whenua. Fishing caught in fresh water included patiki,[39] inanga, kanae, native trout, upoko karoro, herring, kewai, and kakahi. All were important food resources. Eels were caught in the river, its tributaries, swamplands and lakes. Weirs or Pa tuna with structures like dams were built on the rivers.[40] Te Wero o Maru is a Pa tuna on the Mohaka[41]and Hinaki o Kotihe[42] and Hinaki o Kotene are places where eel traps were set.
- In the minds of Ngati Pahauwera the Kahawai was the most important fish. At certain times of the year there was an abundance of Kahawai at the river mouth and a wide range of other fish at sea.[43] A number of fish species are reliant on visits to the rivers as part of their breeding life cycle or diet. "In the 1950s you could see lots of eels, freshwater crayfish, Inanga, patiki, cockabully, mullet and herrings in the streams and the river in the daytime. Not so today"[44].
- The river and its tributaries were used for drinking water and bathing. Springs or puna were taonga used for separate and specific purposes that include: drinking sources, bathing places, birthing places,[45] places for washing the bodies and later the bones of the dead. There are many springs in the area.
- The river and tributaries were used for healing[46]. "My great grandfather Kere was a tohunga. He would take me with him to the Mangaturanga stream where he did healing and ceremonial rites for people.[47]"These were Tuora, takutaku, tohi and tua rites or ceremonial rituals.

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[37] Evidence of Teresa Dunne.WSCA hearings.
[38] Waipapa MLC minutes Para Turi had a house made of earth.
[39] Ray Paku. WSCA
[40] Donald McLean's Diary. 6/4/1885.
[41] NMB 40, P 137
[42] ibid.
[43] Evidence.Maurice Te Kahu. WSCA.
[44] Waaka. Ted. Interview Jan 2011

[45] My Grandmother Ketia was born at the puna Raupunga. It was a puna kohanga.
[46] Evidence Wiki Hapeta. Wai 119.
[47] Oral evidence E,K (Ted) Waaka

- Tapui were reserves or places where food gathering was prevented other than for certain circumstances or certain whanau[48] as opposed to Rahui[49] where gathering of food was prevented for a set period. Such was the case with the hunting of birds in Maungaharuru and the gathering of Kaimoana at sea. When one area was opened the other was closed. Ka pa a Tangitu Ka huakina a Maungaharuru. Ka huakina a Maungaharuru Ka pa a Tangitu. It is an ongoing practice of Ngati Pahauwera whanau to visit the places of their tipuna and where possible collect the traditional foods.[50]
- The people of Ngati Pahauwera continue to be the major resource and the well being of the iwi and cultural base the central concern.

5. Types of sites of significance to Ngati Pahauwera

Every bit of land and waterway in the Iwi rohe is of considerable significance to Ngati Pahauwera. These can be described as Nga wahi tino taonga.

These are sites Ngati Pahauwera hold in esteem or sites of significance. A site is significant for Ngati Pahauwera if the site is associated with our tipuna, an important natural feature, a spiritual relationship, an important mahinga kai area on sea or land. For some of our Kaumatua all sites of significance are also wahi tapu. The location of urupa in this document will refer to the general area rather than specific locations. The specific location of pou mauri or ana taniwha will not be disclosed in this document.

Sites of significance includes the following

Ana Taniwha/ Ana Kumi. refers to the abode of spiritual Kaitiaki that manifest themselves in physical form as a warning, reassurance or to assist with a problem.
Papakainga/kainga refers to open settlement areas that tend to be in the vicinity of a place of refuge, water, cultivation or natural food resources.
Pa refers to defensive positions that may or may not have been fortified.

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48 Tapuirau is a place on the river opposite Whareraurakau.
49 Rahuiwhatiwhati at Hauariki was the cause of a battle between different hapu of Ngati Pahauwera.
50 Evidence of Cordry Huata. WSCA hearings

Pa tuna were structures like dams were built on the rivers.[51] Te Wero o Maru is a Pa tuna on the Mohaka[52]and Hinaki o Kotihe[53] and Hinaki o Kotene are places where eel traps were set

Pa rekereke. Places where food was stored or hidden

Tapui were reserves or places where food gathering was prevented other than for certain circumstances or certain whanau or even individuals

Mahinga kai. Places where food was cultivated, collected, processed, or hunted. These areas may include Mara or gardens or specific places for fishing or setting Hinaki..

Pou. These may be marked by a carved post, a stone, a person of rank to signify authority over an area or they may be spiritual points within the rohe strategically located to protect the mauri ora of certain places.

Waahi tapu are places that are respected by Ngati Pahauwera and treated as places that should be left alone for different reasons and for differing periods of time.[54] In the broadest sense of definition a waahi tapu includes all those natural resources that sustain life and that are culturally and historically important to the tribe to which they belong.[55] This definition could equally apply to sites of significance. In the narrower sense waahi tapu means a place sacred to Maori in the traditional, religious or mythological sense.[56]

Urupa. The vast areas covered by the mobile hapu groups meant numerous tribal urupa were established near the commonly traveled routes at strategic places[57]. These may be normal graves, burials in swamps, caves, trees or unknown sites.

Taumata/Komata. These areas were high vantage points for sentries or as defensive pa. Altitude would put Taumata out of the area of influence of the dam.

Puna. These springs had designated purposes some were reserved for drinking, washing, births or the washing of bones. Some of the drinking puna had known medicinal benefits.

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[51] Donald Mclean's Diary. 6/4/1885.
[52] NMB 40, P 137
[53] ibid.
[54] Personal observation.Te Huki Accord.Raupunga.
[55] Rikiihia Tau . Planning Quarterly
[56] Historic Places Act 1993
[57] Ramon Joe. Evidence Wai 119/201

6. The Cultural Health Index (CHI)

The Cultural Health Index comprises of three linked components.

- The status of the site,
- Mahinga kai values
- The health of the waterway.

Each component is assessed separately and then combined to provide a combined Health measure based on the table below

1= Unhealthy		3=Marginal		5=Healthy

6.1 The CHI Site Status measure

The initial intent of the measure is to identify whether the site is either as a traditional or non-traditional site to Ngati Pahauwera.

Ngati Pahauwera exercised customary use over all of its waterways and all of the sites are traditional sites. Despite the limited scope of the measure from a Ngati Pahauwera perspective the measure does provide an opportunity to describe the significance of the site to Ngati Pahauwera. There is also the opportunity to expand on the customary use and relationship with other sites in the area and the people in occupation.

The second part of this measure is whether Ngati Pahauwera would return to this area. Given our regard for the whenua we will always want to return to any site.

It would be our wish to restore the Mauri ora to the area even if the site was contaminated or degraded. Just as one rotten apple can destroy a barrel of apples one stream can adversely affect the wellbeing whole river.

Ngati Pahauwera will also wish to return to these areas simply to maintain that cultural connection. The main constraint would be legislative as in the case of a Trespass Notice.

6.2 The CHI Mahinga kai values

This measure examines the current ability of the selected site to support mahinga kai species. The current capacity of the site to support mahinga kai activities can be compared to the status of other time periods in living memory or documentation from the past. The assessment of these sites implies that tangatawhenua have physical and legal access to the resources they want to gather.

The other aspect is whether tangata whenua would return to these sites in the future as their tipuna did in the past and a comment has been made on this in the site status component. There may be legislative constraints as private property or Department of Conservation no harvest areas.

6.3 The CHI Cultural waterway Health.

The Cultural Health Index provides a useful framework to which Ngati Pahauwera can add its own interpretation to assess the cultural and biological health of streams and rivers. The data can then be used to assess the nature and extent of adverse impacts of surrounding land activity. Ngati Pahauwera has added some basic water sampling tests to add to the evidence of observation.

Water Quality Evaluation and monitoring

PH

The pH of a sample of water is a measure of the concentration of hydrogen ions; the term pH was derived from the manner in which the hydrogen ion concentration is calculated. It is the negative logarithm of the hydrogen ion (H^+) concentration, what this means to those of us who are not mathematicians is that at higher pH, there are fewer free hydrogen ions, and that a change of one pH unit reflects a tenfold change in the concentrations of the hydrogen ion. When pollution results in higher algal and plant growth from increased temperature or excess nutrients, pH levels may increase, as allowed by the buffering capacity of the water way. Although these small changes in pH are not likely to have a direct impact on aquatic life, they greatly influence the availability and solubility of all chemical forms in the water and may exaggerate nutrient problems. A change in pH may increase the solubility of phosphorus, making it more available for plant growth and resulting in a greater long-term demand for dissolved oxygen.

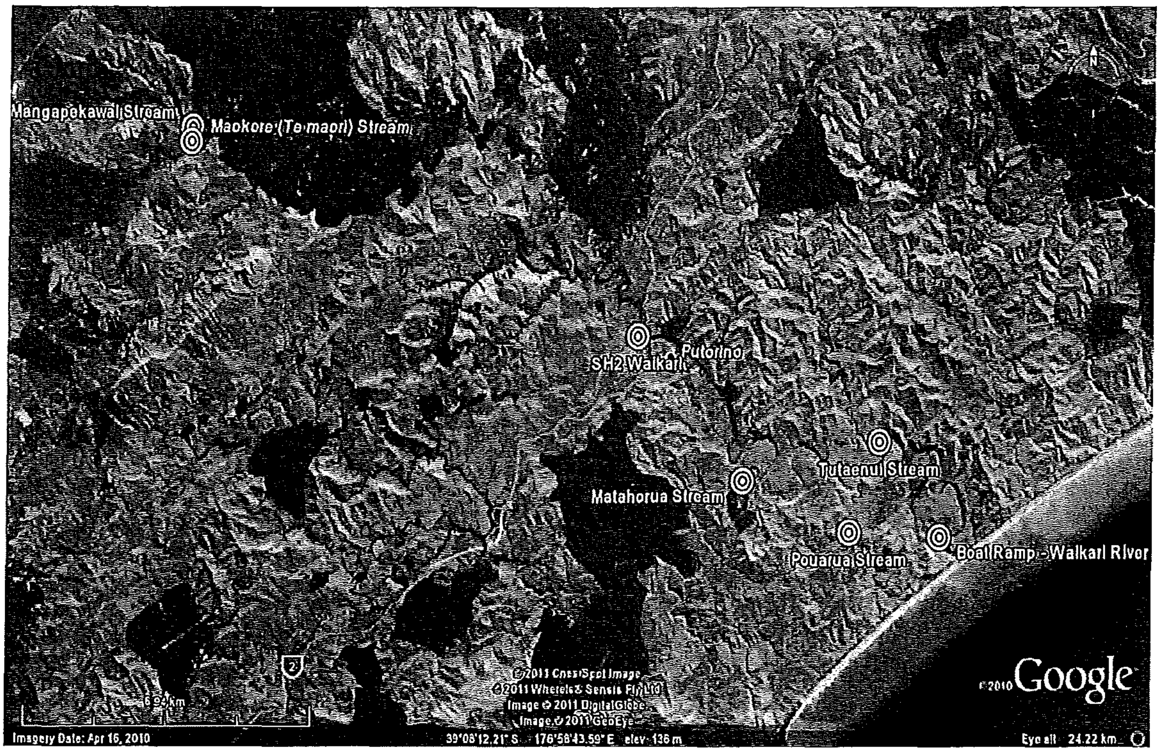
Conductivity

Conductivity is measured in µs/cm, the amount of total dissolved salts or the total amount of dissolved ions in the water. It is controlled by: geology (rock types), the rock composition determines the chemistry of the watershed soil and the water body. In Hawkes Bay limestone is predominantly consistent throughout and has a higher conductivity because of the dissolution of carbonate minerals in the basin. Inputs derived from fertilizer and animal inputs of ammonium nitrates, nitrate-nitrogen, phosphorous, phosphates influence readings. Where the stream and catchment area is very close to the ocean there will be salt accumulation. There is effect from evaporation during low flow which concentrates the solids which remain in solution, increasing conductivity. Atmospheric inputs of ions are typically relatively minor except in ocean coastal zones where ocean water increases the salt load (salinity) of dry aerosols and wet (precipitation) deposition. This oceanic effect can extend inland about 50-100 kilometers.

Turbidity

The greater the amount of total suspended solids in the water, the murkier it appears and the higher the measured turbidity. Particulates may be clays and silts from surface runoff and banks and margins. Introduced pests into the water ways can influence results when the increase in number like bottom-feeding fish (such as carp) stir up bottom sediments and increase the cloudiness of the water. Fine particulate material also can clog or damage sensitive gill structures of fish and decrease their resistance to disease, prevent proper egg and larval development, and potentially interfere with particle feeding activities. Inorganic and detrital particles from the watershed vary largely in response to hydrological events such as storms and snowmelt.

7. Waikari River Survey Sites



The name Waikari

The Waikari River got this name in the time of Ruawharo who was travelling along the coast with his dog. The Waikari River outlet is often blocked by a sandbar. When the dog got to Waikari it started to dig in the sand by the outlet and fresh water oozed up.

Hence the name digging for water Wai kari.

A section of the Waikari River towards the coast from Putorino

The Waikari River is a taonga to Ngati Pahauwera and a valuable source of food for local hapu. There is a whakatauaki of one of our ancestors Tukapuarangi that refers to the abundance of food at the Waikari river mouth.

Ka hoki mai ki Waikari	I return to Waikari
Ki te riu te tai	To the bountiful tide
Patoto i te ahi ahi	that resounds in the afternoon
Patoto i te ata	That resounds in the morning

This whakatauaki was not made on mana, it referred to the food obtainable there[58]

[58]Rewi Poukupenga. WMB Waipapa 13. 5. 06, P. 130

7.1 Waikari River, Te Kuta Boat Ramp

GPS 39° 9'59.19"S 177° 4'50.80"E

A-1 / Mahinga Kai score 3/ Stream Health 24/85 – Average = 1.4

Status of site; Traditional Association; High

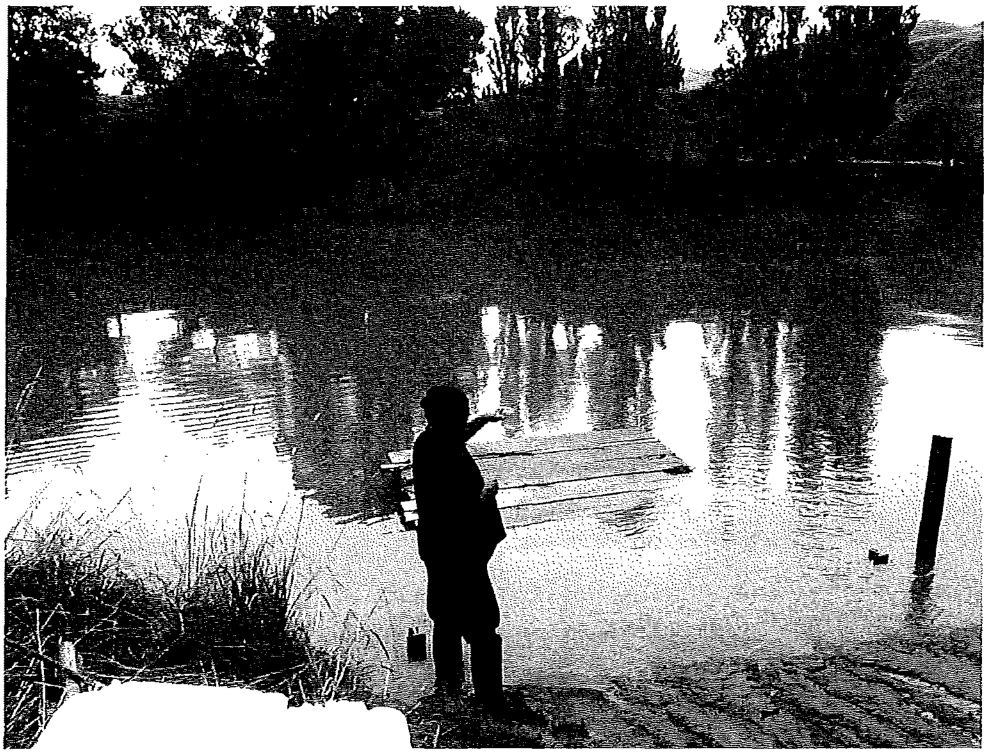
Te Kuta is named after native sedge of which there are few remnants along the river banks. The Te Kuta block of 1409 acres was the site of the last large settlements to be occupied by Ngati Pahauwera whanau on the southern Bank of the Waikari.

There were a number of traditional cultivations in the area including Otitena, Te Kaire, Wharehaua and Te Iringa o Tuawaikura. [59]

Ancient urupa include Taupahi, Kaiwaka and Kapuarangi.

Fisheries included Tuna, Patiki, Kanae, Native Trout, Upokokaroro, herring, Kewai, and Kakahi.

[59] Te Kuta manuscripts



Rangi Spooner, as a young child frequented this area with his father as it yielded good catches of Whitebait, flounder, [60]herrings and mullet.

The surrounding land today is farmland that is grazed by sheep and cows. The test site is within a small Department of Conservation camping ground near the river that also has two toilet sites. There is an urupa nearby.

The rivers riparian margins extremely modified and the water way is surrounded by farmland.

The stream is situated with no margins or adjacent land cover, the water is dirty from enriched inputs into it from intensive farming.

Fish species expected to live here would be eel, flounder, and smelt, Inanga, trout, herring, and mullet. Fish: None present observed.

Tree/Plant species present are: Blackberry, Plum Tree, Willow, Walnut and Poplars.

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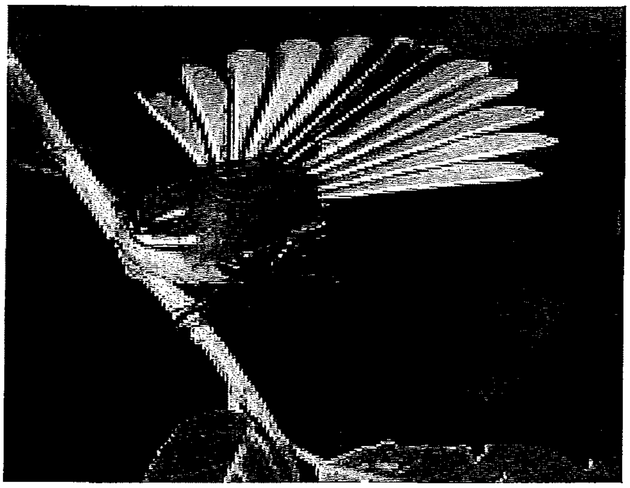
[60] Spooner R, Feb 2011 Interview.

Birds observed: Fantail.



Water way summary; the catchment area is farm tributaries and is highly modified land cover, overall health very critical, large quantities of sediment and silt being transported in good water flow..

Water quality; habitat fish/aquatic inverts; the water is largely influenced by the adjacent land being totally converted to farming, the state of the water way is critical with loss of habitat,

Desired action – Restoration of wetland margins, by fencing off and replanting of marsh plants and trees, including Ngaio, Karaka, Taupata, and Harakeke.

Water Quality

Turbidity (NTU) = na **Conductivity µs/cm =172.5** **pH = 6.94**

7.2 <u>Waikari Tributary Tutaenui Stream</u>

GPS 39° 8'55.73"S 177° 3'48.80"E

A-1 / Mahinga Kai score 2 / Stream Health 35/85 – Average = 2

Status of site; Traditional association; High

The Tutaenui stream has a catchment on the northern side of the Waikari that extends as far as Tawanui and Glenfarg Farms the site of a number of pa including a pa named after Toi. An ancient bush track began at the confluence of the stream with the Waikari and followed the ridge between the Tutaenui and the Waitaha Streams inland to the upper Mohaka and Raupunga. The stream would have been an important water source for kainga and travelers and water life associated with other local streams would have been used for Mahinga kai.

The catchment flows through sheep and cow paddocks. The area continues to be stripped of its natural vegetation despite evidence of slips on the land.

This photo shows recent vegetation removal on vulnerable slopes above the stream.

Mahinga kai values evident. None

Plant species present are: None. Fish: None present. Birds observed: Tui, magpie.

Waterway summary. The land is highly modified with no land cover except grass. The overall health is in a critical state.

Water quality; the water is dirty from enriched inputs into it from intensive farming and siltation.

Habitat for fish/aquatic inverts; Pollution is evident in the high water flow.

Desired action - Encourage riparian planting and fencing, plant steep faces with suitable vegetation

Water Quality

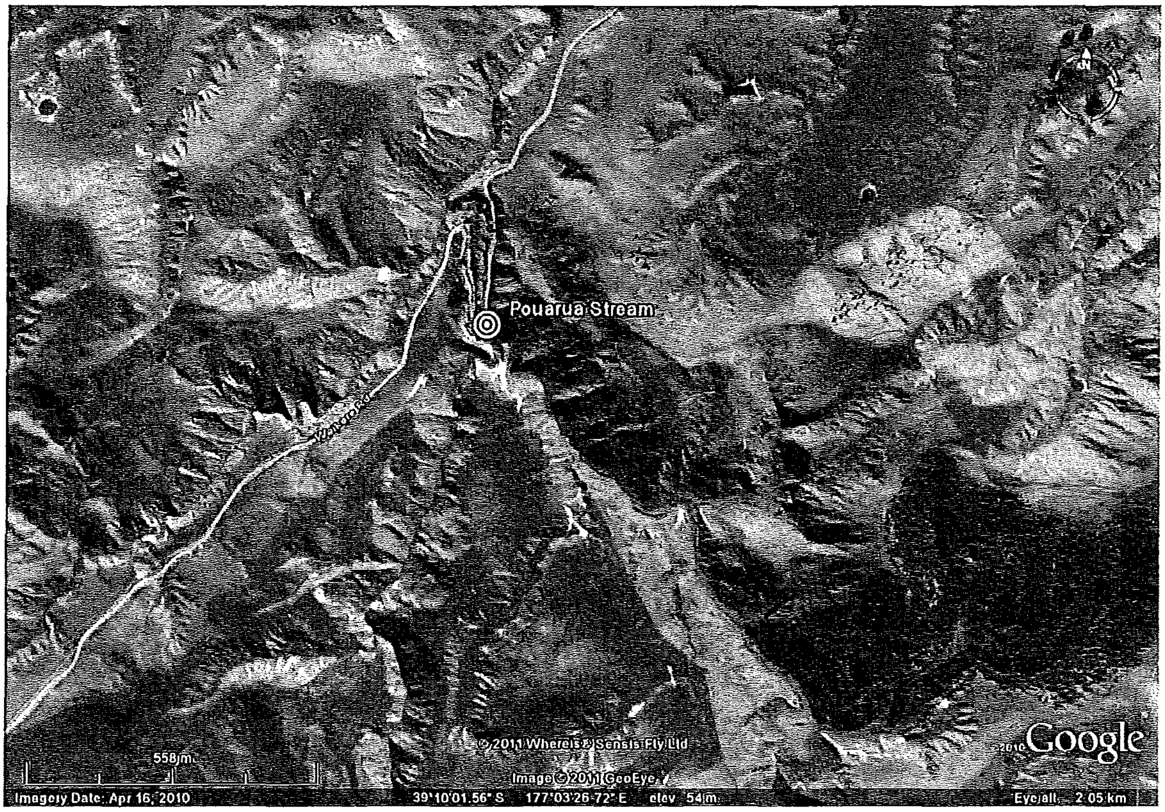
Turbidity (NTU) = na **Conductivity µs/cm =236** **pH = 6.88**

7.3 <u>Waikari Tributary   Pouarua Stream (Bridge 123)</u>

GPS 39° 9'21.75"S 177° 1'29.42"E

A-1 / Mahinga Kai score 3 / Stream Health na/85 – Average = na

Status of site; Traditional Association; High



This stream is close to a number of pa and kainga. Te Rehu a son of Te Huki by his wife Ropuhina, occupied a pa nearby. His wives Haruru and Katea had Tahu affiliations.

The river riparian margins have a few plants and trees and are extremely modified and the water way is surrounded by farmland.

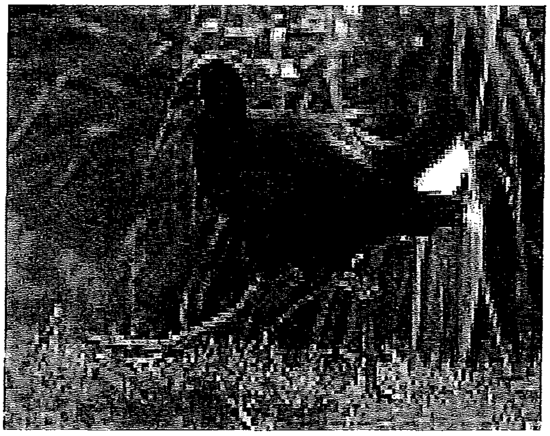
Mahinga kai values plant/fish/bird and Health of water;

The stream is situated with minimal margins and adjacent land cover, the water is dirty from enriched inputs into it from intensive farming, with distant forestry. Fish species expected to live here would be eel, flounder, smelt, inanga, and trout.

Tree/Plant species present are: Blackberry, Willow, Poplars. The land on farmland is characterised by a lack of vegetation apart from grass.

Fish: None present. Reka Joe stated he caught lots of eels in the area in his younger days. 1960s.[61]

Birds observed: Pukeko, Pheasant, and Magpie.



Water way summary; the catchment area is farm tributaries and is highly modified land cover, overall health very critical, large quantities of sediment and silt being transported. Good flow.

Water quality; habitat fish/aquatic inverts; pollution evident and restoration measures needed.

Desired action – fence off stream from stock.

Water Quality

Turbidity (NTU) = na **Conductivity µs/cm =306** **pH = 7.03**

[61] Joe Reka. Jan 2011 Interveiw

7.4 Waikari Tributary Matahorua Stream

GPS 39° 9'21.81"S 177° 1'29.79"E

A-1 / Mahinga Kai score 3 / Stream Health na/85 – Average = na

Status of site; Traditional Association ; High

There are a number of known pa sites and kainga along the verges of the Matahorua. The Ngati Moe hapu who are the descendants of Toenga who occupied pa in the upper Matahorua Gorge. This stream was known in former times for its eels and freshwater Crayfish or kewai. [62] Cultural significance is high because it would have been a regular stream utilised for harvesting.

[62]Interview Hape Huata 2011.

The Matahorua Stream traverses a considerable distance through land that includes grazing, forestry and native bush. The river riparian margins near the sample site are extremely modified and the water way is surrounded by farmland.

The sample site on one side of the stream has fenced margins but the land cover on the opposite bank is badly planned with pines planted on the steep banks slipping into the river. The water is dirty from enriched inputs into it from intensive farming and trucks clearing slips dumping the material over the bank.

Fish species expected to live in the stream would be eel, smelt, inanga and trout and freshwater crayfish.

Tree/Plant species present are: Blackberry, Willow, Poplars.

Fish: None observed.

Water way summary; the catchment area is farm tributaries and is highly modified land cover, overall health very critical, large quantities of sediment and silt being transported in high water flow..

Birds observed: Magpies.

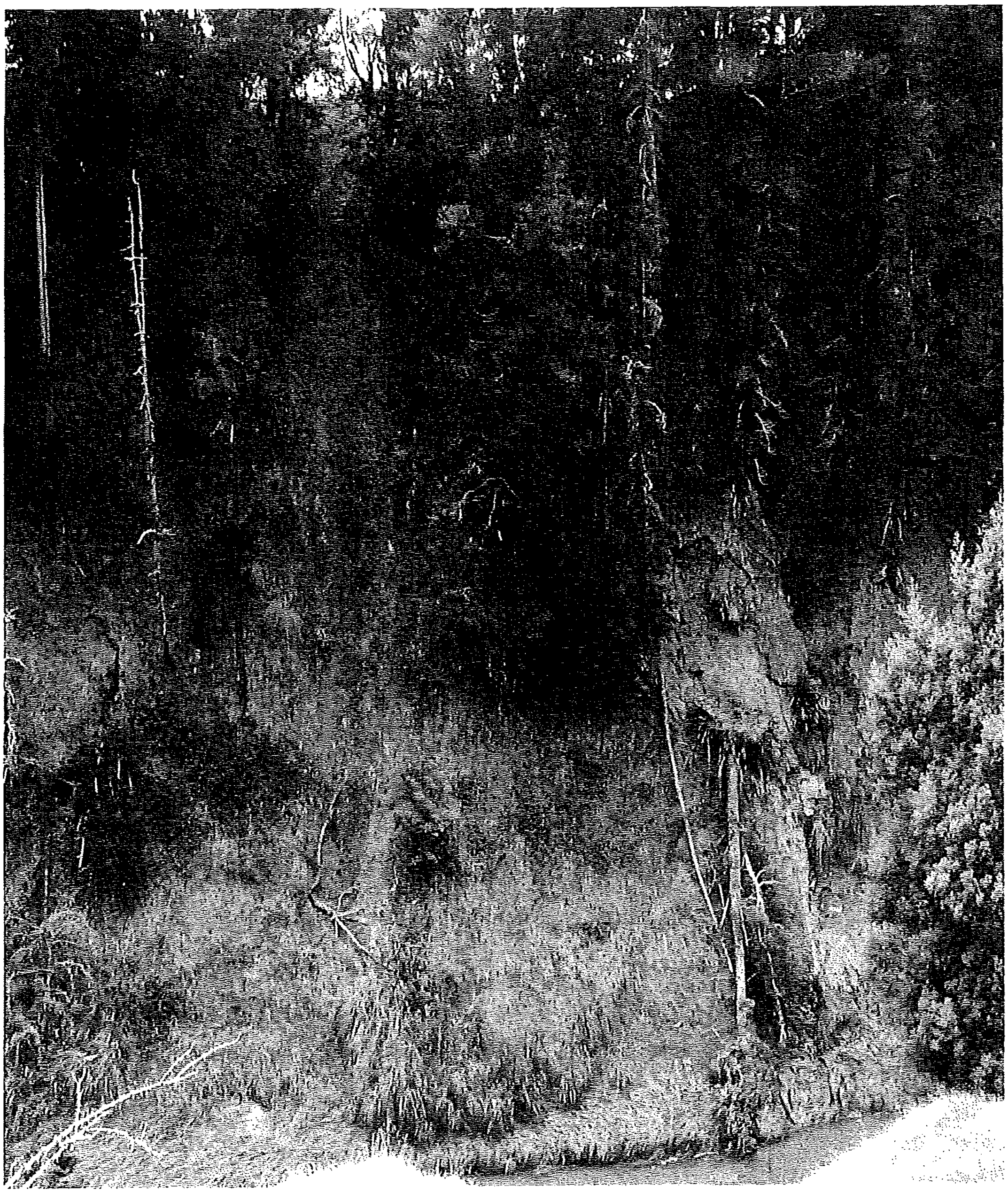
Water quality; habitat fish/aquatic inverts; the water is largely influenced by the adjacent land being converted to farming, the state of the water way is critical, loss of habitat, restoration measures needed.

Desired action – Remove inappropriate vegetation and replant with suitable native plants to restore riparian margins and fence off from stock.

Water Quality

Turbidity (NTU) = na **Conductivity µs/cm =230** **pH = 7**

Photo showing trees on a steep slope slipping into the stream as well as slip material that has been dumped over the bank by contractors clearing road slips.

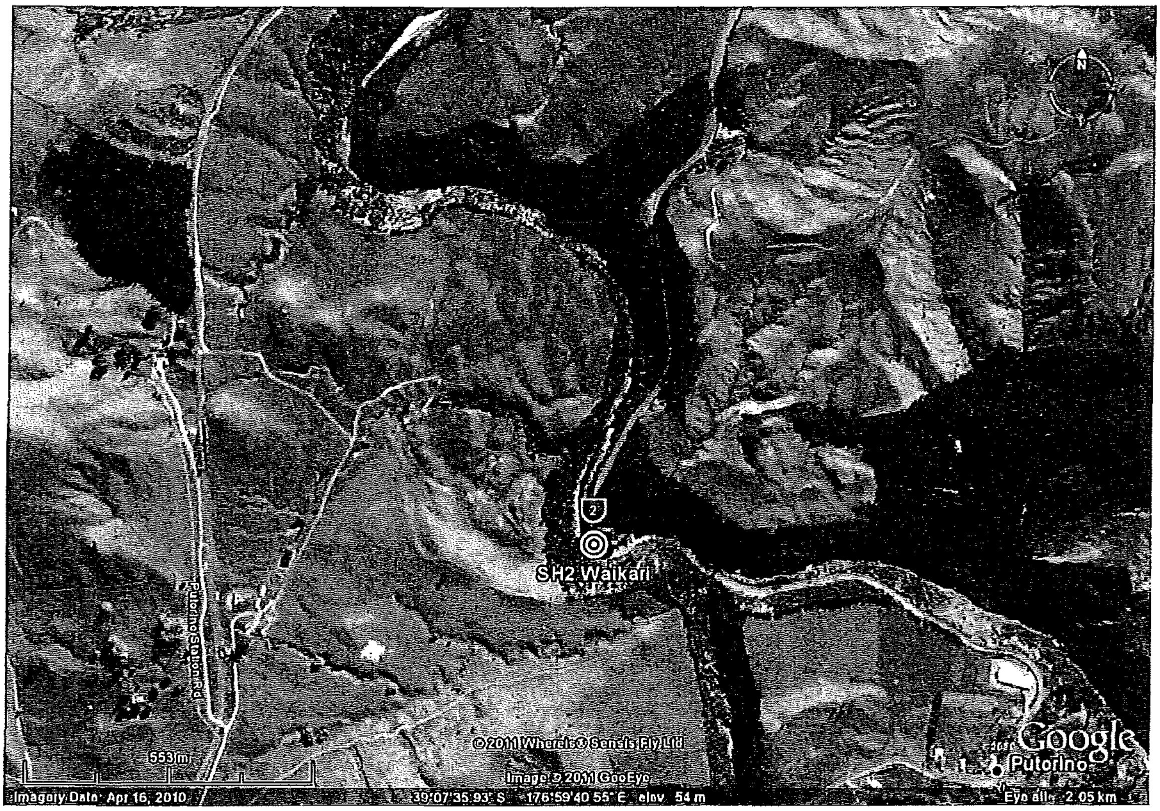


7.5 <u>Pohatunui Stream Waikari River SH2</u>

GPS 39° 7'45.01"S 176°59'41.85"E

A-1 / Mahinga Kai score 3 / Stream Health 47/85 – Average = 2.8

Status of site; Traditional Association; High



This stream is bordered by a number of ancient kainga, cultivations and pa including the Putorino Settlement above the south bank. Putorino is the name of a Maori Trumpet used to sound alerts as well as used for music. On the opposite bank of the Waikari river on a high hill was the large pa Pukepiripiri. The Pohaturua stream flows into the Waikari River just downstream of the State highway bridge. This stream flows through the area known as Totara Flats and traverses through dairy country in its lower reaches.

The sample site of the stream is below a small waterfall where the riparian margins are un-modified and the gully is densely covered in native vegetation. The waterfall has a household rubbish dump nearby. Regenerating scrub and angiosperm land cover adjacent farmland.

Mahinga kai values plant/fish/bird and Health of water; "In the 1960s we caught eels and collected watrcress in this stream and that part of the Waikare River"[63].

The Waikari River verges are well protected in this area with a riparian strip of native vegetation.

Fish expected to live here would be eel, kokupu, koura, inanga, and trout.

Tree/Plant species present are: Kanuka, Fern, Rewarewa, Harakeke, Kumarahou, and Tutu.

Fish: None observed.

Birds observed: Fantail, Kahu, and Pipiwharauroa.

Water way summary; the catchment area begins within a scrub covered gully. The stream then travels throughout intensive farming/forestry land activity. The stream has good flow and has densely vegetated margins.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way is shaded by native/exotic vegetation, the river bed is covered in silt due to flooding and tree/shrub debris. The water way would normally be a great refuge for fresh water ecology to support life and biodiversity.

Desired action – the immediate area is in good health and has native margins, the catchment areas is through intensive farming including dairy farming which should have fenced margins to support the overall health.

Water Quality

Turbidity (NTU) = na **Conductivity ps/cm =181.7** **pH = 7.18**

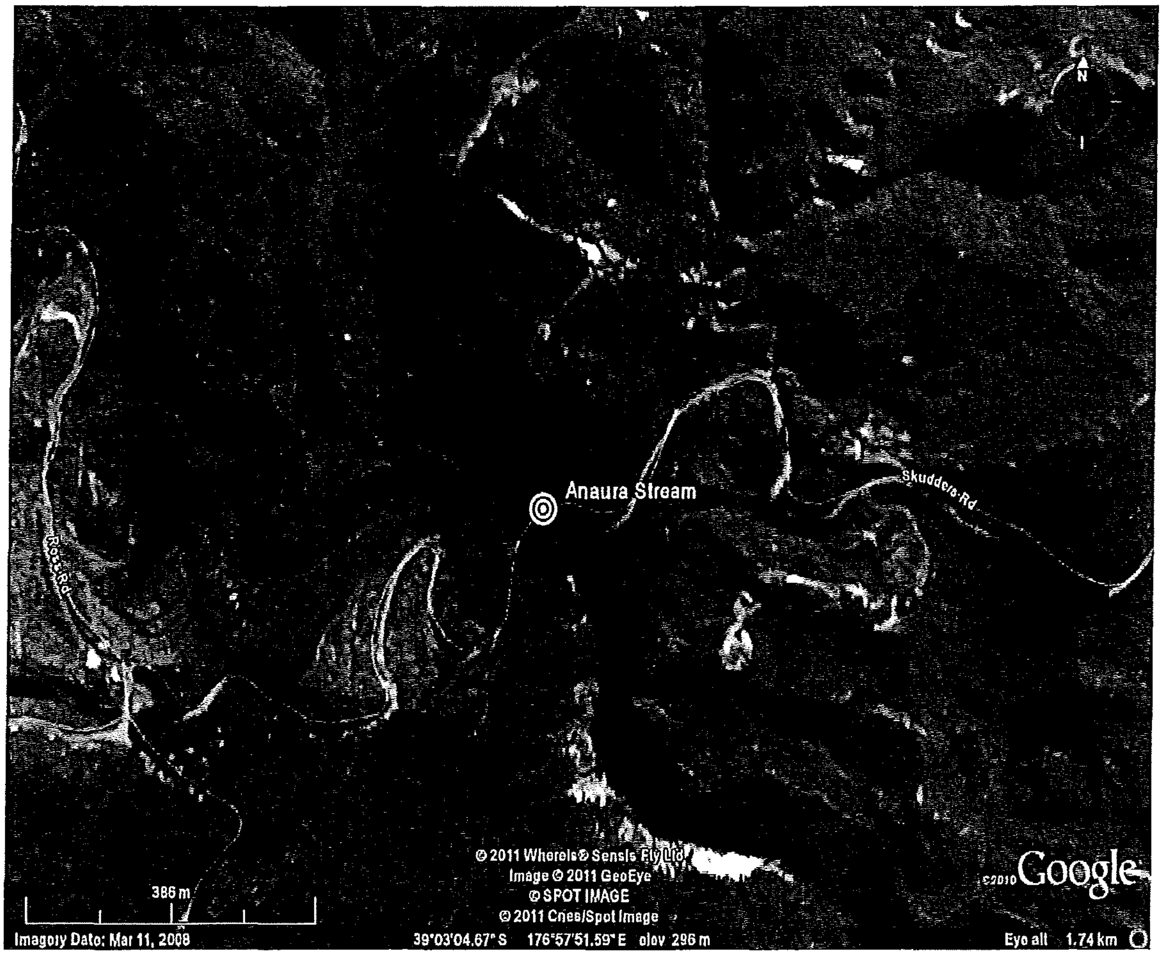
[63] Huata, H. 2011 Interview.

7.6 Waikari Tributary Anaura Stream 'Scudders Rd'

GPS 39° 3'5.93"S 176°57'49.10"E

A-1 / Mahinga Kai score 4 / Stream Health 77/85 – Average =4.5

Status of site; Traditional Association; High



Map showing sample site on the Anaura. The rivers riparian margins are un-modified and the gully the river is situated in densely covered native, regenerating scrub and angiosperm. The land above the riparian strip is in forestry (Mohaka Forest).

The Cultural significance of the sample site is high being in proximity to a number of pa and kainga. Te Kainga Tunua is close by. This kainga was occupied by members of Ngati Kautata and other hapu with Tahu connections[64]. The stream would have high customary use.

The stream would have supported eel's fresh water crayfish and native fish.

The sample site is within the Mohaka Forest and there are limits on access but it is a site that would be revisited for Mahinga kai. Mahinga kai values plant/fish/bird and Health of water;

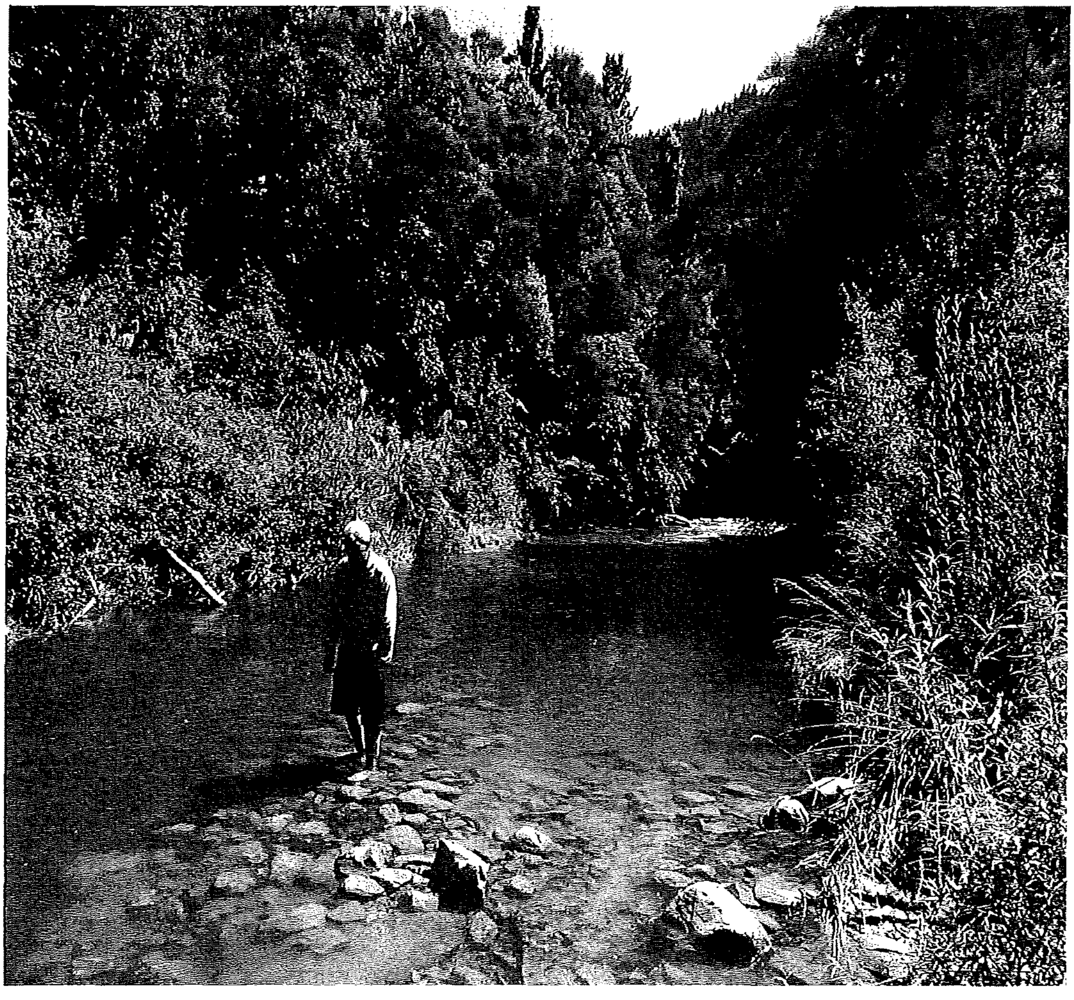


Photo. The Anaura stream sample site a week after the Jan 2011 flood

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[64]Bill Broughton interview.Wai 119.

The stream is situated within a small gorge system with vegetated margins, minimal slipping.

The Anaura Stream is easily accessible but should be approached with caution due to high traffic due forestry operations. .

Tree/Plant species present are: Horoeka (Pseudo crassifolium), Cop crassifolia, Cop grandifolia (Karamu), Puka (Grislinia littoralis) Fern, Harakeke, Kowhai, Ferns, Blackberry, Pine, Willow and Tutu.

Fish: None present.

Birds observed: Fantail.

Water way summary; the catchment area is within a scrub covered gully then throughout intensive forestry tributaries. The stream has good flow and has densely vegetated margins.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way is shaded from native/exotic vegetation, supporting cicadas, dragon flies, nymphs, back swimmers and spiders. The river bed was very clear despite large volumes of rain.

Desired action – the catchment area is forestry and should have adequate siltation minimizing processes in place to avoid fresh water habitat destruction.

Water Quality

Turbidity (NTU) = 9.82 **Conductivity µs/cm =140** **pH = 7.16**

7.7 Waikari Tributary Maokore (Te Maori) Stream

Status of site; Traditional Association; High

GPS 39° 5'36.00"S 176°52'11.16"E

A-1 / Mahinga Kai score 3 / Stream Health na/85 – Average = na

This Stream, also called Maori Stream, extends inland and passes in proximity to Rangiora and a number of sites including the pa Waraharamea and Matuania. They were occupied by members of Ngati Purua, Ngai Tuhemata and Mawete.

The Cultural significance is high because it would have been the local a regular river utilised for harvesting, and the hapu/marae are close, the mauri is strong and the site would be re-visited to harvest kai.

Mahinga kai values. Minimal

The stream is situated within a small gorge system with vegetated margins, minimal slipping. The riparian margins are un-modified and the gully is densely covered native, regenerating scrub and angiosperm land cover adjacent land forestry/farmland. The Te Maori stream is an easily accessible from the road to shine falls. The species of fish expected to live here would be eel, kokupu, Koura, Inanga, and Trout.

Tree/Plant species present are: Horoeka (Pseudo crassifolium) Fern, Harakeke, Kowhai, Rangiora, Matipo, Ongonga, Ferns, Blackberry, Kiaaro, Whau (red clover), Pine, Willows, Cutty grass, Koromiko and Tutu.

Fish: None observed.

Birds observed: Fantail.

The stream has good flow and has densely vegetated margins.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way is shaded from native/exotic vegetation, the river bed was very clear despite large volumes of rain, potentially large spring feed. The water way would be a great refuge for fresh water ecology to support life and biodiversity.

Desired action – the stream inputs be fenced from stock as it crosses farmland.

Water Quality

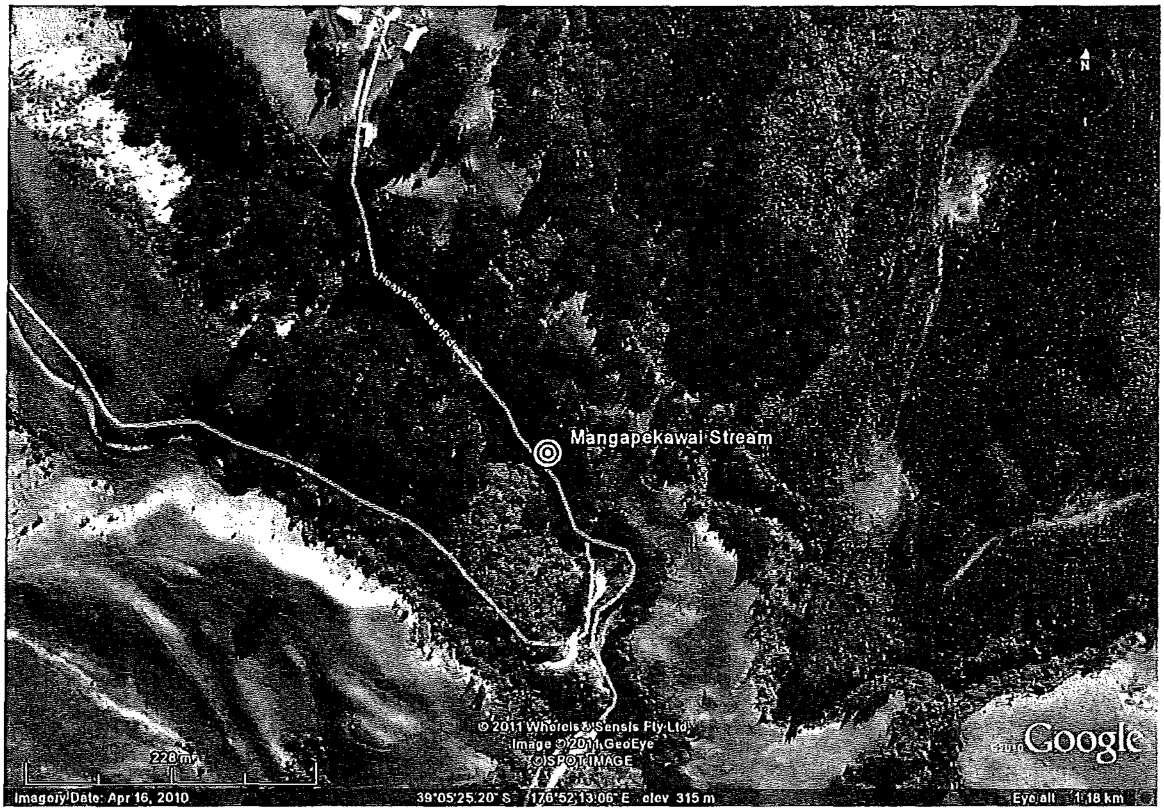
Turbidity (NTU) = na **Conductivity µs/cm =179.6** **pH = 6.96**

7.8 Mangapekawai Stream

GPS 39° 5'26.53"S 176°52'11.65"E

A-1 / Mahinga Kai score 3 / Stream Health 47/85 – Average = 2.8

Status of site; Traditional Association; High



This is a northern tributary of that joins boundary stream before entering the Waikari. There are number of significant sites on boundary stream including Te Kumu and an impressive waterfall. Boundary Stream runs through DOC lands before entering sheep and cattle grazing environment. The Korongomaraeroa stream enters the Waikari on the opposite bank of the Waikare just south of the siter of Tau I Te koko pa. The ancient trail led from here inland to Te Heru o Tureia and on to Te Rotokakarangu a settlement opposite Willowflat. Near the source of the Waikari is the settlement Te Rangi. These lands were occupied by the descendants of Popoia.

The rivers riparian margins are un-modified and the gully the river is situated in is a densely covered native, regenerating scrub and angiosperm land cover adjacent land forestry/farmland. Cultural significance is high because it would have been a regular river utilised for harvesting, and the hapu/marae are close, the mauri is strong and the site would be re-visited to harvest kai.

Mahinga kai values plant/fish/bird and Health of water;

The stream is situated within a small gorge system with steep heavily vegetated sides, minimal slipping. The Waikari River is a well protected site, due to the accessibility fish expected to live here would be Eel, Kokupu, Koura, Inanga, and Trout.

Tree/Plant species present are: Fern, Harakeke, Kowhai, Rangiora, Matipo, Ongonga, Ferns, and Tutu.

Fish: None present.

Birds observed: Fantail, Tui.

Water way summary; the catchment area is within a scrub covered gully then throughout intensive farming/forestry tributaries. The stream has good flow and has densely vegetated margins.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way is shaded from native/exotic vegetation, the river bed was very clear despite large volumes of rain, potentially large spring feed. The water way would be a great refuge for fresh water ecology to support life and biodiversity.

Desired action – there is a road dumping area of soil and mud at the junction of the Magapekawai and Boundary stream which slips into the streams when it rains. There has been some concrete work done with wet cement entering the waterway. These activities need to be regulated and minimized by the Council as the overflow is adversely impacting on water quality and aquatic species.

Water Quality

Turbidity (NTU) = na **Conductivity µs/cm =236** **pH = 6.88**

Summary of Waikari water quality results

Waikari	Conductivity	pH
Waikari Boat ramp	172	6.94
Tutaenui Stream	236	7
Pouarua (Bridge 123)	306	7.03
Matahorua Stream	230	7
Te Maori Stream	179	6.96
Anaura Stream	140	7.16
Mangapekawai Stream	236	6.88
Average	**214**	**7.00**

Water quality data showing the average score for the river during high flow monitoring.

Turbidity observation through the monitoring programme showed incredible density of transported particle. The conductivity results have indicated the stream health of the tributaries and the reduced natural ability to filter ions through riparian margins and overall land cover. The runoff and volume of water flow during the rain event also dilutes the results.

Sampling 3 weeks after high flow

Matahorua Stream	6.58	350.00	7.84
Pohatunui stream	23.5	419.00	7.64
Mangapekawai Stream	3.88	295.00	7.90
Te Maori Stream	7.17	269.00	7.98
Average	10.28	333.25	7.84
		Median	7.87
		Range	6.88- 7.98

Conductivity

Conductivity in the Waikari River sites had averaged an increase of 116µs/cm throughout each site and the range increased (140-306µs/cm) from (140-306 µs/cm) and monitoring three weeks after range (269-419µs/cm). Conductivity estimates the concentration of dissolved salts and reflects the geological makeup of the catchment area and how quickly it changes reflects the catchment size; thus being the larger catchment and more surface area to run off the faster the concentration will increase. Hawke's Bay has a typical limestone / Papa base and higher levels of conductivity are to be expected when compared nationally due to the dissolution of carbonate minerals.

pH

Waikari River had decreased availability of hydrogen ions with the lower flow rate, the range during high flow (6.88-7.16) and median of 7pH, became more basic post high water results range (6.88-7.98) with median of 7.87pH. The results indicate that the natural variation influences the water during peak photosynthetic activity which uses up dissolved carbon dioxide during the day time of extended light at mid to early afternoon. The overall health in the headwater catchment area of the Waikari indicates how the natural margins have purifying qualities far better than other sample locations.

Turbidity

The Waikari River sampled three weeks after high flow and the results were very good. An average of 10.28 and a range (3.88-23.5) the headwater tributaries are very clear because of densely vegetated native margins and enclosed biological environment. Due to the overhanging native margins this physical attribute will restrict large amounts of direct sunlight limiting phytoplankton activity.

<u>Waikari River Cultural health Index Summary</u>

Key Indicators

1= Unhealthy		3=Marginal		5=Healthy

Traditional association of the site = high.

Mahinga Kai values compromised. 3.

Land use = 1 Lands very modified. Wetlands and Marshes lost.

Vegetation = 2 Scarce vegetation – Almost non-existent.

Use of the River banks & margins = 1 Margins Heavily Modified

Riverbed Condition (Sediment) = 2.5 Patches of slime or weed, some muddy areas, some sand and sediment.

Changes to the River Channel = 5 Channel appears Unchanged

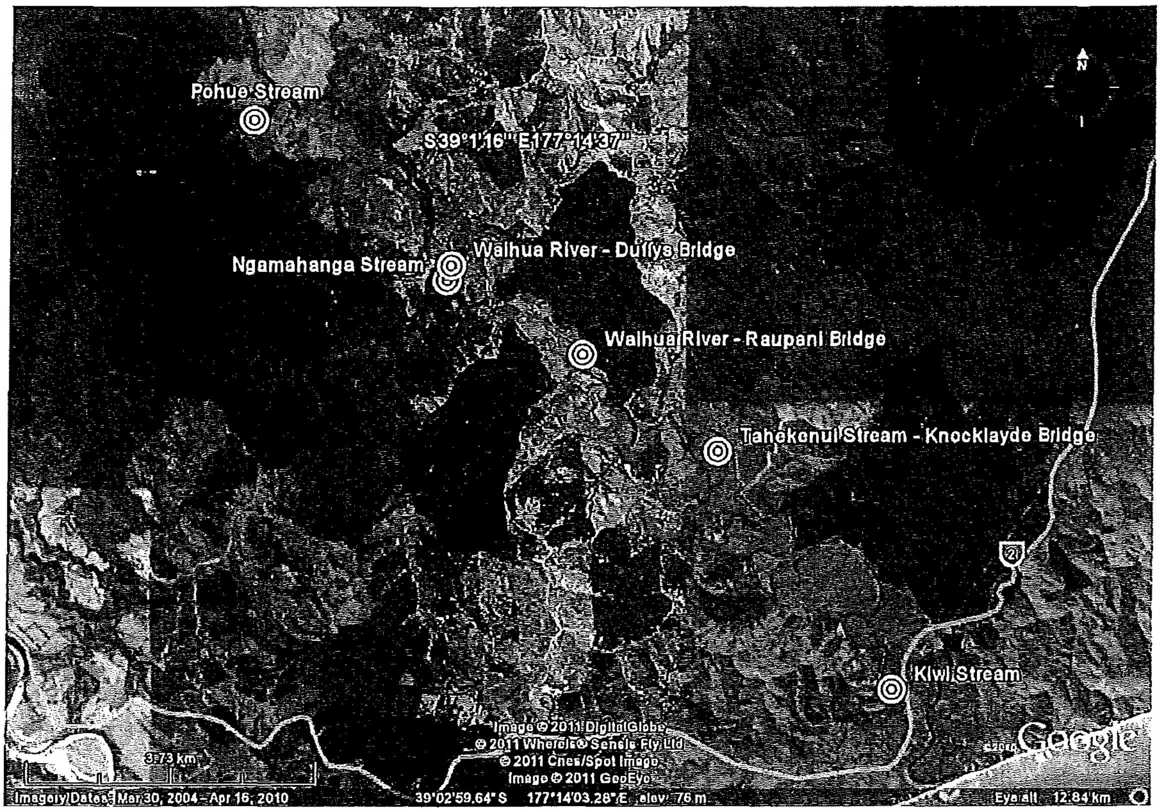
Water Quality = 2 Pollution quite evident

Water Clarity = 2 Discoloration quite evident

Impact on Habitat = 2. The river health is detrimental to the aquatic environment. The lower river catchment shows an absence of habitat, as opposed to the higher catchment.

Are you satisfied that the present condition of the river protects Cultural values at this site? = No

8. Waihua River Sites Surveyed



8.1 <u>Waihua Tributary Kiwi Stream</u>

GPS 39° 4'55.65"S 177°16'50.83"E

Status of site; Traditional Association; High

A-1, Mahinga kai score 1 / Stream health 42.5/85 Average score = 2.5

The Kiwi stream origins are past Te Kumi near Paroa and meanders through the valley towards Waihua entering the river upstream of the Waihua Bridge. The hills in between the Kiwi Stream and the coast were called Nga Ngaru o Te Huki. In former times a number of pa existed on both sides of the Kiwi Stream headwaters right down to its confluence just upstream from the Mouth of the Waihua. Two pa on the coast were occupied by Mamagu and Te Huki. Te Pa Otutarewa was near the Mouth of Waihua, on north side of it and occupied for a period by Tuhemata.

The stream had on the northern side very modified riparian margins exotic trees and on adjacent land there were areas of native trees/scrub. Recently drums, and rubbish dumped in the stream were reported to the HBRC but there has been no response to indicate if action had been taken.[65]

Mahinga kai values plant/fish and Health of water;

The area land use was farmland with nearby dwelling with long drop. There was cover of native bush to the surrounding visible landscape with patches of kanuka over a pasture valley. The collective condition of the site was poor water quality with heightened siltation and riparian margin grazed, fish expected to live here would be eel, mullet. The adjacent land did have cabbage trees: Punga, blackberry, manuka, matapo.

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[65] Fred McRoberts. Waihua Kaumatua.

Water way summary; this body's catchment area is low lying and meanders parallel to the SH2 and the catchment is very small. Good water flow.

Water quality; habitat fish/aquatic inverts; the water was silted and discoloured with minimal to no habitat available to support fresh water fish and invertebrates, only mud compatible inverts.

Desired action – the riparian margin be replanted and fenced from stock.

Water Quality

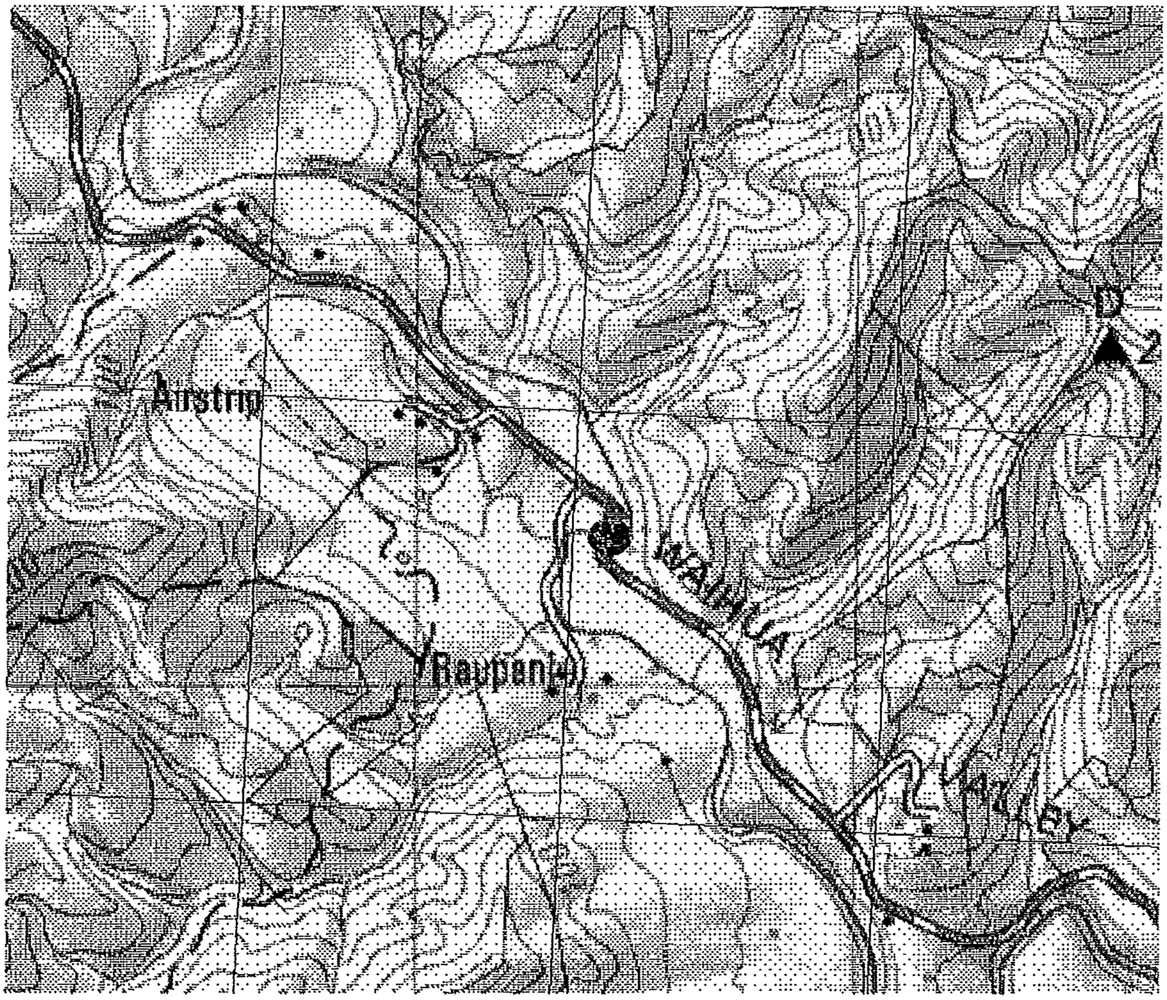
Turbidity (NTU) = 39.4 **Conductivity ps/cm = 449** **pH = 7.87**

8.2 Waihua River - Raupuni Bridge

GPS 39° 2'38.29"S 177°14'2.85"E

A-1 / Mahinga Kai score 3 / Stream Health 56/85 – Average = 3.82

Status of site; Traditional Association; High



This stream enters the Waihua stream from the north. Mamangu later in life shifted to the north side of the Waihua River to Tahikiwa where he built a pa called Ureiro where his children were reared. Paroa, one of the sons of Mamangu sons lived at Ureiro but when his children were grown up he left to look for a kainga taking his children and grandchildren with him. They went to Te Putere but met with trouble and returned to Waipapa.

The stream has riparian margins on the farm without fencing; the water way has significantly degraded from upstream. Cultural significance is high because it would have been a pristine tributary to the river before the land development, the site would be re-visited to harvest kai.

Mahinga kai values plant/fish/bird and Health of water;

It is within farmland, fish expected to live here would be eel, Koura, Inanga, Trout and fresh water cress be present during the winter. Birds observed: Tui. The stream is situated within the farmland and adjacent Pine forest, minimal riparian margins ±10m. The vegetated sides had slipped badly in the high water and trees had deposited within the water way. The species present are: large Willow, Kanuka, Tutu, Blackberry, Pampas, Cabbage Tree.

Water way summary; the catchment area is within a large Gully system with good riparian margins of dense vegetation, intensive farming throughout tributaries. The stream has good flow and has minimal protected margins.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way was shaded very efficiently from native/exotic vegetation and steep banks. The water way would be a great refuge for fresh water ecology to support life and biomass once the flow had minimised siltation.

Desired action – riparian margin fenced and replanted.

Water Quality

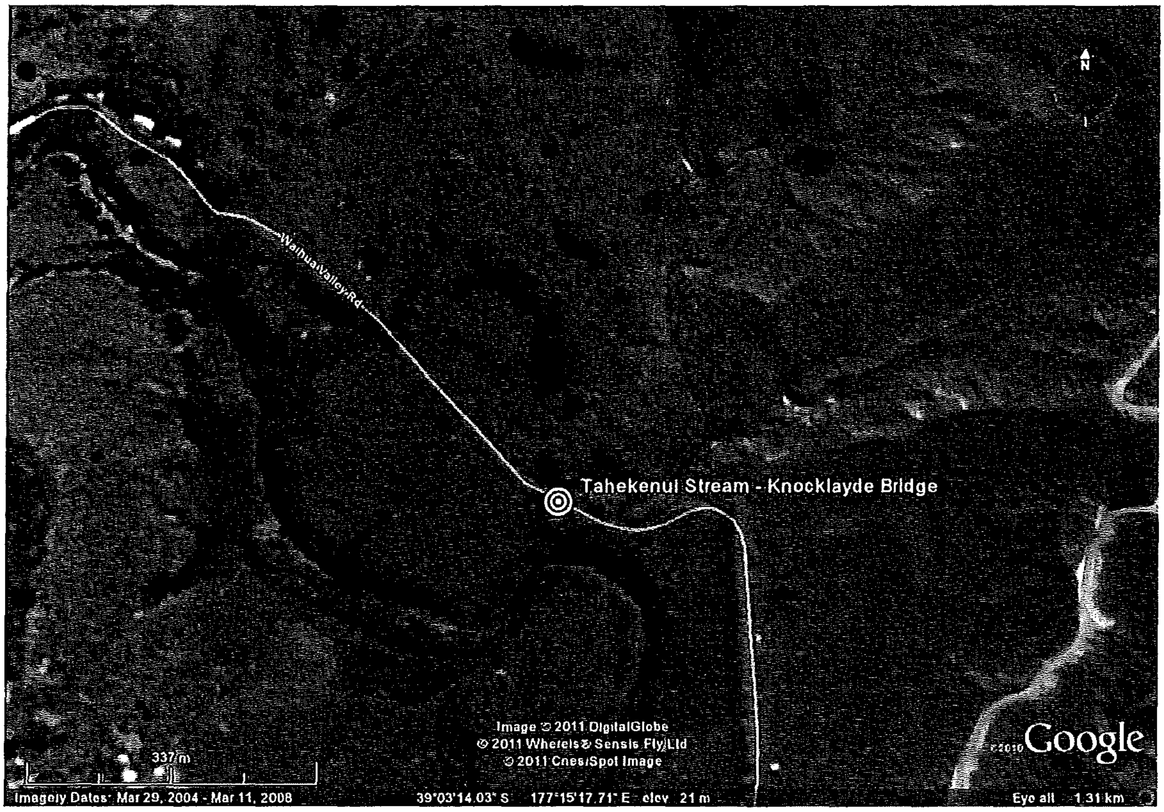
Turbidity (NTU) = 29.7 **Conductivity µs/cm =260** **pH = 7.61**

8.3 Tahekenui Stream - Knocklayde Bridge Waihua

GPS 39° 3'17.95"S 177°15'16.33"E

Mahinga Kai score 3 / Stream Health 63/85 – Average = 3.7

Status of site; Status of site; Traditional Association; High



Cultural significance is high because it would have been a pristine tributary to the river before the land development, the site would be re-visited to harvest kai. Buck Tumataroa stated that the river supported a healthy stock of eels and fresh water Crayfish in the 1930s[66] Gaye Hawkins expressed her concerns at the decline in the fisheries of the Waihua and a need for better land management practices in the valley.[67]

Mahinga kai values plant/fish/bird and Health of water

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[66] Tumataroa B. Interview Wai 199.

[67] Hawkins G. Waihua Marae Waanaga 2009.

The stream has riparian margins on the farm without fencing the water way has significantly degraded from upstream. The vegetated sides had slipped badly in the high water and trees had deposited within the water way. The species present are: large willow, Kanuka, Pampas, Silver poplar. Birds observed: none. Fish observed. none. The stream is situated within the farmland and yards, minimal riparian margins ±20m but dense cover

Water way summary; the catchment area is within a large Gully system with good riparian margins of dense vegetation, intensive farming throughout tributaries. The stream has good flow and has minimal protected margins.

Water quality; habitat fish/aquatic inverts; the water was swift in flow. The water way has potential to support life and biomass once flow decreased to minimize siltation and allow new timber to be inhabited.

Water Quality

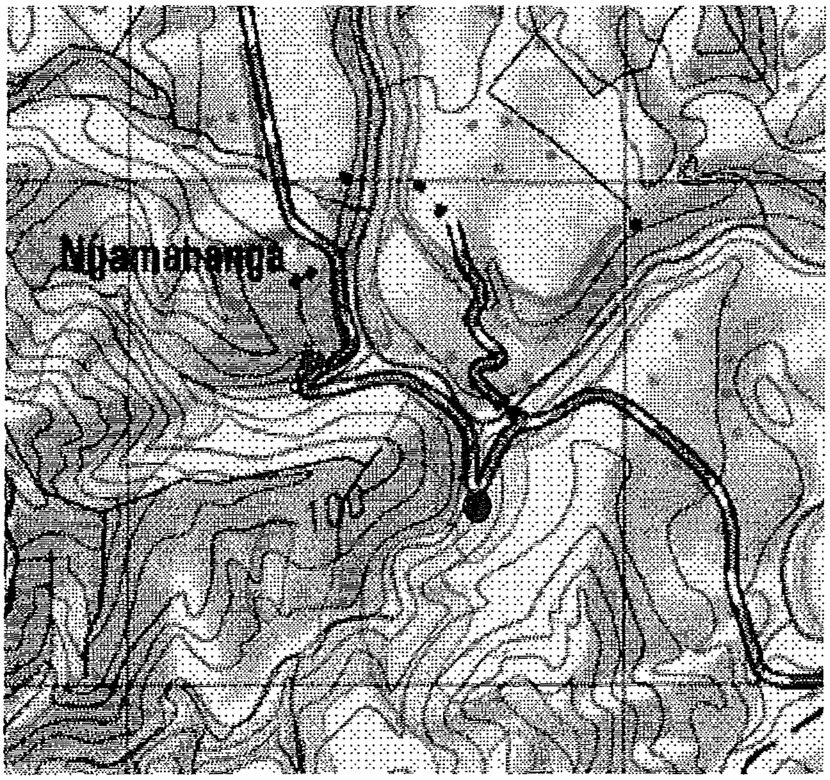
Turbidity (NTU) = 25.8 **Conductivity µs/cm =405** **pH = 7.59**

8.4 Waihua Tributary. Ngamahanga

GPS 39° 2'7.97"S 177°12'49.46"E

A-1 / Mahinga Kai score 2 / Stream health 55/85 Average = 3.2

Status of site; Status of site; Traditional Association; High



The Ngamahanga stream was in proximity to a large number of pa and kainga including Nga Koauau kainga, Whitinga Te Marama pa and Morunga Te Rangi pa. This area in proximity to the Waihua River was occupied by Ngati Kukura and Ngai Te Rau hapu members

Map showing the Ngamahanga catchment. Sample site where the road in red at the top of the map cuts back down into the yellow of the bridge. This is just above where the Ngamahanga joins the Waihua River.

. Mahinga kai values.

The Ngamahanga is a well protected site, fish expected to live here would be eel, kokupu, koura, inanga, and trout. Birds observed: Tui, Starling, Bellbird, Bush Robin. The stream is situated within a small gorge system with steep heavily vegetated sides, minimal slipping. The species present are: Dysoxlum, Poplar, Punga, Kanuka, Tutu, Douglas Fir, Pine, Pampas, Kakaho, Native grasses.

Water way summary; the catchment area is within a small native bush reserve then throughout intensive farming tributaries. The stream has good flow and has protected margins. There were 1000's of Cicadas which indicates a good food source for fish, bumble bees present

Water quality; habitat fish/aquatic inverts; the water was swift in flow and very clear the water way was shaded very efficiently from Kanuka and Pine, cobbles were not visible form sample site as it were soon after high water flow, covering the stream bed in silt. The water way would be a great refuge for fresh water ecology to support life and biomass.

Desired action – minimize input through non point source, fence stream where catchment is across farmland.

Water Quality

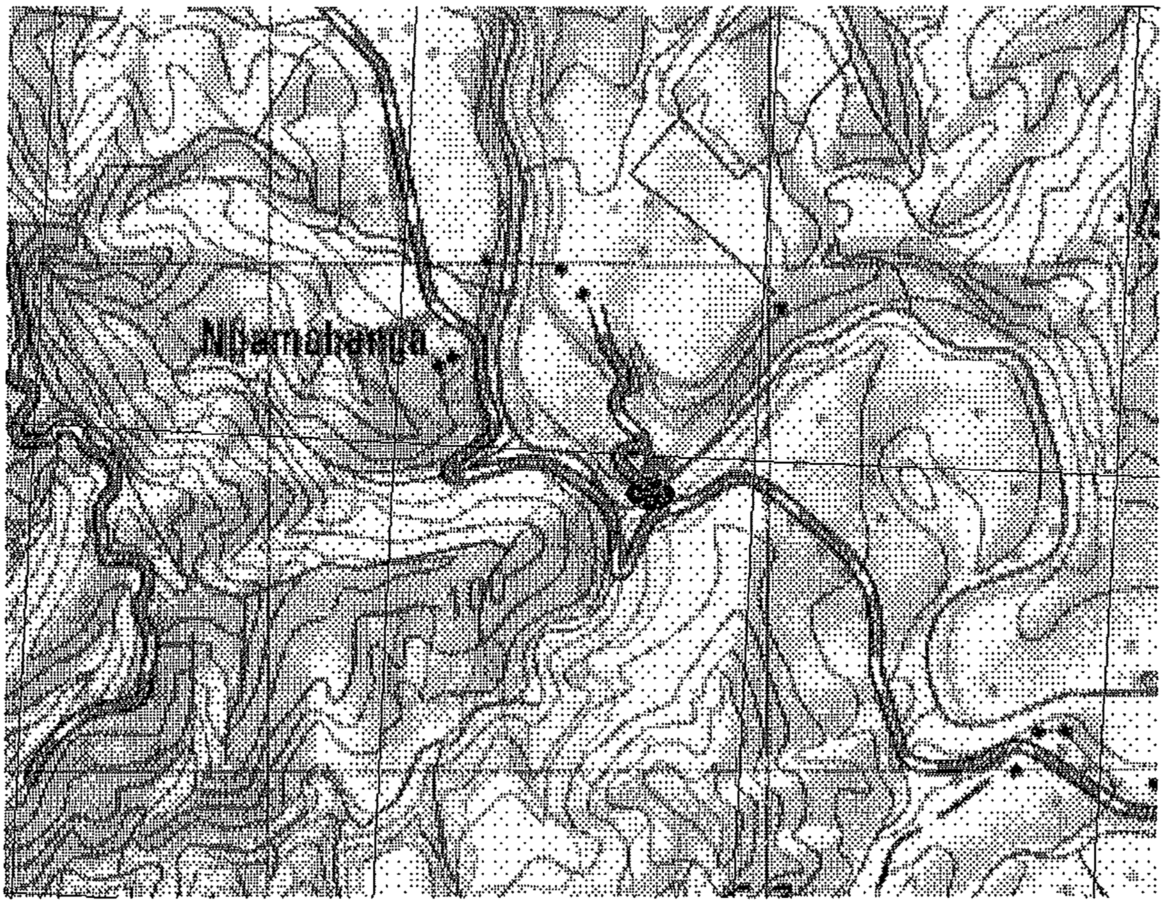
Turbidity (NTU) = 27.8 **Conductivity µs/cm = 278** **pH = 7.74**

8.5 Waihua River Duffy's Bridge on Pine Hill Station

GPS 39° 2'1.93"S 177°12'51.78"E

A-1 / Mahinga Kai score 3 / Stream health 70/85 average = 4.12

Status of site; Status of site; Traditional Association; High



This Survey site of the Waihua River is below the Ngamahanga Stream and was in proximity to a large number of pa and kainga including Nga Koauau kainga, Whitinga Te marama pa and Morunga Te Rangi pa. There were pa tuna just south of the sample site called Te Kopa and Rimunui. [68]This area was occupied by Ngati Kukura and Ngai Te Rau hapu members.

[6868]Te Wainohu, "12 Wairoa: Mohaka Hearing." p 93[68]

Kaiarai Te Wainohu said that this is a pa tuna in Waihua with cultivations on the bank. It was used up to the exodus to Nukutaurua, but not used after Te Kooti's massacre.[69] The stream has good riparian margins as a result of fencing to protect the water way. A clean well protected tributary of the Waihua River.

The adjoining Maulders Reserve will be returned to Ngati Pahauwera under the Treaty Settlement process. Waihua Marae Trustee Vern Winitana advocates hapu monitoring "The health of the river should be monitored by local rangatahi (youth) trained in the Cultural Health Index methodology so that they can be the eyes of the Iwi."[70]

Mahinga kai values plant/fish/bird and Health of water;

The Ngamahanga is a well protected site, fish expected to live here would be eel, kokupu, Koura, Inanga, Trout and fresh water mussel observed. Birds observed: Tui, Kereru, Zebra Finch, and Pheasant. The stream is situated within a small gorge system with steep heavily vegetated sides, minimal slipping. The species present are: Kanuka, Willow tree, Toe toe, Punga, Pampas, Miro, Matai, Eucalyptus, native grasses.

Water way summary; the catchment area is within a small Gully system with good riparian margins of dense vegetation and has intensive farming throughout tributaries. The stream has good flow and has protected margins. There were 100's of Cicadas and a dragon fly which indicates a good food source for fish and a healthy water way.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way was shaded very efficiently from Pine and steep banks, cobbles were visible from sample site even though it was soon after the flood. The water way would be a great refuge for fresh water ecology to support life and biomass.

Desired action. Remove invasive plant species and fence upstream areas to prevent stock acess..

Water Quality

Turbidity (NTU) = 19.4 **Conductivity µs/cm =246** **pH = 7.88**

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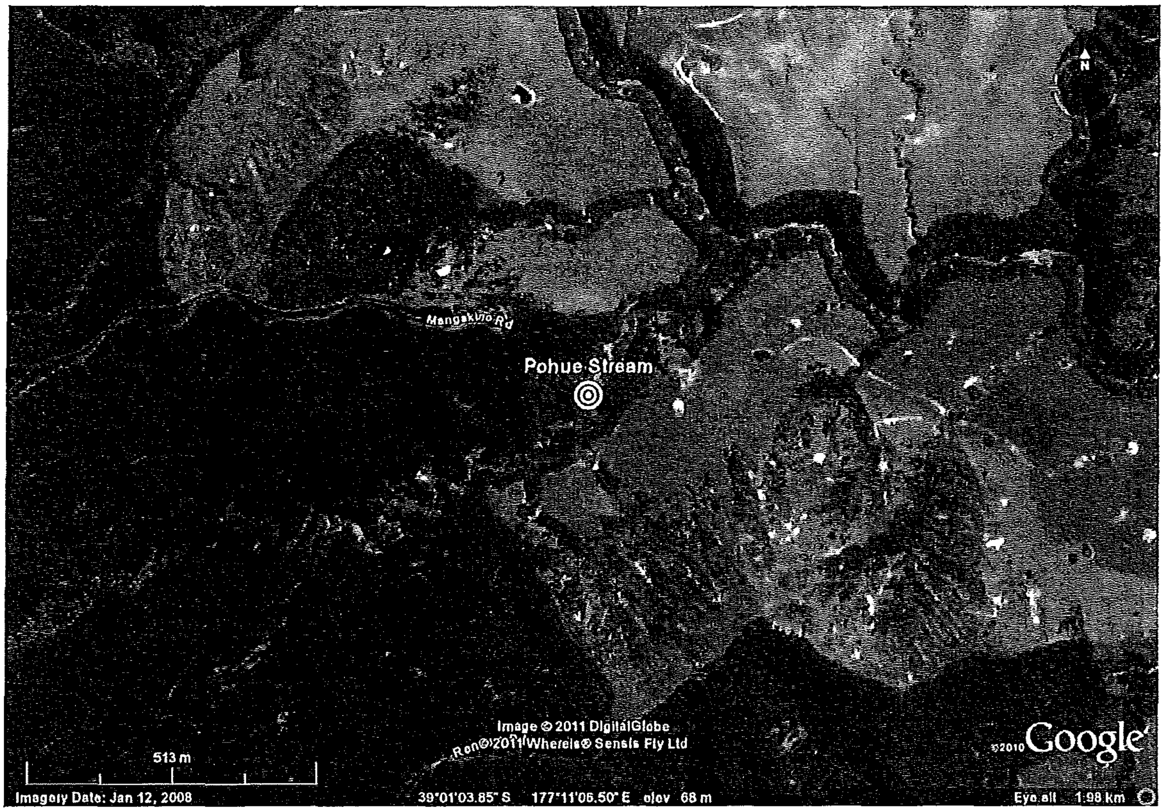
[69]Te Wainohu, "12 Wairoa: Mohaka Hearing.", p 93
[70] Winitana. V. Waihua Marae meeting. Feb 2011.

8.6 Walhua Tributary Pohue Stream Waihua Valley

GPS 39° 1'3.15"S 177°11'6.79"E

A-1 / Mahinga Kai score 2 / Stream Health 64/85 – Average = 3.8

Status of site; Status of site; Traditional Association; High



The presence of remnant mature Ti Kouka groves or cabbage trees indicates the proximity to a place of settlement. In the Pohue area was a place called Horo te atea where Ngati Pahauwera astronomers would gather to study the stars at certain times of the year.[71] There is a pa site on the northern side of the Waihua Hinetangi and the Pohue stream would have been the access point for those crossing the Waihua as the river at that point is characterized by steep faces.

[71]Botica D.Interview.

The stream has riparian margins of the farm has fenced off the riparian margin to protect the water way. The photo of the riparian cover above the Pohue stream is an excellent example of wise land management.

Cultural significance is high because it's a clean well protected tributary to the Waihua River at the head water regions

Mahinga kai values plant/fish/bird and Health of water;

It is a well protected site, fish expected to live here would be Eel, Kokupu, Koura, Inanga, Trout and fresh water cress would be present during the winter. Birds observed: Tui, Fantail. The stream is situated within a small gorge system with steep heavily vegetated sides, minimal slipping. The species present are: Kanuka, Mingimingi, Rangiora, Thistle, Blackberry, Podocarp in the adjacent gully, angiosperm in immediate headwater catchment, ferns, native grasses.

Water way summary; the catchment area is within a small Gully system with good riparian margins of dense vegetation and has intensive farming throughout tributaries. The stream has good flow and has protected margins. There were 10,000's of Cicadas which indicates a good food source for fish and a healthy water way. Moss covered banks and shore line providing great habitat for egg laying inverts, insects and back swimmers

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way was shaded very efficiently from native/exotic vegetation and steep banks, cobbles/boulders were visible from the sample site even though it was after the flood. The water way would be a great refuge for fresh water ecology to support life and biomass.

Desired action – fence off the streams margins to stop stock form entering, only allow at crossing (track).

Water Quality

Turbidity (NTU) = 13.4 **Conductivity µs/cm =195** **pH = 7.62**

Waihua River water quality summary of results in flood conditions

Waihua River	Turbidity	Conductivity	pH
Waihua (Raupani Bridge)	29.7	260	7.61
Ngamahanga	27.8	278	7.74
Kiwi Stream	39.4	449	7.87
Tahekenui Stream	25.8	405	7.59
Waihua River (Duffy's bridge)	19.4	246	7.88
Pohue Stream	13.4	195	7.62
Waihua SH2	36.7	148	7.64
Average	**27.46**	**283.04**	**7.71**

Water quality results from high flow monitoring.

Turbidity has indicted the streams have highly modified margins and adverse impacts from intensive farming land use. The findings support the need to ensure better land use practices. The conductivity results show the effects of upstream inputs of ion load and the settling and consumption of ions near the river mouth. The results of the pH monitoring indicated the Waihua catchment is relatively consistent throughout concluding the geology of the catchment is the same.

Summary of results three weeks after high flow.

Waihua River - Sampled post high flow.	Turbidity	Conductivity	pH
Waihua (Raupani Bridge)	29.7	260	7.61
Ngamahanga	27.8	278	7.74
Kiwi Stream	39.4	449	7.87
Tahekenui Stream	25.8	405	7.59
Waihua River (Duffy's bridge)	19.4	246	7.88
Pohue Stream	13.4	195	7.62
Waihua SH2	36.7	148.3	7.64
Average	**27.46**	**283.04**	**7.71**

Sampling 3 weeks after high flow

Kiwi Stream	6.87	606.00	7.84
		Median	7.69
		Range	7.61- 7.88

Conductivity

Conductivity within the monitored sites in the Waihua River had significantly increased with the three week sample run with Kiwi Stream being used as the indicator site. The stream had increased 157µs/cm which indicates that the potential for non point source pollution inputs may be present due to the farmland catchment areas that runs parallel to SH2 and the fact that farming runoff has a high dissolved salt level. The agricultural inputs derived from fertilizer and animal inputs of ammonium nitrates, nitrate-nitrogen, phosphorous, phosphates. The coastal position of the stream and catchment area is very close to the ocean and this will have an impact on the salt accumulation, there is an increase through evaporation processes.

pH

Waihua River high water flow range (7.59-7.88) indications were very consistent and after high flow the indicator site at Kiwi stream had a result of 7.84pH, which indicates the regulation of the ion transportation and velocity of the stream to be very stable. The stability may be due to inputs being constant, the gradient of flow or being within the salinity push of the tidal variation.

Turbidity

Waihua River monitoring at the indicator site Kiwi Stream reduced from 39.4 to 6.87. This is a significant reduction after the flooding. The stream does not have vegetation on the banks so the stream does not have detritus deposits and has a quick Turbidity recovery as any material is easily flushed downstream.

<u>Waihua River Cultural health Index Summary</u>

Key Indicators

1= Unhealthy		3=Marginal		5=Healthy

Status of site; Traditional Association;= High

Mahinga Kai values = 3

Land use = 2 Major land changes, Wetlands and Marshes almost non existent

Vegetation = 2 Scarce vegetation – Almost non-existent.

Use of the River banks & margins = 1 Margins Heavily Modified

Riverbed Condition (Sediment) = 2 Mostly covered by mud, sand, slime, sediment or weed

Changes to the River Channel = 5 Channel appears Unchanged

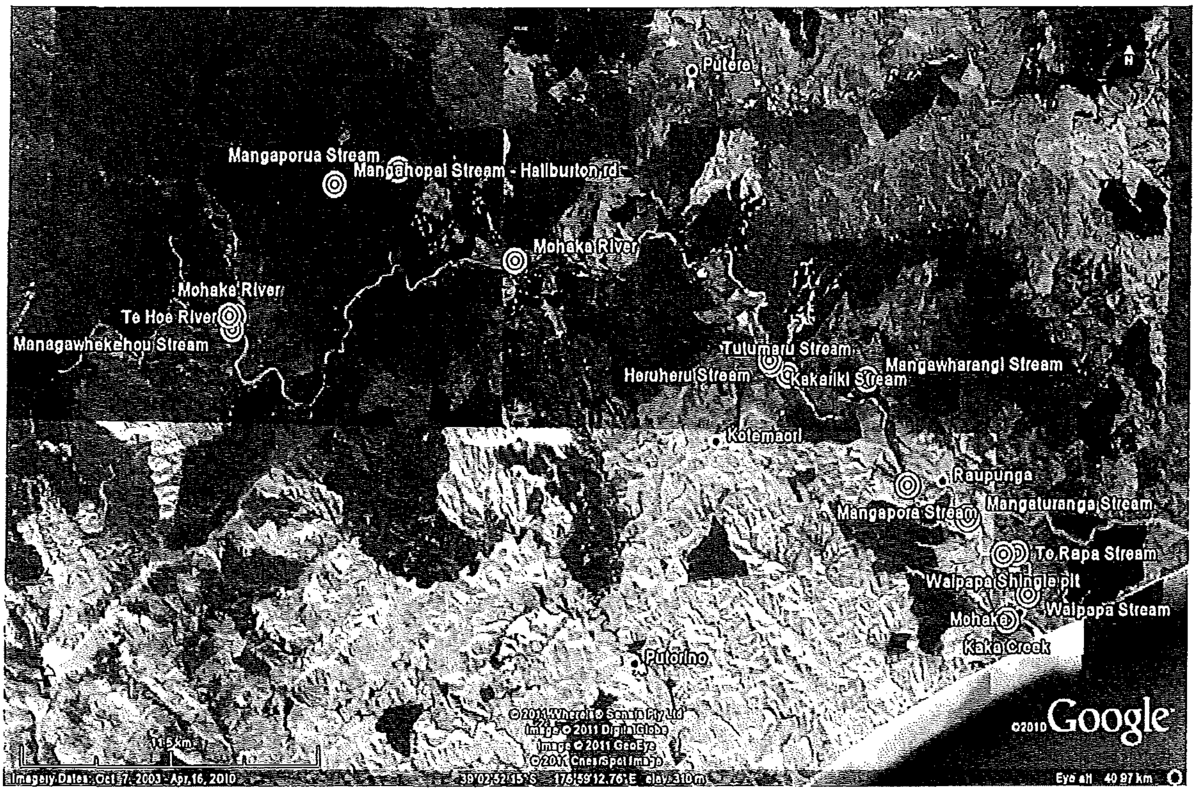
Water Quality = 2 Pollution quite evident

Water Clarity = 1 Water heavily discoloured

Impact on Habitat = 2 River health is detrimental to aquatic habitat, lower reaches highly detrimental, Higher catchment more diverse

Are you satisfied that the present condition of the river protects Cultural values at this site? = No

9. Mohaka River Sites Surveyed



Mohaka is said to have been the name of a river or stream in Hawaiki.

The Mohaka River is a taonga of inestimable cultural and spiritual value to Ngati Pahauwera.[72] The Ngati Pahauwera pepeha support this. Such expressions include: Ko au te awa, Ko te awa ko au. I am the river and the river is me.[73]Te tapu o Irakewa. (Made sacred by Irakewa) Mohaka Tomairangi, (Mohaka the unifier). Mohaka te Waiora. (Mohaka the life giver).

Many settlements on the Mohaka were in proximity to routes and crossings. The principal. route taken by tribes entering the Mohaka Catchment from the north was via the Hautapu stream that runs into the Te Hoe River.[74]

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[72]Evidence of Maraea Aranui. Claimant and Key witness for Wai 119.
[73] An Ngati Pahauwera saying or pepeha.
[74]— "Report No. 1 for the Mohaka Forest Claim Wai 119/201: Traditional Resources of Ngati Pahauwera before 1851," p 71

The routes that travelers could take from the Te Hoe confluence included:

Follow the Mohaka downstream to Mohaka and the sea
Follow the river downstream to Kakariki then cross to follow the trail to Wairoa
Climb the Maungaharuru to Pohokura and descend to Tutira
Follow the Mohaka upstream and cross over Titiokura or Ranga a Tawhao near Puketitiri
Cross the Mohaka and take a number of different routes inland.[75]

Photo taken of the erosion on the Maungaharuru range as a result of the Pine Forest felling operations. Jan. 2011

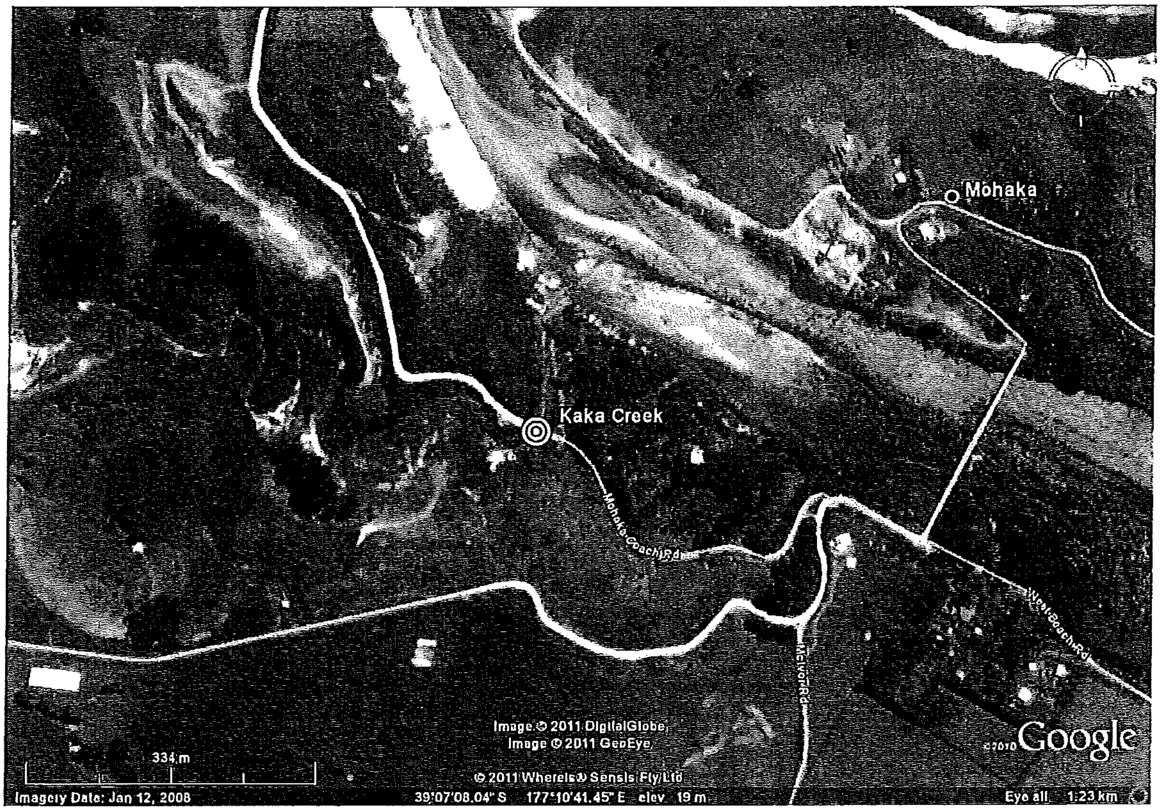
[75]Ibid., p 70

9.1 <u>Mohaka Tributary Kaka Creek</u>

GPS 39° 7'9.01"S 177°10'39.17"E

A-1 / Mahinga Kai score 3 / Stream Health 78/85 – Average = 4.6

Status of site; Status of site; Traditional Association; High



In former times the stream provided an excellent source of water for a number of kainga and pa including Tawhitinui and Whakataretare. There are a number of urupa in the area as a testimony to that occupation.

The rivers riparian margins are un-modified and the gully the stream is situated in is a densely covered native and exotic vegetation land covered margins and adjacent land use is farmland. Cultural significance is high because it would have been a regular tributary utilised for harvesting, and the hapu/marae are close, the site would be re-visited to harvest kai. Is very close to the river mouth and is an ecologically in balance stream.

Mahinga kai values plant/fish/bird and Health of water;

The stream is situated within a small gorge system with heavily vegetated sides, minimal slipping. Kaka creek confluence is a well protected site, fish expected to live here would be Eel, Kokupu, Koura, Inanga, and Trout.

Tree/Plant species present are: The species present are: Kanuka, Pampas, Toe toe, Poplar trees, Oak, Fennel and Pine.

Fish: None present.

Birds observed: Tui, Zebra finch, Swallow.

Water way summary; the catchment area is within a scrub covered gully then throughout intensive farming tributaries. The stream has good flow and has protected margins.

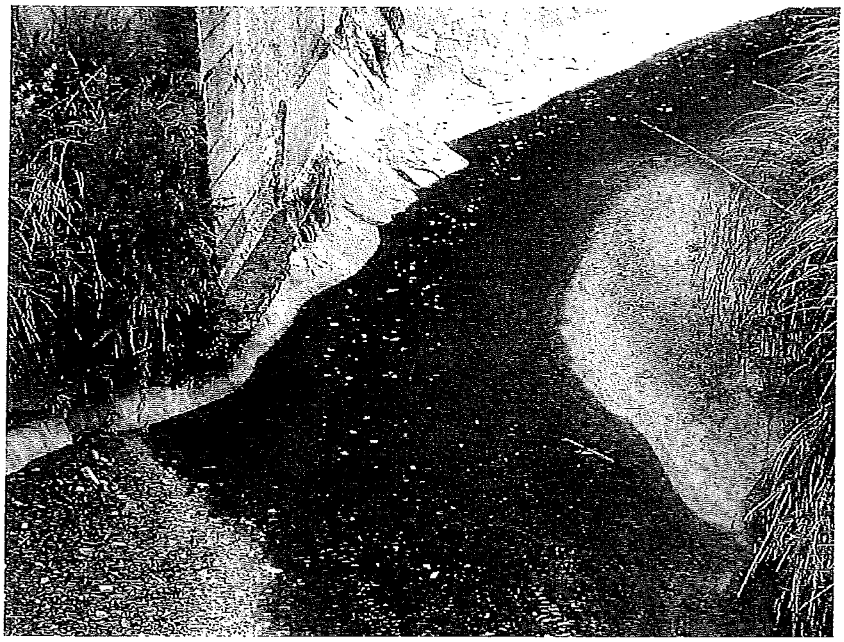
Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way is shaded from native/exotic vegetation, the river bed is silty due to high flow and tree/shrub debris. The water way would be a great refuge for fresh water ecology to support life and biomass because of the cobbles and boulders present.

Desired action – fence margins from stock, replant to support the redevelopment of recruitment for eels and habitat for inanga. Stop the dumping of dirt and other road construction operation waste being dumped by road contractors as the over flow of the materials is falling into the stream.

Water Quality

Turbidity (NTU) = 16 **Conductivity µs/cm =480** **pH = 7.20**

Kaka Creek scored very high during the monitoring circuit and as a consequence of high flow and a thoroughly cleared out stream. The returned photo of two weeks later highlights a very different stream. Foams are clearly visible on the surface and dark brown appearance is due to farming/stock inputs and abundance of algal growth.



Kaka Creek, visited two weeks after the increased flow highlighting the return of very enriched water flow and algae bloom. Algae extend over a wide area in proximity to the river mouth. "About two years ago the fishing was impossible at the mouth as there was a lot of green weed"[76].

The map below shows three sample sites.

The Kaka Creek sample site. This is where the road bridge crosses the stream on the left hand side of the Mohaka River.

The map also shows the Shingle quarry site sample area Arero on the right hand side of the Mohaka area.

The Waipapa stream site is shown as a blue line on starting on the left hand side of the map till it joins the Mohaka River.

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[76] Moses, M Jan 2011 Interview.

In former times Te Arero was the site of a number of Kainga and marae including the site of the whare tipuna Hineringa. The area just above the bridge was a popular whitebait fishing area until shingle extraction ruined the whitebait recruitment environment.

The rivers riparian margins are much modified and were pasture now the blackberry and gorse have become dominant. Cultural significance is high because it would have been a pristine river before the land development, and the hapu/marae are close, the site would be re-visited to harvest kai.

Mahinga kai values plant/fish/bird and Health of water;

It is within farmland. Fish expected to live here would be Eel, Koura, Inanga, Trout and fresh water cress would be present during the winter.

Birds observed: Swallow.

Tree/Plant species present are: Fennel, Blackberry, pampas.

Fish: None present.

Water way summary; the catchment area is a huge area over multiple land uses and cover. Intensive farming throughout tributaries and forestry with places of native vegetation

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way was not shaded from native/exotic vegetation covering the river bed in silt and tree/shrub debris. The water way is in bad shape with surrounding adjacent land slipping, ecology declining.

Desired action – replant the river banks and adjacent land to minimize slipping, fence off the river bed.

Water Quality

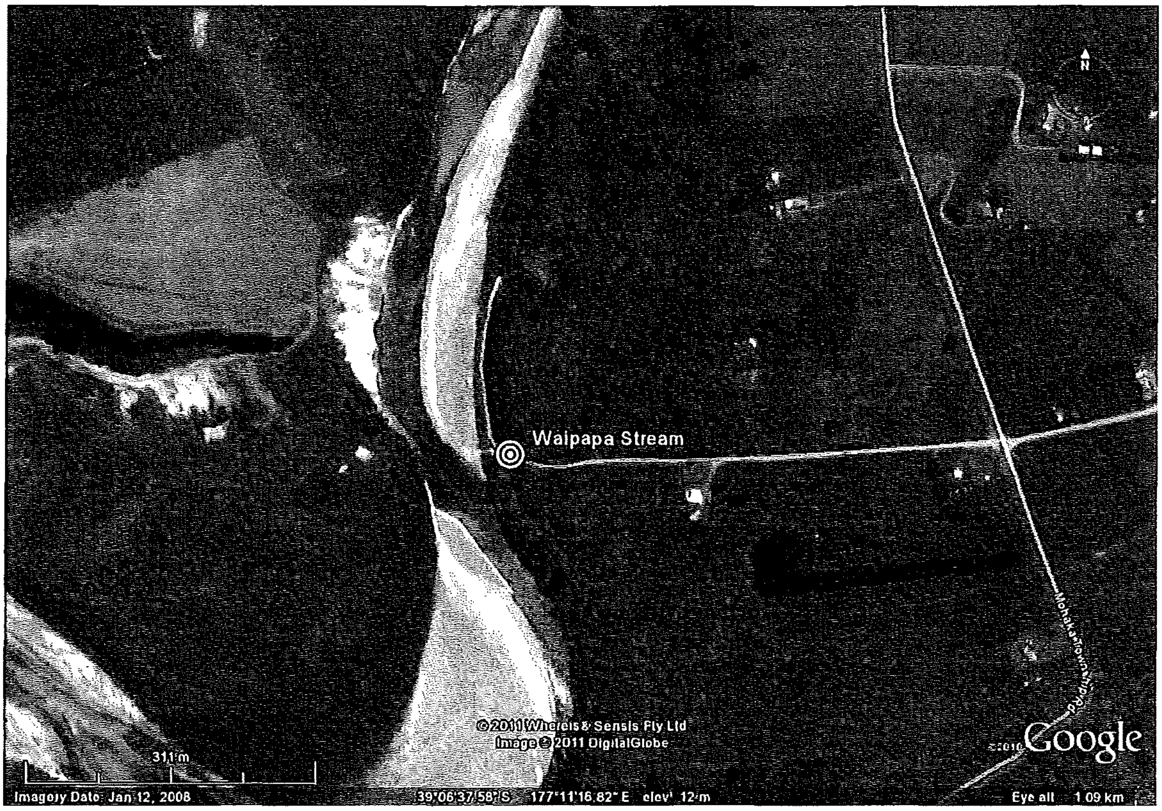
Turbidity (NTU) = 419 **Conductivity µs/cm =124.3** **pH = 8**

9.3 Mohaka Tributary Waipapa Stream

GPS 39° 6'39.24"S 177°11'13.52"E

A-1 / Mahinga Kai score 3 / Stream Health 52/85 – Average = 3.1

Status of site; Status of site; Traditional Association; High



The general area was heavily populated with pa including Takararo and Pukemokimoki, Waipapa kainga and urupa in the general locality. This site is below the current Mohaka marae Waipapa a Iwi an important cultural centre for Ngati Pahauwera today.

The rivers riparian margins are much modified and were pasture now the black berry and gorse have become dominant. Cultural significance is high because it would have been a pristine river before the land development, and would be used by whanau of the kainga and pa close by.

Mahinga kai values plant/fish/bird and Health of water;

It is within farmland, fish expected to live here would be Eel, Koura, Inanga, Mosquito fish, Trout and fresh water cress be present during the winter.

Birds observed: Sparrow, Starling.

Tree/Plant species present are: Pine, Willow, Blackberry, pampas,

Fish: None present.

Water way summary; the catchment flows through an area with multiple land uses and cover.

Water quality; habitat fish/aquatic inverts; the water was flowing and the water way was not shaded from native/exotic vegetation covering the river bed in silt and tree/shrub debris. The water way is in bad shape with surrounding adjacent land slipping, ecology declining due to the flood water damages.

Desired action – fence off the margins to stop stock grazing and standing in the body of water.

Water Quality

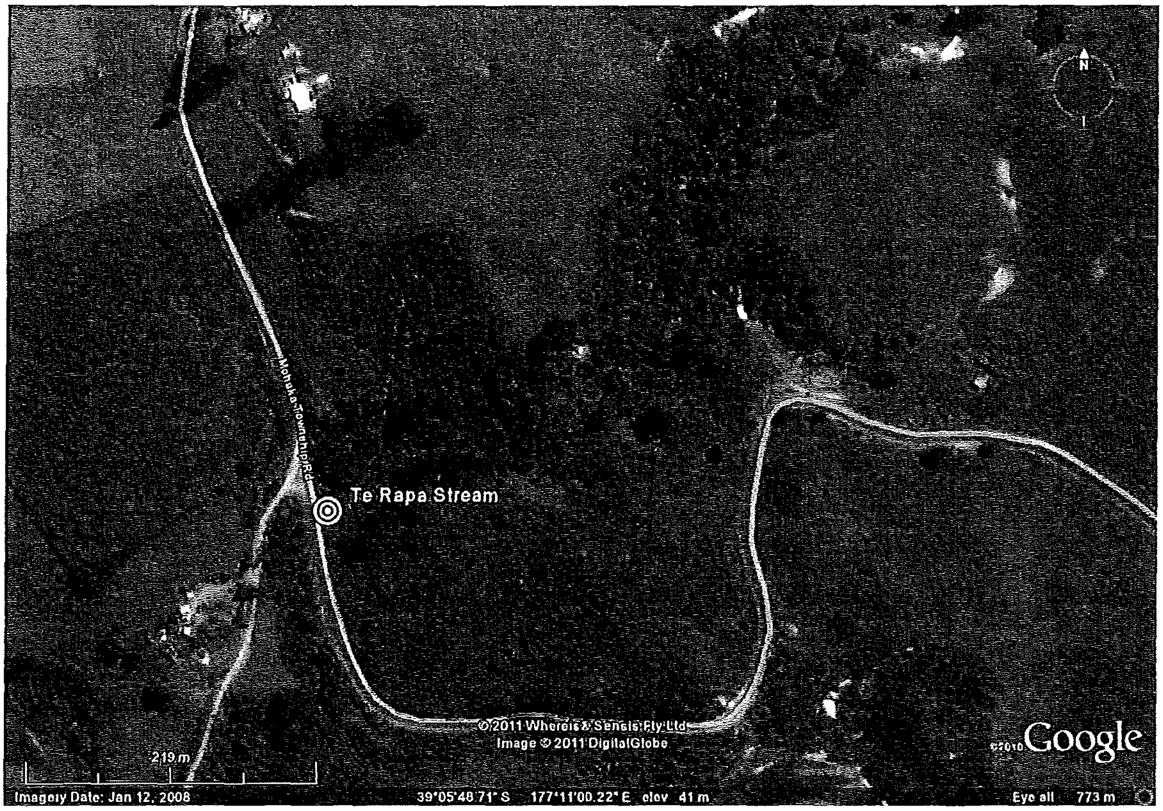
Turbidity (NTU) = 13.8 **Conductivity µs/cm =423** **pH = 7.2**

9.4 <u>Mohaka Tributary Te Rapa Stream</u>

GPS 39° 5'51.18"S 177°10'52.40"E

A-1 / Mahinga Kai score 3 / Stream Health 73/85 – Average = 4.3

Status of site; Status of site; Traditional Association; High



This stream is in close proximity to a number of pa and kainga including Pirau pa one of the principal pa in the Mohaka valley. The stream was widely used for domestic use as well as Mahinga kai. Eels are still caught in this stream and watercress is gathered here as well.

The rivers riparian margins are un-modified and the stream is situated in is a densely covered Native and Exotic vegetation ±70m from the stream, land covered margins and adjacent land use is farming and the land has been let go and plants regenerating. Cultural significance is high because it would have been a regular tributary utilised for harvesting, Pa sites and marae in vicinity, the site would be re-visited to harvest kai.

Mahinga kai values include plants, fish, birds and water;

The stream is situated within farmland with heavily vegetated sides, minimal slipping. The stream is a well protected site with shaded areas and moderate flow for great habitat, fish expected to live here would be eel, kokupu, Koura, Inanga.

Tree/Plant species present are: The species present are: karamu, Kanuka, Pampas, Tutu, Thistle, Gorse, Black berry, Pine, Willow

Fish: None present.

Birds observed: Zebra finch, Hawk, Starling.

Water way summary; the catchment area is within a farmland with good riparian, the clouding of the water from high flow and surface runoff.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way is shaded from native/exotic vegetation, the river bed was only slightly silted due to high flow and tree/shrub debris. The water way would be a great refuge for fresh water ecology to support life and biomass because of the cobbles and boulders present. The stream has good flow and has protected margins. Efficient niche for fresh water ecology, inverts insects, animals, fish breeding, large numbers of cicadas, flies and spiders present.

Desired action – fence off the stream and continue to promote the regeneration within the catchment.

Water Quality

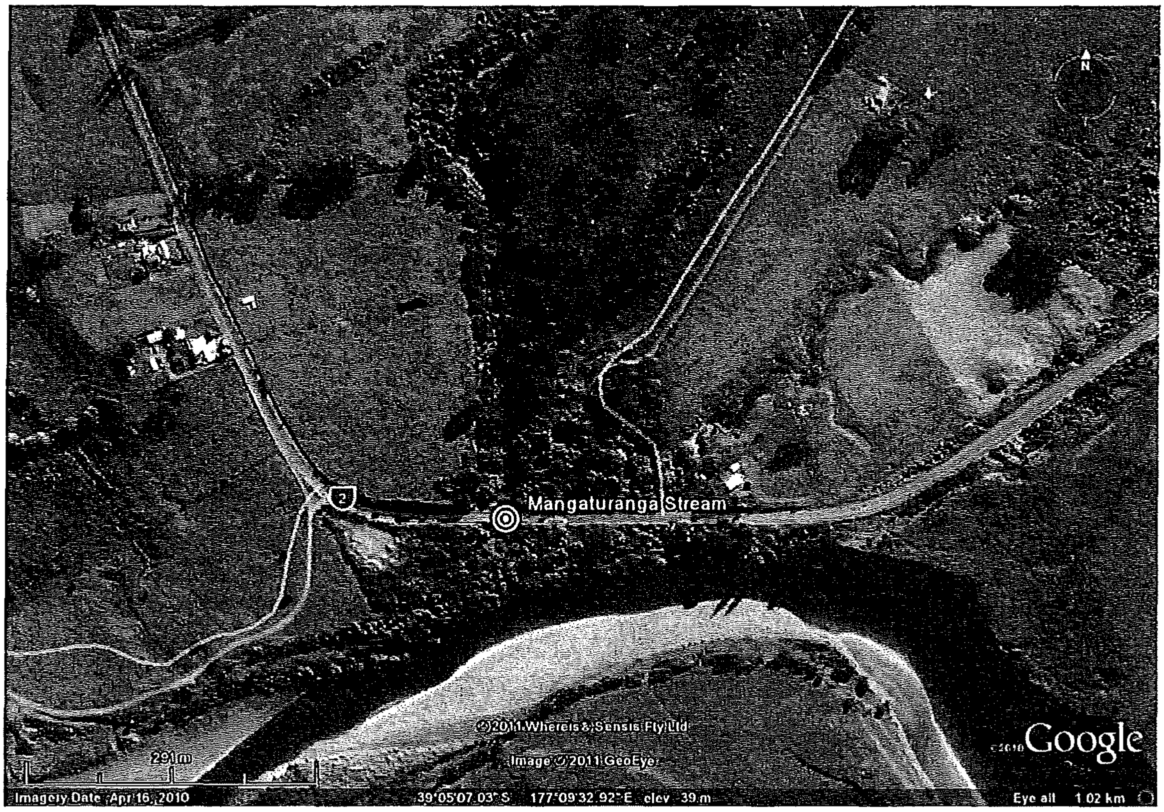
Turbidity (NTU) = 14.1 **Conductivity µs/cm =603** **pH = 8.10**

9.5 Mohaka Tributary Mangaturanga Stream

GPS 39° 5'10.63"S 177° 9'29.69"E

A-1 / Mahinga Kai score 3 / Stream Health 68/85 – Average = 4

Status of site; Status of site; Traditional Association; High



The Mangaturanga Stream has its origins inland from the Kahungunu area near the pa Tauwharеroa and is fed by a large number of small tributaries before it reaches the Mohaka.

In the lower reaches of the Mangaturanga it is overlooked by the Pa Morunga Te rangi and Pa roa.

This area was highly settled with a number of kainga and urupa spread up the valley of the stream. "There were lots of eels, fresh water crayfish and whitebait came up the stream when I was a boy." [77] "Whitebait was plentiful at Mangaturanga but now we have to go to the Mohaka river mouth."[78]

The rivers riparian margins are un-modified and the stream is situated in native and exotic vegetation. Cultural significance is high because it would have been a regular tributary utilised for harvesting, Pa sites in vicinity, the site would be re-visited to harvest kai.

Mahinga kai values plant/fish/bird and Health of water;

The stream is situated within farmland with heavily vegetated sides, minimal slipping with extremely high siltation

Tree/Plant species present are: The species present are: Cabbage Tree, Coprosma grandifolia (Kanono), Raukaua (Pseudopanax edgerleyi, leatus) Kanuka, Pampas, Apple trees, Kowhai, Five finger, Harakeke, Thistle, Gorse, Black berry and Pine, Punga, Fennel,.

Fish: None present.

Birds observed: Tui, Zebra Finch, Black bird.

Water way summary; the catchment area is within a farmland with good riparian, the clouding of the water from high flow.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way is shaded from native/exotic vegetation, the river bed was only slightly silted due to high flow and tree/shrub debris. The water way would be a great refuge for fresh water ecology to support life and biomass. Efficient niche for fresh water ecology, inverts insects, animals, fish breeding, large numbers of cicadas.

Desired action – fence off stream from stock.

Water Quality

Turbidity (NTU) = 20.3 **Conductivity µs/cm =139** **pH = 7.35**

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[77] Waaka Ted. Jan 2011 interview.

[78] Moses, Marie. Jan 2011 Interview.

9.6 Mohaka Tributary Mangapora Stream

GPS 39° 4'32.92"S 177° 7'48.23"E

A-1 / Mahinga Kai score 3 / Stream Health 67.5/85 – Average = 4

Status of site; Status of site; Traditional Association; High

The Mangapora stream was a crossing place to Arakanihi where the trail snaked up to what is now the Raupunga Settlement. "The Mangapora was opposite Whenua raro where the Whare Tipuna Paaka Te Ahu once stood surrounded by a kainga. In earlier European settler days there was a church. It was a good whitebait spot in former times".[79] The streams margins are un-modified and the gully the stream is situated in is a densely covered manuka land cover adjacent land forestry/farmland. Cultural significance is high because it would have been a regular tributary utilised for harvesting, and the hapu/marae are close, the site would be re-visited to harvest kai.

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[79]Awhina Waaka Jan 2011 interview.

Mahinga kai values plant/fish/bird and Health of water;

The stream is situated within a small gorge system with steep heavily vegetated sides, minimal slipping. The Mangapora confluence is a well protected site, fish expected to live here would be Eel, Kokupu, Koura, Inanga, and Trout.

Tree/Plant species present are: The species present are: Tutu, Kanuka, Pampas and Kowhai trees, Karamu, Gorse, Lancewood.

Fish: None present.

Birds observed: Tui.

Water way summary; the catchment area is within a scrub covered gully then throughout intensive farming tributaries. The stream has good flow and has protected margins.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way is shaded from native/exotic vegetation, the river bed in silty due to high flow and tree/shrub debris. The water way would be a great refuge for fresh water ecology to support life and biomass. Large numbers of cicadas a good food source for fresh water ecology.

Desired action – fence off margins in the head water in the farmland.

Water Quality

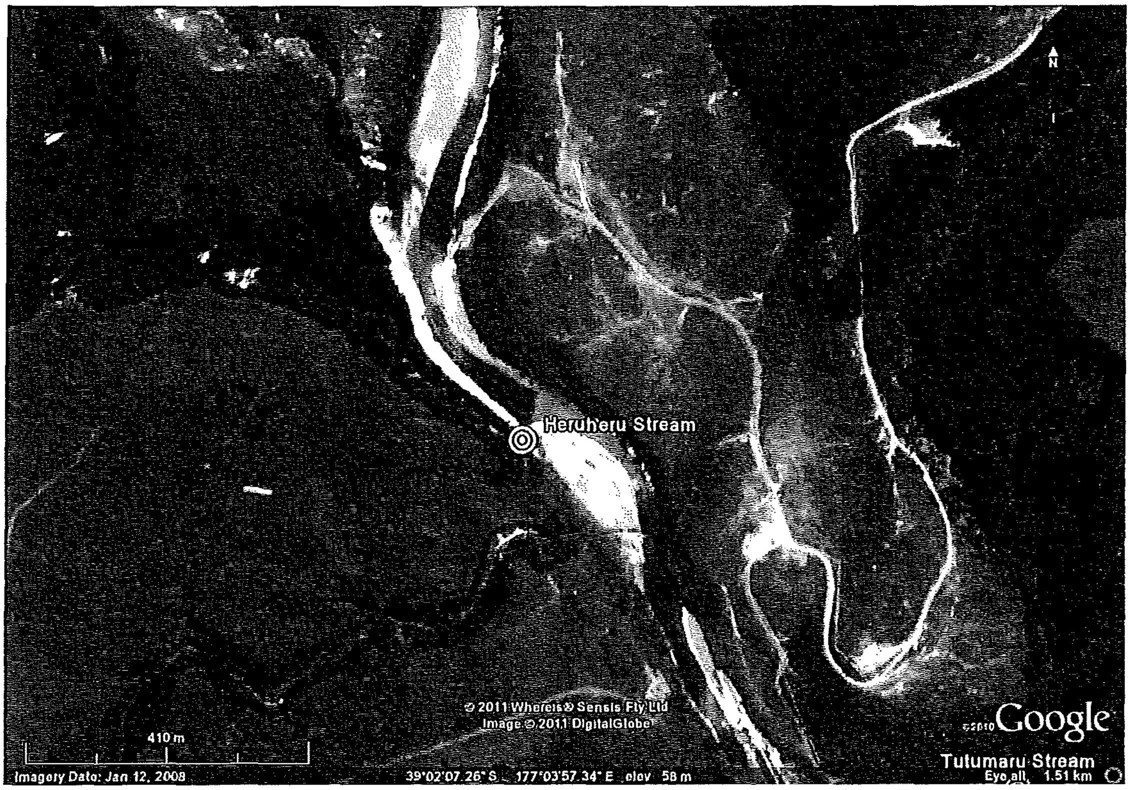
Irretrievable due to high flow

9.7 Mohaka Tributary. Heruheru Stream, Kotemoari

GPS 39° 2'9.36"S 177° 3'54.55"E

A-1 / Mahinga Kai score 3 / Stream Health 74/85 – Average = 4.4

Status of site; Status of site; Traditional Association; High



Evidence of settlement in this area is extensive. Sites with pits and terraces were located beside the Kakariki Stream, and an extensive pa site overlooking the confluence of the Kakariki Stream and Mohaka River was located. Downstream a cluster of pits and pa were recorded and indistinct pits were recorded upstream at First Flat. The landscape is dominated by large flats along the true right of the Mohaka River. These flats have been cultivated for years and the possibility of these flats being gardened in pre-European times is high.

Several of the recorded archaeological sites can be collated with place names and stories associated with the area. W19/229, a site comprising pits, is close to an area known as Himunui. W19/227 pits and terraces is possibly "Whiohutia, 'a kainga on the Kakariki Stream near its junction with the Mohaka';"[80] and W19/226, which is a group of six terraces facing east, south west of W19/227, are also close to the area known to Ngati Pahauwera as Taanga Kakariki. Another archaeological site W19/235, also comprising pits, is close to the area known to Ngati Pahauwera as Tutaenui. Downstream of Kakariki Stream, by Strathgrave, Bain and Keefe recorded another four sites which are close to an area known to Ngati Pahauwera as Ngoi Ngoi. These sites are W19/210 Pits and terraces, W19/211 Pit, W19/212 Pa and W19/213 Pa.

The rivers riparian margins are un-modified and the gully the stream is situated in is densely covered native and exotic vegetation land cover and the adjacent land use is farmed. The farmland then goes into forestry. The stream is situated within a small gut system with heavily vegetated sides, minimal slipping. Heruheru confluence is a well protected site, fish expected to live here would be eel, kokupu,

Mahinga kai values plant/fish/bird and Health of water; Koura, Inanga, Trout.

Tree/Plant species present are: The species present are: Kanuka, Pampas, Fern, Tutu, Thistle, Swamp grasses, Flax (brown flowers) Mingimingi.

Fish: None present. Birds observed: Starling, Yellow Hammer.

Water way summary; the catchment area is within a scrub covered gully then throughout intensive farming tributaries which caused the clouding of the water. The stream has good flow and has protected margins. Good native riparian about ±0.4km wide and large.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way is shaded from native/exotic vegetation, the river bed was only slightly silted due to high flow and tree/shrub debris. The water way would be a great refuge for fresh water ecology to support life and biomass because of the cobbles and boulders present.

Desired action - Conduct a research into the streams biomass and look into species present, develop research projects to investigate a range of biological processes.

Water Quality

Turbidity (NTU) = 5.84 **Conductivity µs/cm =298** **pH = 7.97**

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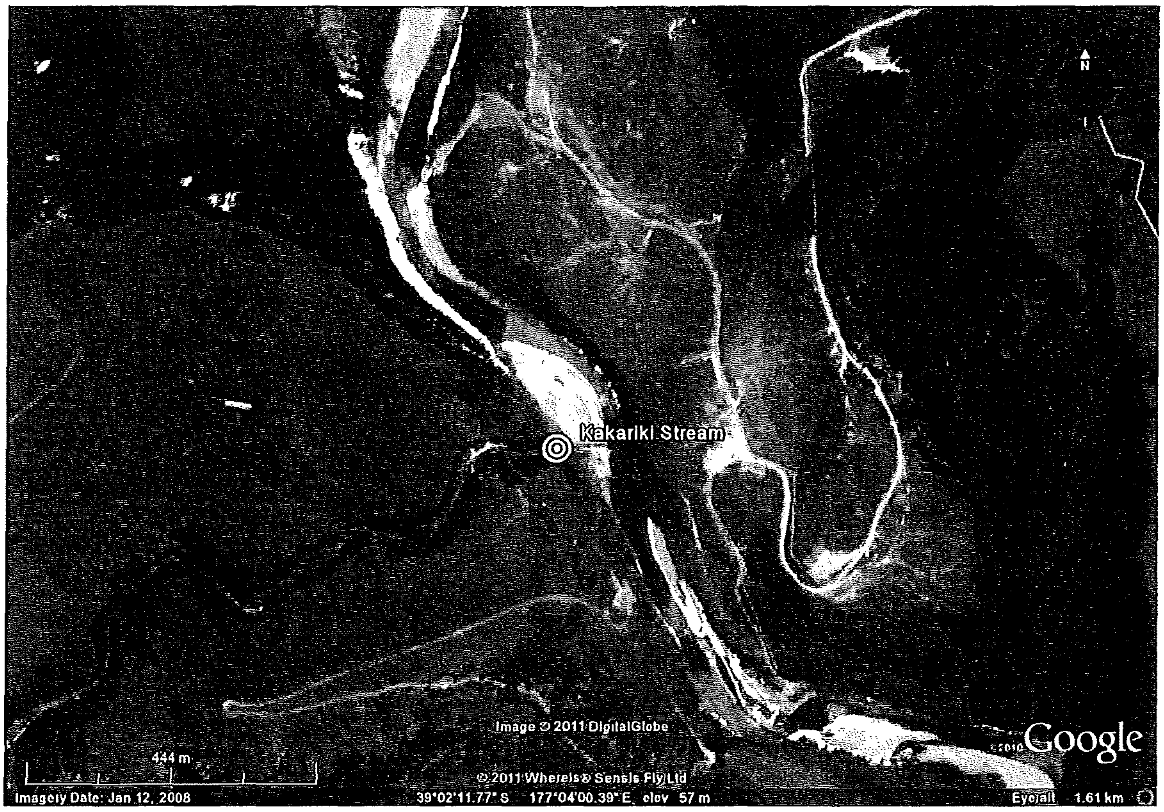
[80] Ibid., p 13

9.8 Mohaka Tributary. Ta anga Kakariki Stream

GPS 39° 2'13.85"S 177° 3'58.66"E

A-1/ Mahinga Kai score 4 / Stream health 56.11/85

Status of site; Status of site; Traditional Association; High



The Heruheru site summarized above is close to the Kakariki confluence with the Mohaka and shares the same proximity to settlements mentioned in that summary. Bill Broughton stated "Here one crossed over the river to Potaka pa and joined into the old Maori Trail to Pakowhai". He also identified Whiohutia as a kainga andTanoa, and Ngoingoi.

This area was under the mana of Kainui of Ngati Purua. Ngati Kapekape married into Ngati Purua and lived with them here. The name suggests the site is a wahi tapu.

There are three pa sites, two village sites and middens. The terraced area was a Mahinga kai used for crops. There is a group of four raised rim pits identified by Bain on a spur facing northeast above a small stream feeding into the Mohaka River. This site is close to Himunui.

This area was not only important as a crossing but also for eeling. "The best places for eeling on the Mohaka River are where the Kakariki Stream joins the Mohaka." [81]

The stream has riparian margins of native angiosperm trees and kanuka from the native reserve of kakariki over 2km away, the farm has fenced off the riparian margin to protect the water way.

Mahinga kai values plant/fish/bird and Health of water;

The Kakariki confluence is a well protected site, fish expected to live here would be eel, kokupu, Koura, Inanga, and Trout. Birds observed: Swallow, Starling. The stream is situated within a small gorge system with steep heavily vegetated sides, minimal slipping. The species present are: Tutu, Kanuka, Pampas and patches of gorse.

Water way summary; the catchment area is within a small native bush reserve then throughout intensive farming tributaries. The stream has good flow and has protected margins.

Water quality; habitat fish/aquatic inverts; the water was swift in flow and very clear the water way was shaded very efficiently from Kanuka and larger trees, cobbles were not visible form sample site as it were smooth bottom papa. The water way would be a great refuge for fresh water ecology to support life and biomass.

Limitations of monitoring, day time/fish sightings etc.

The research was done without any restrictions to observations.

Possible extensions of the monitoring programme: pathogen sampling to involve cryptosporidium, e-coli, giardia, enterococci, day and night water quality surveys, night fishing, bird counts at first and last light.

Desired action - fence off the remainder of the farmland (Front section fenced), further research.

Water Quality

Turbidity (NTU) = 10.3 **Conductivity μs/cm = 278** **pH = 7.77**

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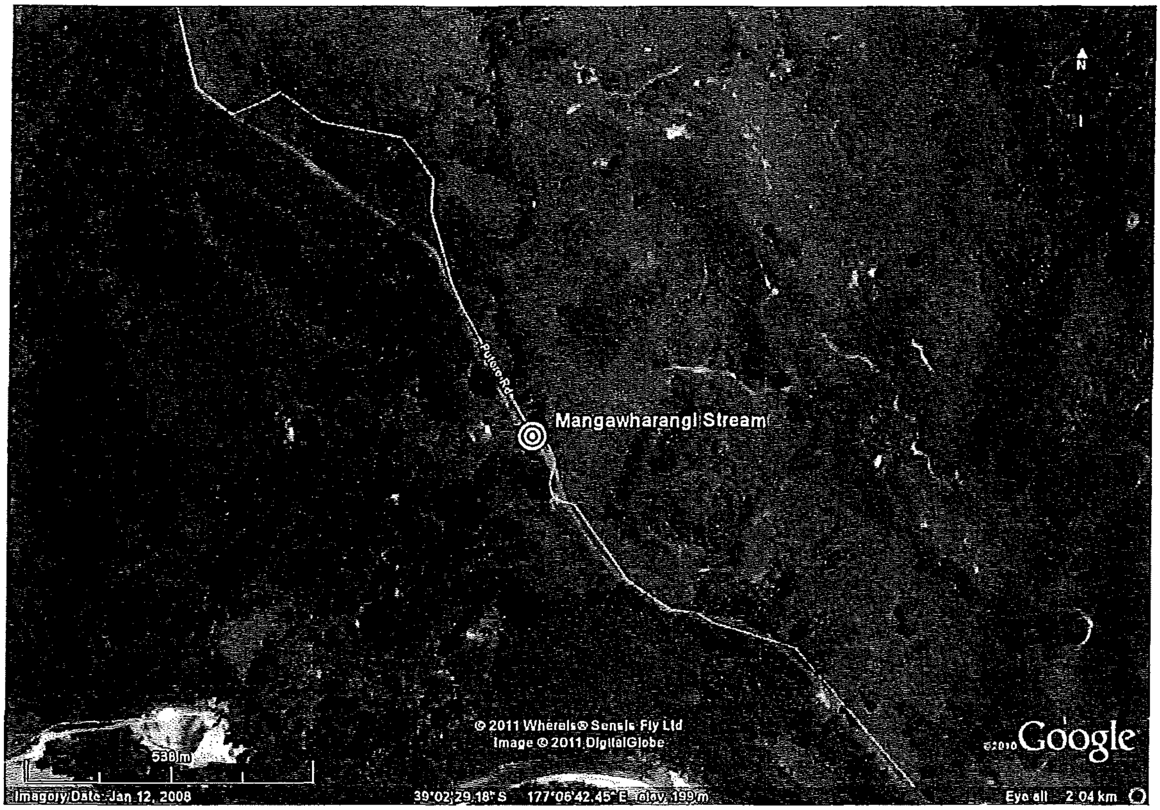
[81]Ibid., p 10

9.9 Mohaka Tributary Mangawharangi Stream

GPS 39° 2'30.97"S 177° 6'38.55"E

A-1 / Mahinga Kai score 3 / Stream Health 62/85 – Average = 3.65

Status of site; Status of site; Traditional Association; High



The rivers riparian margins are un-modified and the stream is situated in is a densely covered native and exotic vegetation within 20m of the stream land covered margins and adjacent land use is farming and the land has been let go so gorse and black berry establishing. Cultural significance is high because it would have been a regular tributary utilised for harvesting, Pa sites in vicinity, the site would be re-visited to harvest kai.

kerosene tins of freshwater Cray upstream in that area in his day."[82] He also noted that frogs had disappeared for a long period. Dough Putaranui said he was shocked at the decline of cray and numbers and habitat which he associates with flood events including Bola and the impact of forestry and stock pollution on the stream[83].

Tree/Plant species present are: The species present are: Cabbage Tree, Pseudopanax grandifolia (Kanono), Kanuka, Poplar, Pampas, Fern, Tutu, Thistle, Mingimingi, Gorse, Black berry and Pine.

Fish: None present. Birds observed: Tui, Zebra finch, Swallow, Black bird, Starling.

Water way summary; the catchment area is within a farmland with good riparian, the clouding of the water from high flow.

Water quality; habitat fish/aquatic inverts;

Tthe water was swift in flow and the water way is shaded by native/exotic vegetation, the river bed was only slightly silted due to high flow and tree/shrub debris. Potentially the water way could be a great refuge for fresh water ecology to support life and biomass because of the cobbles and boulders present. A large numbers of cicadas present.

Desired action – The restoration of the habitat for Freshwater Koura. The removal of invasive species like blackberry & gorse, and the fencing of areas upstream from stock.

Water Quality

Turbidity (NTU) = 14.7 **Conductivity µs/cm =94.1** **pH = 6**

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[82] Adsett, W. Jan 2011 interview

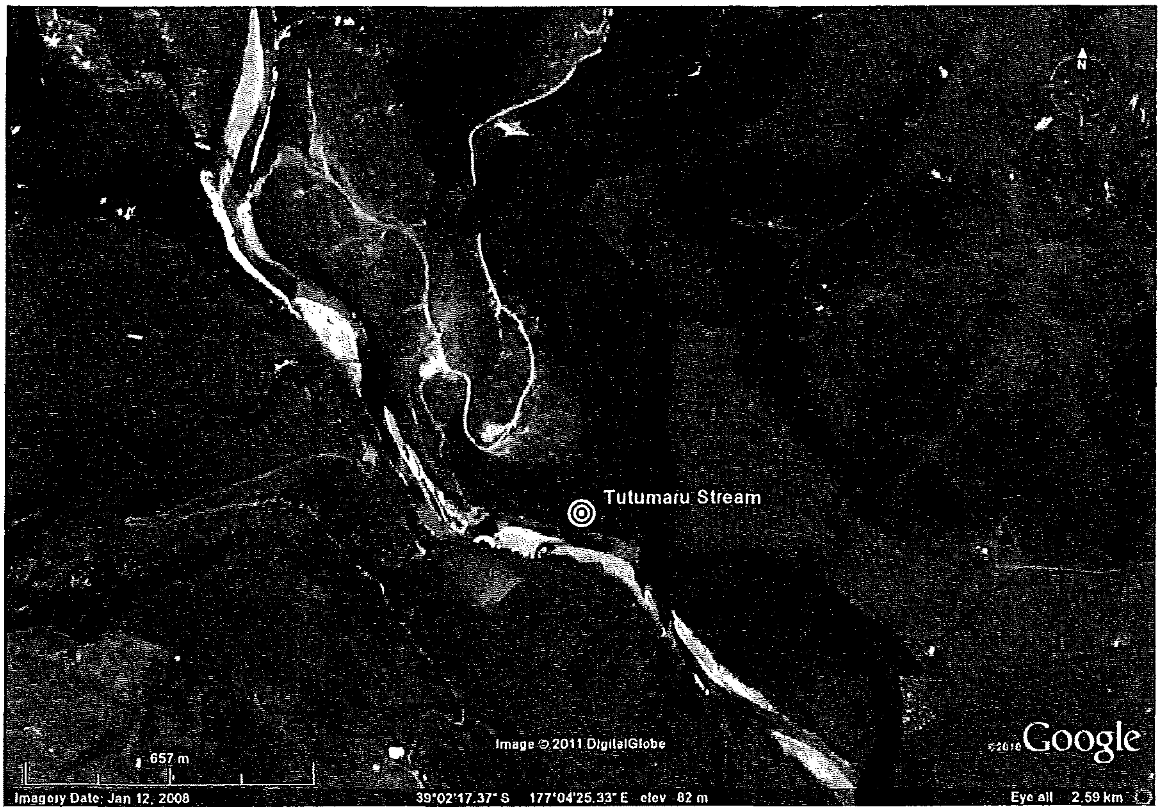
[83] Putaranui, D Feb 2011

9.10 Mohaka Tributary Tutumaru Stream

GPS 39° 2'25.27"S 177° 4'32.20"E

A-1 / Mahinga Kai score 4 / Stream Health 78/85 – Average = 4.6

Status of site; Status of site; Traditional Association; High



The area was occupied by the hapu Ngai Tangopu and Hine Iro and Ngati Purua.

There were a number of pa and settlements in the area including Te Mahia, Te Umuti and Potaka. There was a river crossing here from Kakariki and a trail headed from this point to Frasertown[84] West of Umuti is the place Tutumaru. NMB 40, P139. **Umuti** is a Taumata and Waahi tapu. Louise Furney.[85] Mouru and my hapu Purua lived there together. **Te Mahia**[86]is a mahinga kai and kainga by the river of the same two hapu.[87]NMB 40, P.62,138.

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[84] The Forestry land database map shows the Northern site of the dam on the land Block Mohaka 2B. This land was in the ownership of my great grandfather Paratene, his wife and his brother and three sisters until the Consolidation Orders in 1922.

Potaka a site downstream from Te Mahia. NMB 40, P47 cultivation. A bird place that belonged to all the uri of Paaka Te Ahu.[88]Identified by Louise Furney as a wahi tapu. (1985)[89] Maori Rongoa and dyes for harakeke. Teresa Dunne.[90] Charlie King informed us of an urupa in the area. Hoani Keefe stated 'the streams in this area were good for eeling and fresh water crayfish in former times but he has seen a marked decline in availability of species for Mahinga kai due to pollution and forestry."[91]

The rivers riparian margins are un-modified and the gully the stream is situated in is a densely covered native and exotic vegetation land covered margins and adjacent land use is forestry, Mohaka forest. The site would be re-visited to harvest kai.

Mahinga kai values plant/fish/bird and Health of water;

Tree/Plant species present are: The species present are: Kanuka, Pampas, Fern, Rewarewa, Tutu, Thistle, Mingimingi, Rangiora, Gorse, Black berry and Pine.

Fish: None observed. Birds observed: Tui, Zebra finch, Swallow, Black bird, Starling.

Water way summary; the catchment area is within a scrub covered gully with forestry in the upper reaches which is caused the clouding of the water. The stream has good flow and has protected margins. Good native riparian about ±2km wide and large numbers of cicada's.

Water quality; habitat fish/aquatic inverts; the water was swift in flow. The water way would be a great refuge for fresh water ecology to support life and biomass because of the cobbles and boulders present.

Desired action – siltation management from forestry operations and fencing of farmland.

Water Quality

Turbidity (NTU) = 7.66 **Conductivity µs/cm =265** **pH = 7.86**

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[85] Mohaka Forest land database. P 42
[86] Pam Bain. DOC
[87]Evidence of Fergus Sinclair. Wai 119.
[88]NMB, 40. P62,138.
[89]Mohaka Forest Land database. P 42
[90] ibid.
[91] Keefe, H. Feb 2011 Interview

9.11 Mohaka River Willow Flat site

GPS 39° 0'15.29"S 176°56'50.41"E

A-1 / Mahinga Kai score 3 / Stream Health 69/85 – Average = 3

Status of site; Status of site; Traditional Association; High

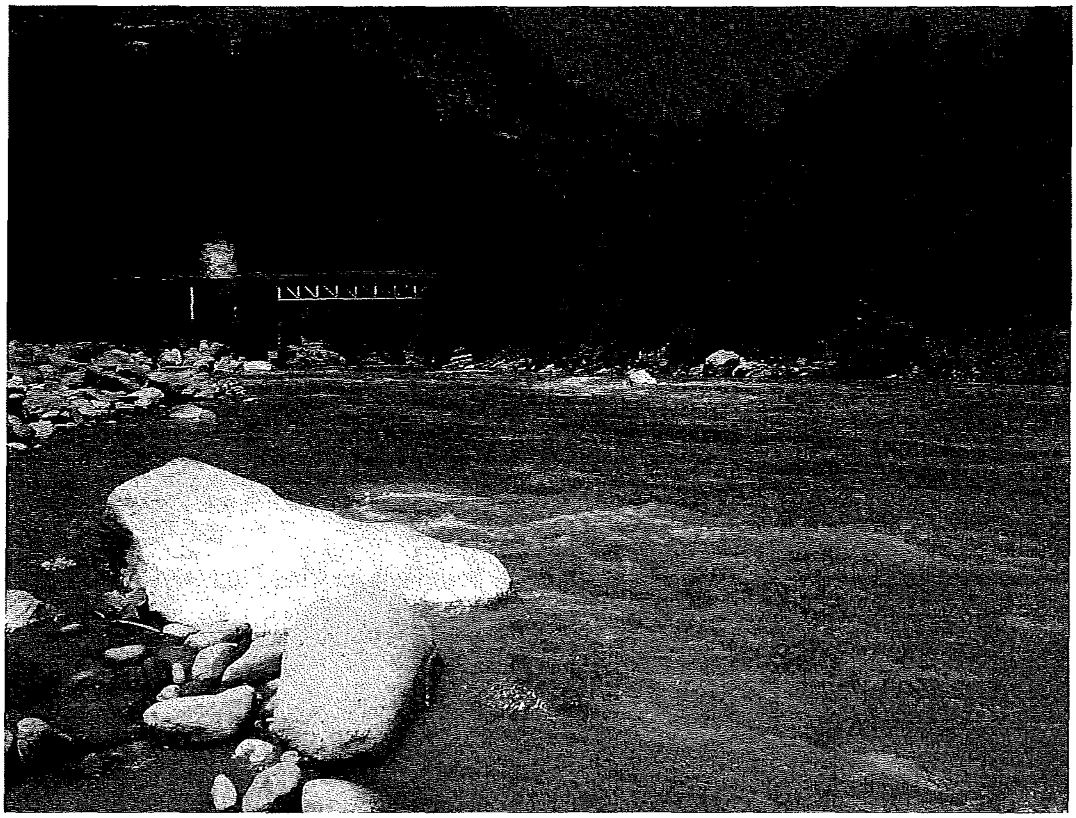

Photo. Sample site below the Willow flat Bridge. Taken 10 days after Jan flood.

- There are three significant pa and Taumata on the left side of the river in the vicinity of Willowflat. Kokohitoa (Below it is Boulder pa.)[92]Komatakaiamu. Komata o Oneone. Oneone was a son of Popoia. This point overlooks the Willowflat area and across to Taramaire pa on the Rotokakarunga block.

- Te Whakawhitinga o Tureia site is a ridge way of intermittent stones that enabled travelers to cross the Mohaka River[93].
- Te whakawhitinga o te Kooti. This is another crossing downstream at Patauhinu where some of the followers of Te Kooti were drowned trying to cross the river at this point in the night[94]
- Kaiawatea is a lagoon (Mahinga kai, kainga) inland from Patauhinu.
- Pa sites, Kainga and associated pits terraces, ovens, and midden. This is an area that shows extensive archaeological evidence of occupation.[95]
- A pa site and Taumata. On the northern side of this area are also numerous sites of kainga and mahinga kai recorded. Some pigeon drinking troughs were found by loggers. Below the northern face of Komata o Oneone is another Kainga.

The rivers riparian margin is native and adjacent land forestry, large silt deposit area become established. Cultural significance is high because it would have been a pristine river before the land development, and the hapu/marae are close, the site would be re-visited to harvest kai. Cattle had been browsing the tree daisy and various plants in area.

Mahinga kai values plant/fish/bird and Health of water;

It is within forestry/native/small farming and settlement area, fish expected to live here would be eel, Koura, Inanga, Trout and fresh water cress be present during the winter.

Birds observed: Zebra Finch, Starling, Swallows, and midday survey most natives would be inactive.

Tree/Plant species present are: Cabbage tree, pampas, Koromiko, Kumarahou, Tutu, Black berry, Tarata, Karamu (Cop grandifolia), Pseudo leatus, Totara, Kahikatea, angiosperm mixed trees, Kanuka, Willow, Karamu, Tree daisy and Pine.

Fish: None present.

Water way summary; the catchment area is a huge area over multiple land uses and cover; Intensive farming throughout tributaries and forestry on adjacent land with patches of native

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[94] Oral evidence. Bill Broughton. Wai 119.
[95] Pam Bain report. DOC

vegetation. Water inverts present are: back swimmers, land locked pool with high biodiversity for midge, mosquito, sand flies, and dragonflies. Pumice deposited all around.

Water quality; habitat fish/aquatic inverts; the water was swift in flow. There were high levels of silt from the upper reaches of the river. The water way is in bad shape (Chocolate Brown) with surrounding adjacent land slipping and being deposited here. Oil slicks in the land locked pools indicating cattle had been present in the water.

Desired action – Incorporate better land management practices for forestry and farming.

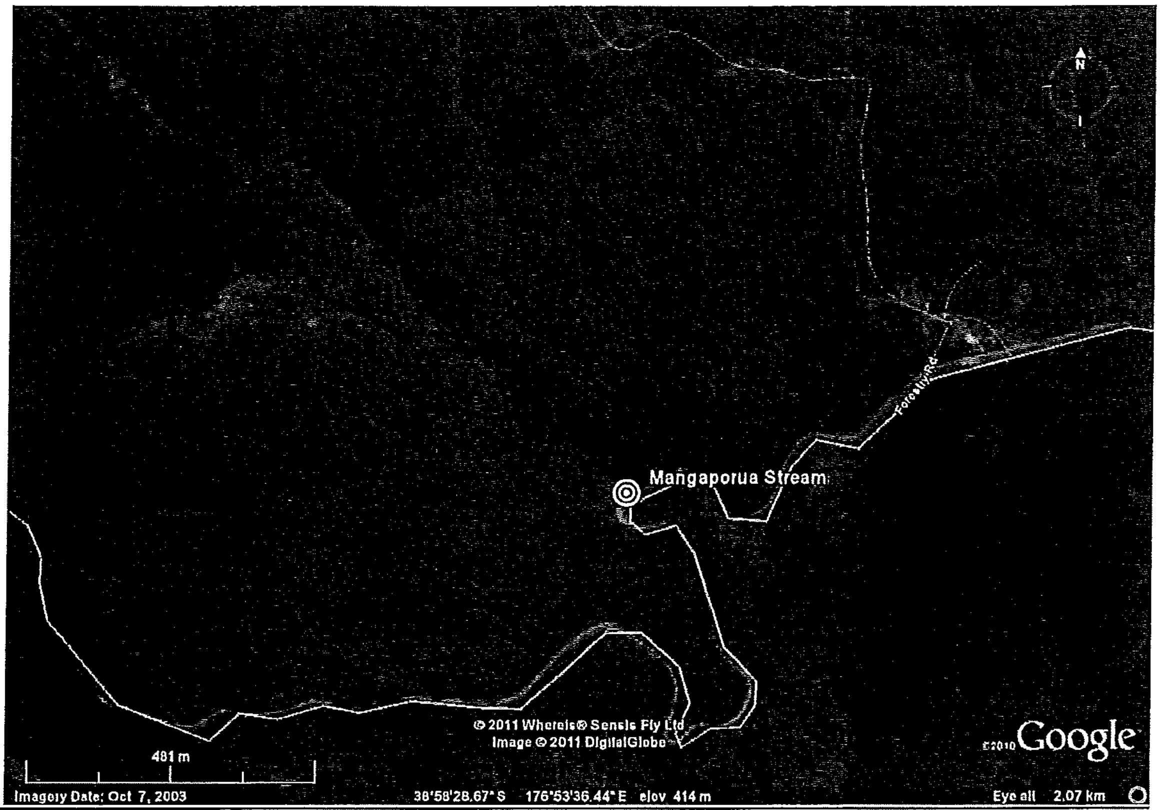
Water Quality Turbidity (NTU) = 222 Conductivity µs/cm = 116.5 pH = 6.86

9.12 <u>Mohaka Tributary Mangapurua Stream Willow flat settlement bridge</u>

GPS 38°58'33.43"S 176°53'39.58"E

A-1 / Mahinga Kai score 4 / Stream Health 76.5/85 – Average = 4.5

Status of site; Status of site; Traditional Association; High



The description of the Willow flat site describes a huge number of traditional settlements the occupants of these settlements would have ranged far for Mahinga kai.

The rivers riparian margins are un-modified and the stream is situated in is a covered native and exotic vegetation within the adjacent gully of the stream land covered margins and adjacent land use is forestry. Cultural significance is high because it would have been a regular tributary utilised for harvesting, Mahinga kai values plant/fish/bird and Health of water;

The stream is supported by and is heavily shaded and protected by native trees and shrubs, minimal slipping. The confluence is a well protected site, fish expected to live here would be eel, kokupu, Koura, Inanga, koaru (climbers) Trout.

Tree/Plant species present are: The species present are: Cabbage Tree, Coprosma grandifolia (Kanono), Raukaua (Pseudopanax edgerleyi, leatus) Kanuka, Pampas, Kowhai, Five finger, Black berry and Pine, Punga, fennel, Rewarewa, Beech, Miro, Totara, Tutu, Koromiko

. Fish: None present. Birds observed: None, middle of the day survey.

Water way summary; the catchment area is within forestry with good riparian / adjacent. One of the better sites visited for complete ecological harmony, native trees and water way. Clear felled areas in the distance contributing to the siltation.

Water quality; habitat fish/aquatic inverts; the wetland supports a range of life - swift in flow beneath the water fall and the water way is shaded from native/exotic vegetation. The water way could potentially be a great refuge for fresh water ecology to support life and biomass. Efficient niche for fresh water ecology, inverts insects, animals, fish breeding, large numbers of cicadas.

Desired action – siltation management from forestry operations, research done on the small wetland for species diversity.

Water Quality

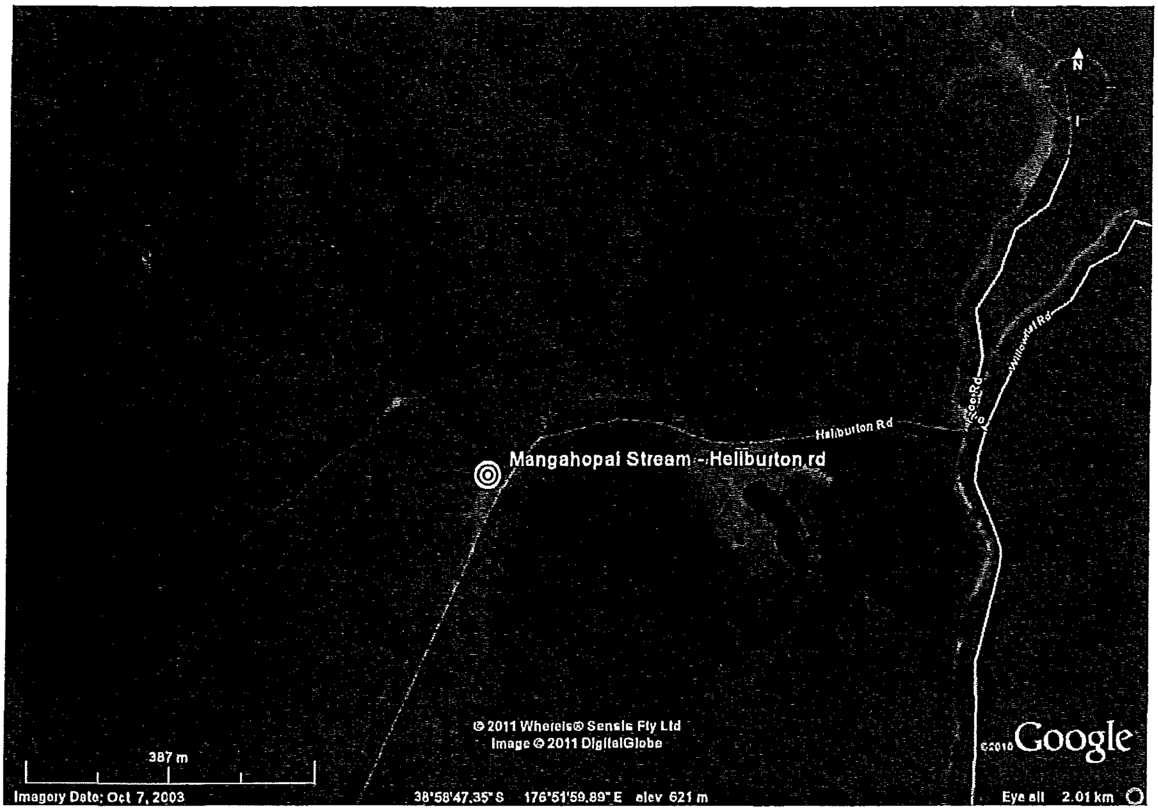
Turbidity (NTU) = 47.6 **Conductivity µs/cm =171.2** **pH = 7.16**

9.13 Mohaka River Tributary Mangahopai Stream, Haliburton Rd.

GPS 38°58'50.41"S 176°51'54.48"E

A-1 / Mahinga Kai score 4 / Stream Health 68/85 – Average = 4

Status of site; Status of site; Traditional Association; High



The area described on the northern side of the river is a complex of sites that included Kaiawatea, Pepewaru, Tapatahi, Rotokakarangu, Patauhinu, Nukurere, Pa Whakataka, Taramaire and Kaimanuka. The occupants of these areas would have ventured into the headwaters of the Mangahopai for Mahinga Kai. Some of these Settlements were well back from the Mohaka River for safety reasons.

The rivers riparian margins are un-modified and the stream is situated in is a covered native and exotic vegetation within the adjacent gully of the stream land covered margins and adjacent land use is forestry. Cultural significance is high because it would have been a regular tributary utilised for harvesting, Pa sites in vicinity, the site would be re-visited to harvest kai.

Mahinga kai values plant/fish/bird and Health of water;

The stream is supported by heavily shaded and protected by native trees and shrubs. The confluence is a well protected site, fish expected to live here would be eel, kokupu, Koura, Inanga, koaru (climbers) Trout.

Tree/Plant species present are: The species present are: Cabbage Tree, Coprosma grandifolia (Kanono), Raukaua (Pseudopanax edgerleyi, leatus) Kanuka, Pampas, Five finger, Thistle, Black berry and Pine, Punga, Rewarewa, Beech, Miro, Totara, Tutu.

Fish: None present.

Birds observed: Tui.

Water way summary; the catchment area is within forestry with good riparian vegetation. The best site visited for complete ecological harmony, native trees and water way.

Water quality; habitat fish/aquatic inverts; the wetland supports a range of life - swift in flow beneath the water fall and the water way is shaded from native/exotic vegetation. The water way would be a great refuge for fresh water ecology to support life and biomass. Efficient niche for fresh water ecology, inverts insects, animals, fish breeding, large numbers of cicadas.

Desired action – siltation management from surrounding forestry.

Water Quality

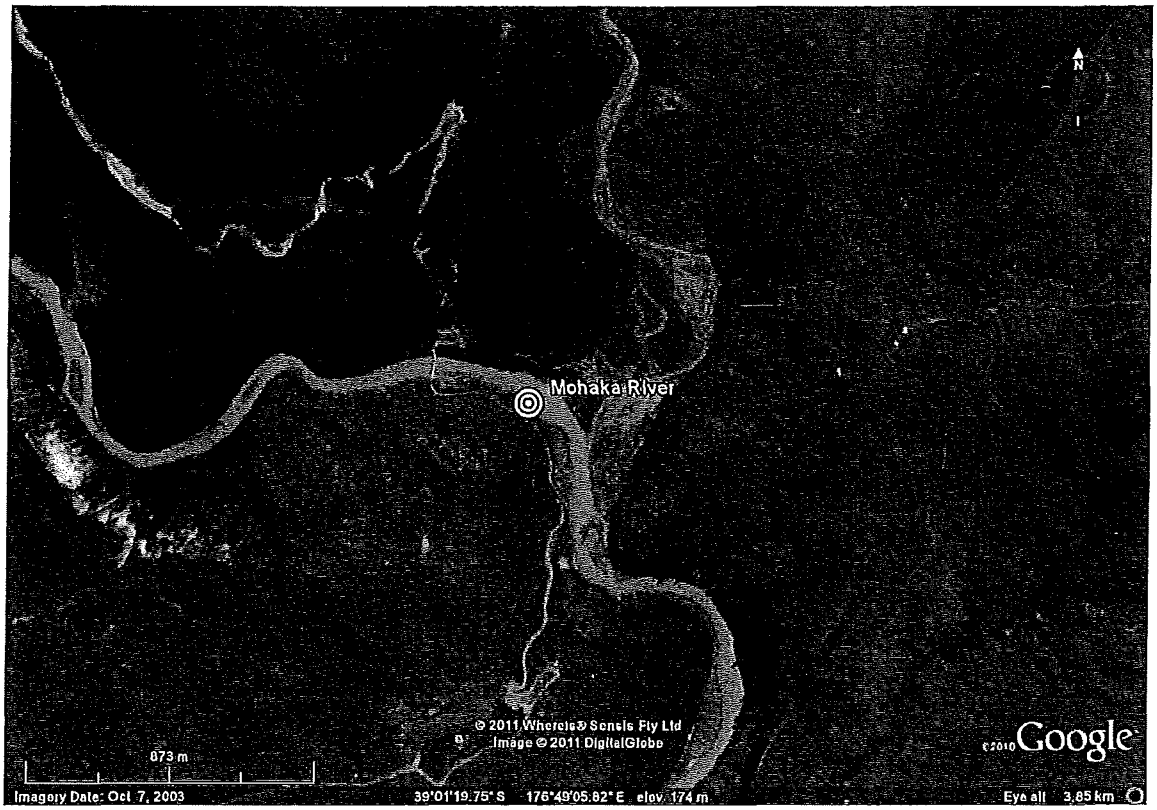
Turbidity (NTU) = 9.45 **Conductivity µs/cm =74** **pH = 5.99**

9.14 Mohaka river, upstream 100m from Te Hoe confluence

GPS 39° 1'19.45"S 176°48'57.54"E

A-1 / Mahinga Kai score 3 / Stream Health 56/85 – Average = 3.3

Status of site; Status of site; Traditional Association; High



The area and settlement on the southern side upstream of the Te Hoe confluence was called Paewahie. The settlement was well placed for eeling, bird hunting, forest fruits and the planting of late crops.[96] The hill with the pou to the south of the Te Hoe confluence had a good view of the Te Ipu o Hape pa on the northern side of the Mohaka as well as both Heru o Tureia and Patuwahine on the Mohaka Block, which would allow communication by smoke signals if there were intruders. The Mohaka /Te Hoe crossing was a route used by neighbouring tribes and the pa at Paewahie was in a good position to determine the intentions of visitors.

[96]Ibid. p 71

The rivers riparian margins are modified and were pasture now the black berry and gorse have become established. Cultural significance is high because it would have been a pristine river before the land development, and the hapu/marae are close, the site would be re-visited to harvest kai.

Mahinga kai values plant/fish/bird and Health of water;

It is within farmland/forestry/native, fish expected to live here would be eel, Koura, Inanga, Trout and fresh water cress be present during the winter.

Birds observed: Ducks, Sea gull, Starling. Tree/Plant species present are: Kanuka, Willow, Gorse, Karamu, Pine, and Poplar.

Fish: None present.

Water way summary; the catchment area is a huge area over multiple land uses and cover. Intensive farming throughout tributaries and forestry with places of native vegetation

Water quality; habitat fish/aquatic inverts; the water was swift in flow. The water way is in bad shape (Chocolate Brown) with surrounding adjacent land slipping, ecology declining.

Desired action – siltation management from forestry, replanting of riparian margins, and fence off water way from stock.

Water Quality

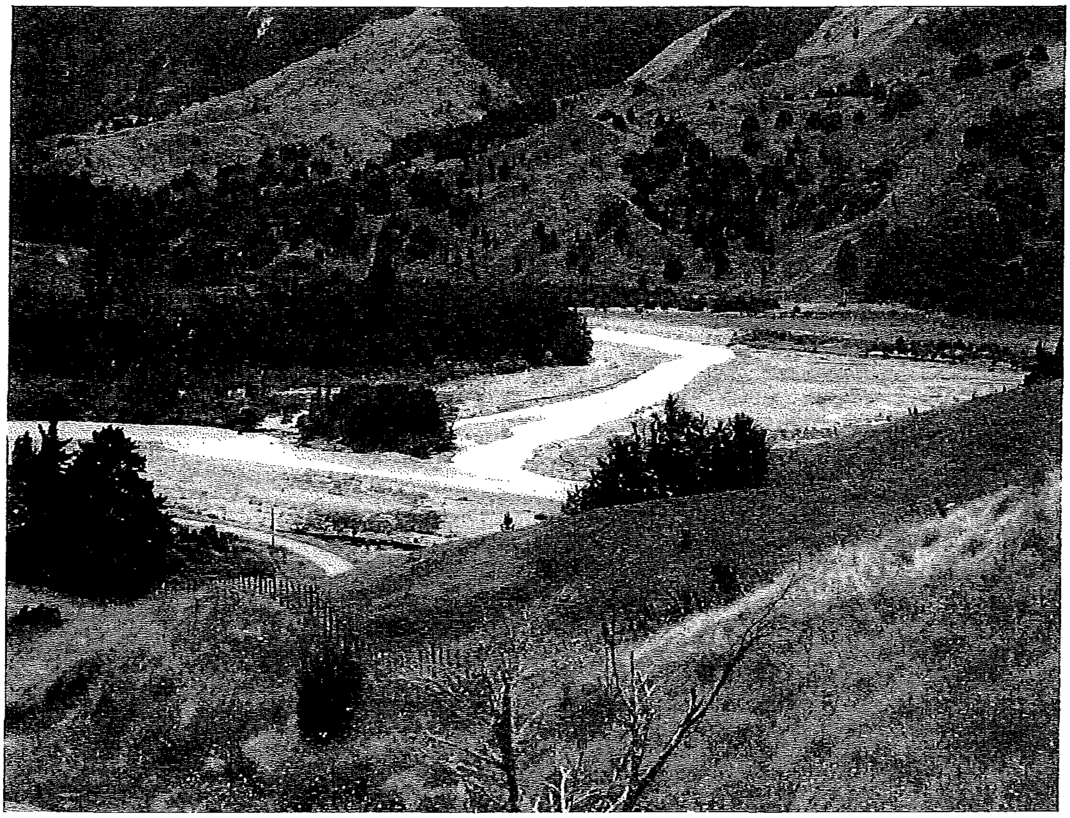
Turbidity (NTU) = 142 **Conductivity µs/cm =93.1** **pH = 7.53**

9.15 Te Hoe confluence, 100m Up stream

GPS 39° 1'20.18"S 176°49'7.99"E

A-1 / Mahinga Kai score 2 / Stream Health 66/85 – Average = 3.9

Status of site; Status of site; Traditional Association; High



There is a high concentration of pa sites and kainga on both sides of the Te Hoe River. The river was a major route between the coastal and inland hapu. The general area is known as Kuwatawata to Ngati Pahauwera. This area was occupied by the descendants of Kainui a daughter of Popoia until conflict that came with the Crown land wars and the land was confiscated. On the opposite left bank is the Ngati Purua and Ngati Tahu pa Pirinoa that was for a brief period one of Te Kooti's important strongholds.

Dave Kinita in the evidence describes himself as Ngati Tahu. He described the resources of the area and how they were used:

We could and still catch trout and eels. We use plants as medicines. I still live like that now. We also have plants like pikopiko, fern fronds. You cook this like you would asparagus. We also ate ongaonga which is a type of stinging nettle. The leaves were good to eat as were kouka (cabbage tree), berries and manuka tea.[97]

Kinita also describes the birds [and mammals] in the vicinity of Paewahie. "The native birds in the Te Hoe area include native pigeons, tui, bellbirds, morepork, kiwi, whio, bats."[98]

The rivers riparian margin is modified and is now slipping away in large areas, large silt deposit area become established. Cultural significance is high because it would have been a pristine river before the land development, and the hapu/marae are close, the site would be re-visited to harvest kai.

Mahinga kai values plant/fish/bird and Health of water;

It is within farmland/forestry/native, fish expected to live here would be eel, Koura, Inanga, Trout and fresh water cress be present during the winter.

Birds observed: None, very windy

Tree/Plant species present are: Kanuka, Willow, Karamu, and Pine.

Fish: None present.

Water way summary; the catchment area is a huge area over multiple land uses and cover. intensive farming throughout tributaries and forestry with places of native vegetation

Water quality; habitat fish/aquatic inverts; the water was swift in flow and the water way was not shaded from native/exotic vegetation, covering the river bed in silt, trees/shrub debris. The water way is in bad shape (Chocolate Brown) with surrounding adjacent land slipping, ecology declining.

Desired action – riparian margin fenced, limit the river bed modification.

Water Quality

Turbidity (NTU) = 325 **Conductivity µs/cm =84** **pH = 7.57**

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[97] Ibid. p70 citing Evidence of Dave Kinita [p] 12. Water and Soil Conservation Act. 253/90
[98] Ibid.

9.16 Mohaka Tributary. Mangawhekehou Stream

GPS 39° 1'35.05"S 176°49'3.09"E

A-1 / Mahinga Kai score 1 / Stream Health na/85 – Average = na

Status of site; Status of site; Traditional Association; High

The catchment of this stream is Waitere station a farm that grazes sheep and cattle. The land is steep rolling country. The stream flows into the Mohaka 300 metres south of the Te Hoe confluence. The stream verges have little in the way of riparian vegetation or fencing to protect it from stock. There is evidence of a rabbit problem in the region which if not dealt with will cause erosion issues and water quality issues for the stream and river in the next decade.

The Mangawhekehou entering the Mohaka River

Mahinga kai values plant/fish/bird and Health of water;

The stream flows through an intensive farming station and has little to no protection of the margins or adjacent land, water way in critical condition. Fish expected to live here would be eel, Koura, Inanga,

Fish observed none. (Alive)

Birds observed: None,

Plant species present; Small Manuka growing on the stream verges upstream of the sample site. The vegetation at the sample site was young willows and poplar saplings.

Other observation: A strong smell of dead fish from the Mohaka floods filled the air. Some fish died stranded in pools that dried up. Other fish were buried in silt.

The fish in the picture had only its tail exposed out of the silt.

Water quality; habitat fish/aquatic inverts; There was good water flow and clarity, little to no margins and expected minimal supported life with highly enriched water way.

Desired action- Replant and fence the riparian margin throughout the farm land and catchment area.

Water Quality

Turbidity (NTU) = 19.3 **Conductivity µs/cm =243** **pH = 8.17**

Mohaka water quality results summary

Mohaka River	Turbidity	Conductivity	pH
Kakariki Stream	10.3	278	7.77
Tutumaru Stream	7.66	265	7.86
Te Rapa Stream	14.1	603	8.1
Heruheru Stream	5.84	298	7.97
Mangawharangi Stream	14.7	94.1	6
Kaka Creek	16	480	7.84
Waipapa Stream	13.8	423	7.2
Mohaka River (Waipapa)	419	124.3	8
Mangawhekehou Stream	19.3	243	8.2
Managahopai Stream (Haliburton rd)	9.45	74	5.99
Mangapurua Stream (Willowflat settlement B)	47.6	171.2	7.16
Te Hoe river	325	84	7.57
Mohaka river (100m Up from Te Hoe)	142	93	7.53
Mohaka River (Willow Flat)	222	116.5	6.68
Mangaturanga Stream	20.3	139	7.35
Average	**85.80**	**232.41**	**7.41**

The Turbidity results indicate the presence of streams with highly modified margins and intensive farming and forestry operations. It supports the need to ensure better land use practices. Kaka Creek for example was monitored directly after the flood and had an outstanding result, but once returned to normal flow had severely degraded (See photo Mohaka survey). The results of the pH monitoring indicated the Mohaka catchment is greatly variant ranging from 6-8pH. The Mangawharangi Catchment area has been historically used as a site for a number of community dumps which may have contributed to the acidic result. The conductivity shows that there are differences in the geology of the catchment and throughout the sampled areas. The Mangahopai site sample was taken near a small wetland area and can be noted to have a higher biological extraction through plant uptake. The Te Rapa site has indicated that it has potential to be spring fed with a very concentrated result, as the land use is predominantly farmland that has been let go and is now regenerating.

Mohaka River Cultural health Index Summary

Key Indicators

1= Unhealthy		3=Marginal		5=Healthy

Status of site; Traditional Association; High

Mahinga Kai. 3

Land use = 1 Lands heavily modified. Wetlands and Marshes lost

Vegetation = 3 Patches of vegetation minimal indigenous, some exotic

Use of the River banks & margins = 1 Margins Heavily Modified lower reaches, shingle extraction, slight modification in the upper = **3**

Riverbed Condition (Sediment) = 3 High flow rate of shingle river bed, silt transportation effecting lower reaches.

Changes to the River Channel = 3 Moderate modification, accelerated by shingle extraction and widening.

Water Quality = 2 Pollution quite evident

Water Clarity = 1 Water heavily discoloured in main body of water

Impact on Habitat = 2 River health is detrimental to the aquatic habitat, consistent from the Te Hoe downstream to the mouth.

Are you satisfied that the present condition of the river protects Cultural values at this site? = No

10. Summary of Health Index Statistics

All sites surveyed had high Cultural status

The majority of sites showed a limited capacity for Mahinga kai

The surveys have been limited to daytime observations

None of the water at the sites was fit for human consumption given the proximity of domesticated and feral animals to waterways.

The Testing of water samples was limited to Turbidity, Conductivity and PH and the time frame parameters of the monitoring schedule. To enable a snap shot of the water quality within the time frame.

The water survey results indicate that water quality results can be manipulated based on timing, of testing in different weather conditions that influence phytoplankton activity and the physical and chemical parameters of each tributary.

If you survey directly after a flood, much of accumulated evidence regarding pathogens has been flushed into the sea or diluted. If you survey a month after a flood later the results will differ often showing a worst water quality result. As illustrated with Kaka Creek photo of lowered (average flow) post high flood water.

Each site indicated a varied degree of mismanaged land use and indicated the water way would benefit from rehabilitation programme.

Large parameters fundamentally influencing the catchment is sedimentation and surface run off causing flash flood characteristics throughout all sample locations.

Photo showing silt deposition on the lower Mohaka after the Jan 2011 flooding.

Mahinga Kai values of the catchment were observed to have been compromised by silt, pollution and removal of habitat to support fisheries.

Riparian margins have largely been grazed and the waterways require fencing to provide protection.

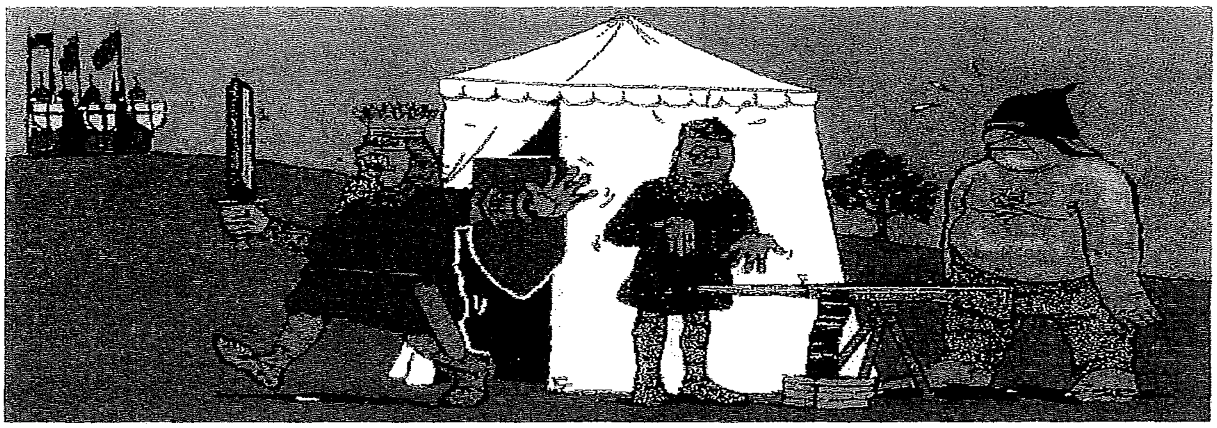
Adjacent land use being steep hill sides of farm have a greater risk of slipping and where this is already prominent there is a need to remedy areas of high risk and already shifting land.

Access to all sites is varied and no access to areas of head water because of private land and forestry operations.

11. Conclusion

The Report described the river catchments and the long period of occupation by the ancestors of Ngati Pahauwera. The Waikari, Mohaka and Waihua rivers are important to the spiritual and psychic essence of Ngati Pahauwera and the Iwi social and economic survival. The resources on the land, the river, and the sea were managed by Ngati Pahauwera in a sustainable manner for the long-term interests of the Iwi. The Cultural Health index was used as a tool to provide a conclusive report to show there is an adverse Cultural impact on Ngati Pahauwera and the health of the rivers as a result of land use. The Assessment identified the rivers are in a state of ecological collapse. The waters were tested at each site to support observations.

The Report recommendations advocate for a collaborative approach by all river stake holders to develop a strategy that will restore the mauri ora of the river. A precursor to that is the need to accept that we need a new approach to succeed and a commitment by all stakeholders to a change management strategy. The time has come to put the health of the rivers above the small group of land users who resist change and ignore the wider environmental, social, cultural and economic benefits of embracing new ways to measure enduring success.



"I've a battle to fight, I haven't got time to look at new inventions!"

12. Glossary/APPENDIX 1

Meaning within the context of the report

Iwi.	The Ngati Pahauwera members
Hapu	Affiliated whanau groupings to Ngati Pahauwera.
Moana	Sea
Awa	River
Waiata	song
Tuahu	Land marks and rocks that marked sacred places
Kaumatua	Male Elders
Kuia	Female elders
Tipuna	Ancestors
Whakapono	Religious s beleif
Karakia	Prayer
Te mita o te reo	Dialect
Taurima nga marae	Care for the marae
Taonga.	Something valued.
Tiaki taonga	Care for tribal treasures
Nga mahi o te ra	Everyday activities
Hui	Gatherings
Tangi	Grieve, pay respect to the dead
Whakapapa	Genealogy
Whaikorero	Oratory at hui
Korero pakitara	gossip and tales
Korero Tawhito	Ancient stories
Manaakitanga	Hospitality

Nga tohu o nga tipuna	The marks on the land/symbols of the ancestors
Tikanga	The ethics
Kawa	The rules/protocol
Mahi a ringa	Action songs
Haka	Dance
Whakairo	Carving
Moko	Tatoo
Tino rangatiratanga	Absolute authority
Pa tuna	Eel wier
Ope	Group/war party
Manaakitanga	The practice of respect and hospitality
Maunga	Mountain
Piko	Frond/ bend in the river
Te Ao Hurihuri	The changing world
Koiwi	Human remains or human bones
Pa anga	an association with the land through the bones of your tipuna.
Pikau/kete	Bags/kits
Patiki	Flounder
Inanga	Whitebait
Kanae	Mullet
Kewai	Freshwater crayfish
Kakahi	Freshwater mussel
Upokokaroro	Cockabully type fish
Tuora,Takutaku,Tohiora,tohi,ahu.	Ceremonial rites associated with birth and health

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"H"

2012 - 2017

STRATEGIC PLAN

Ngati Pahauwera Incorporated

This is the exhibit marked "H" referred to in the affidavit of Toro Edward Reginald Waaka on behalf of the Trustees of the Ngāti Pāhauwera Development and Tiaki Trusts affirmed at

NAPIER this 5th day of

DECEMBER 2014 before me

Signature:

A Solicitor of the High Court of New Zealand /Justice of the Peace

Cara Bennett
Solicitor
Napier

Contents

Background – leading up to the establishment of the Ngati Pahauwera Incorporated Society (NPIS).

Prior to the election of the NPIS Board in 1989, the Mohaka Maori Committee (MMC) had the obligation of looking after the social and cultural welfare of the Mohaka district (Kahungunu, Raupunga, Mohaka and Waihua communities). In 1985 the MMC was informed that government agencies were in the process of devolving the services of social and cultural welfare to the people. At a MMC meeting held on 10th April 1989 it was resolved that a public meeting be called to discuss the establishment of the Ngati Pahauwera Society. As a consequence of this resolution a draft constitution was prepared and tabled for discussion at a Special General Meeting held on 14th May 1989. At this meeting all members in attendance gave their consent to an application for incorporation of the said Society. It was also resolved that the MMC be the interim management committee for the 'Society' until the election of the Governance Board at the next MMC Annual General Meeting. This AGM was held on 29th July 1989 and the following community members were elected to the 'Board'.
Rose Taylor – Ereti Te Urupu whanau
Wiki Hapeta – Maraea Ropihana whanau
Maraea Aranui – Raupunga marae
Edward Te Kahika jr (Deputy Chairman) – Waihua marae
Niki Te Kahika – Kahungunu marae
George Harvey – Mohaka marae
Harry Hawkins – Kaumatua
Derek Huata – Rangatahi
Arial Aranui (Treasurer) – Sports and Recreation
Raymon Joe (Chairman) – Unemployed
Arthur Gemmell (Secretary) – Administration

Application for Incorporation

The following 15 persons (as members of the society) gave their signatures to the application for incorporation of the Society.

Aerial Aranui	Koea Pene
Tom Gemmell sr	Henry Pene
Betty Gemmell	Irene Stuart
Ihipera Te Kahika	Charlie King
Eruera Te Kahika	George Harvey
Eddie Te Kahika jr	Kahu Heta
Ani Hancy	Peter Ryder
Rose Taylor	

Ngati Pahauwera Certificate of Incorporation

This "Society" was registered under the Incorporated Societies Act 1908 in 02 June 1989.

Ministry of Economic Development
Manatū Ōhanga
Companies Office

CERTIFICATE OF INCORPORATION

NGATI PAHAUWERA INCORPORATED

436492

This is to certify that NGATI PAHAUWERA INCORPORATED was incorporated under the Incorporated Societies Act 1908 on the 2nd day of June 1989.

Registrar of Incorporated Societies
30th day of April 2012

REGISTRAR OF INCORPORATED SOCIETIES NEW ZEALAND

For further details visit www.societies.govt.nz

Certificate printed 30 Apr 2012 15:03:03 NZT

Ngati Pahauwera Incorporated Certificate of Registration

charities commission
Komihana Kaupapa Atawhai

Certificate of Registration

Ngati Pahauwera Incorporated

Registration number: CC27042

This is to certify that Ngati Pahauwera Incorporated was registered as a charitable entity under the Charities Act 2005 on 30 June 2008.

Sid Ashton
Chair

Trevor Garrett
Chief Executive

Compliance History of the NPIS

02/06/1989 – Alteration of Rules
08/10/1996 – Change of Registered Office
30/01/2003 – Dissolution Certificate
16/05/2003 – Notice of Restoration
05/09/2003 – Change of Registered Office
06/10/2003 – Alteration of Rules
17/06/2004 – Dissolution Certificate
08/07/2005 – Application for Restoration
23/07/2005 – Certificate of Registration
26/07/2005 – Alteration of Rules
12/11/2007 – Alteration of Rules
13/02/2008 – Change of Address
26/06/2008 – Alteration of Rules

NPIS Land Titles:
(Naumai Flats)

COMPUTER FREEHOLD REGISTER
UNDER LAND TRANSFER ACT 1952

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**HBJ3/1353**
Land Registration District	**Hawkes Bay**
Date Issued	22 April 1982

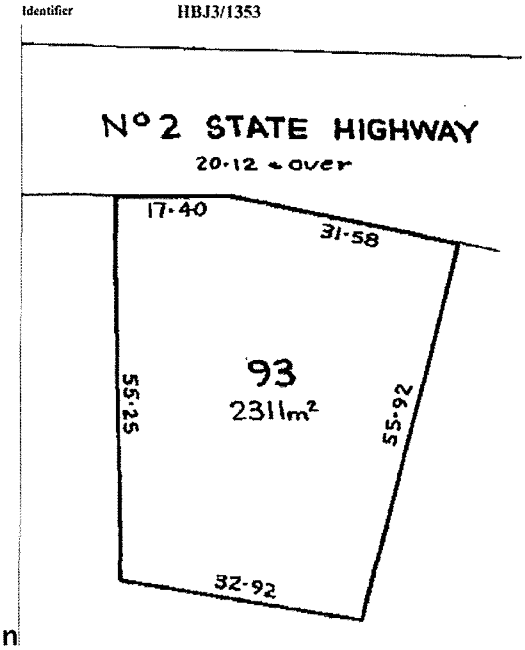
Prior References
HBPRJ3/1352

Estate	Fee Simple
Area	2311 square metres more or less
Legal Description	Raupunga Township 93 Block

Proprietors
Ngati-Pahauwera Incorporated

Interests

Identifier HBJ3/1353



Naumai Flats Site Plan

Mohaka B35 – Section 436/1953 (That piece of land containing 6035 metres squared situated in Block 1X, Waihua Survey District).

ORDER REVESTING LAND ACQUIRED FOR A PUBLIC WORK

The Maori Affairs Act 1953
Section 436

In the Maori Land Court)
of New Zealand)
Tairawhiti District)

87 Wairoa MB 126

IN THE MATTER of the land known as:-

MOHAKA B35

At a sitting of the Court held at Gisborne on the 26th day of February 1990 before Norman Francis Smith, Esquire, Judge.

WHEREAS the land described in the Schedule hereto was acquired for the purpose of a Maori School

AND WHEREAS the said land is no longer required for the purpose for which it was acquired

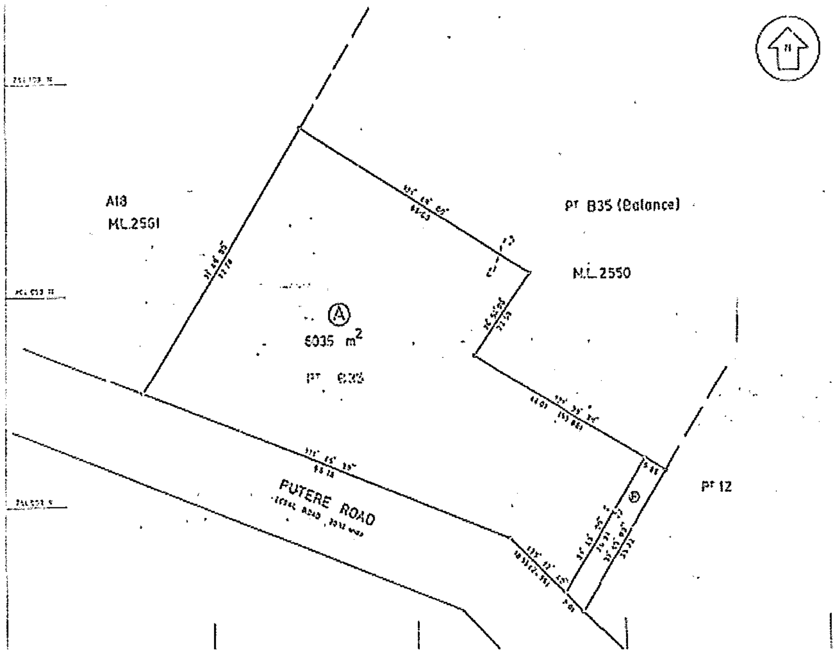
NOW THEREFORE upon hearing an application by the Minister of Lands for an Order vesting the land in the person or persons justly entitled IT IS HEREBY ORDERED that the land described in the said Schedule be and the same is hereby vested in the Ngati-Pahauwera Incorporated Society.

AS WITNESS the hand of Heta Kenneth Hingston, Esquire a Judge and the Seal of the Court.

THE MAORI LAND COURT OF NEW ZEALAND

JUDGE

NPIS Land Area Plan (Administration Building Site)



The Current NPIS Board Members are:

Janet Huata jr – Raupunga marae
Janet Huata sr – Kaumatua
Maraea Aranui – Maraea Ropihana whanau
Arthur Gemmell – Community (Chairman / Administration)
Charlie Lambert – Unemployed (V.Chairman / Quality Manager)
Edward Te Kahika – Kahungunu marae
Ngaire Huata – Sport and Recreation
Eddie Gilbert – Putere marae
Wayne Taylor – Ereti Te Urupu whanau
Lyshana Aranui - Rangatahi

NPIS Buildings

Ngati Pahauwera Incorporated Society has taken ownership of two independent buildings in Raupunga (Northern Hawkes Bay)

1) The NPIS Administration Building at 30 Putere Road, which houses the Ngati Pahauwera Health services and the Te Rau o Te Oriwa Kohanga Reo.

2) The Naumai Flats situated directly off State Highway 2, comprises two blocks of dual one bedroom flats.

The Current Environment

The NPIS receives rent from the Hauora, Kohanga Reo, EIT and Naumai Flats as the main source of regular income, and a large proportion of these funds are committed in this financial year to the Naumai Flats, for urgent repairs and maintenance.
This work involves replacing the water pump, installing new stoves and hot water cylinders in flat 2 and flat 4 respectively and repairing all the plumbing and electrical wiring in all four flats.
Hauora Health Services (HHS) - It is common knowledge that five of the community Hauora health services in the Wairoa district will eventually amalgamate under the auspices of Te Whare Maire o Tapuwae (TWMoT). The question arises as to when will this transition occur and to what impact will it have on the future management and operation of the NPIS Hauora services which employs a fulltime service manager and assistant as well as a few other part-time staff.
The Eastern Institute of Technology (EIT) is currently involved in running a horticulture course utilising the NPIS grounds for gardens and the NPIS conference room for theory.
The NPIS is currently sponsoring the local netball teams and the EIT horticulture course in the purchase of essential equipment and materials.
Naumai Flats (NF) – Flat 1 and flat 3 have been let to tenants since April 1, 2011 and flat 4 has been occupied (without a tenancy agreement) since October 1, 2011. Flat 2 has been under repairs for sometime and hopefully will be available for tenancy within the next two months.

Where do we want to be in 2017?

To have an organization that;

1) Has a strong Board with the right balance of skills and experience.
(Clearly understands the respective roles of all involved)
2) Is accountable and transparent.
(Complies with good-practice standards and relevant ethical issues)
3) Maintains a focus on learning and improving.
(Assesses its own performance and monitors changes in relevant social trends)
4) Is clear about its purposes and direction.
(Actively reviews its purpose in relation to the needs of it's beneficiaries)
5) Sound and prudent.
(Controls and manages resources to achieve the best possible value from them)
6) Has the right people for its activities.
(Ensures it has the right qualities and competence in its people to manage and support the delivery of its services)
7) Shows fitness for its purpose
(Implements policies and procedures to efficiently deliver services and to engage as required cross culturally with all ethnic groups)

This strategic plan

This Strategic Plan has been developed by the Ngati Pahauwera Incorporated Society (NPIS) to support its role as a provider of social and cultural services for the people of the Mohaka district.

This Strategic Plan is intended to be used as a tool by the NPIS to respond to the long term environment within which it operates. It requires planning to occur at the governance level. In itself, the Strategic Plan provides a statement of how the organisation will achieve its goals and meet its challenges.

This plan is for a five year period and incorporates three critical elements:

i. The **strategic vision and objectives** – these are extrapolated from the NPIS's constitution. Each of the objectives is incorporated into a detailed breakdown which includes the following
ii. **Targetted outcome dates** – the expected time period within which the objectives are expected to be achieved. Not all activities identified have outcome dates as in some cases, the targetted outcome may be ongoing or non-specific
iii. **Key performance indicators (KPIs)** – these are indicators which can be used to ensure that the strategic objective is being successfully implemented and on target to be achieved. They provide a benchmark for performance.

The Strategic Plan should be reviewed annually. When reviewed, the key performance indicators will be used to assess whether the strategy is being achieved or whether changes are necessary.

Core Values

The NPIS is able to demonstrate capacity and capability to apply Maori values, beliefs, obligations and responsibilities to support Whanau connection with Te Ao Maori by facilitating:

- The spiritual and cultural reconnection of Whanau with maunga, awa, moana and other icons in terms of Hapu and Marae.
- The NPIS represents the social and cultural interests of five marae; Putere marae, Kahungunu marae, Raupunga marae, Mohaka marae and Waihua marae.
- The NPIS is committed to Te Tirity o Waitangi; to support the principles of partnership, protection and participation. We embrace traditional Maori values and concepts realizing for many, the key to Tino Rangatiratanga.

Strategic Vision

To be an effective and efficient provider of social, cultural and health services within the Mohaka district of Northern Hawkes Bay

Purpose

The NPIS mission is to enhance entity obligations/responsibilities and to revitalize, protect and retain the rangatiratanga and mana of Whanau.

Guiding Principles

The following principles will apply:

- Te tikanga o te Whanaungatanga;
  All members will acknowledge and respect their close links and the binding nature of their whakapapa.
- Te tikanga o te Manaakitanga;
  All members will support and respect each others ability to care for whanau in achieving positive outcomes.
- Te tikanga o te Mahi Tahi;
  All members will acknowledge and respect the capacity to work collaboratively and collectively in achieving positive outcomes for all Whanau, Hapu and Iwi.
- Te tikanga o te Wairua;
  All members will acknowledge, support and practice 'Taha Wairua', further binding and providing a unique focus on caring for and retaining the Mana and Rangatiratanga of all whanau.

Well-being

The NPIS agree that the well being (oranga) of the whanau is paramount and all members will adhere to:

- **Mana Atua**
  All members will practice and acknowledge the strength derived from a positive relationship with our Atua.
- **Mana Whenua and Mana Moana**
  All members accept the strength derived from a relationship with the natural environment, and the authority of each Marae entity.
- **Mana Tupuna**
  All members agree, practice and support the strength derived from a positive and healthy relationship to ancestors and whakapapa, including 'taonga tuku iho'.
- **Mana Tangata**
  All members agree to maintain the strength of relationships with one another as a benchmark and model to connect the unconnected whanau to extended whanau.

Strategic Goals:

1. To develop an **effective and efficient organisation**
2. To promote and support **healthy and sustainable lifestyles**

1. An Effective and Efficient Organisation

To develop and maintain a credible, efficient organisation with the appropriate structures to ensure **sustainability**

In order for the NPIS to successfully manage the future health and welfare needs of its members, it will need to ensure that suitable systems and processes are in place.

In the first two to three years of this Strategic Plan, these systems and processes will not need to be complex but they should be sound and easy to use.

Critical elements associated with this goal are:

a. ***Governance:*** Establish proper governance policies and procedures, and implement these effectively and consistently. This will include maintaining minutes of trust board meeting, records, authorities and decisions.
b. ***Financial Management:*** Establish a robust financial accounting system that includes accurate and comprehensive records and meets the requirements of the auditors.
c. ***Administration:*** Establish sound business administration policies and systems including file and document management, correspondence, email and paper records, asset management and procurement information.
d. ***People Management:*** Operate legally and morally sound human resource practices that protects, value and enhance the skills and abilities of Board members and those employed by the NPIS. This will include employment agreements, performance management, contracts for service, remuneration and training and development systems.
e. ***Public Relations:*** Produce an Annual Report each year that reports back to members and maintain all reports to funders as required.
f. ***Planning:*** Develop and implement a strategic approach to achieving the goals and objectives through a Strategic Plan outlining the NPIS's core activities.
    - Financial Plan; covering financial structures adequate to meet tax and audit requirements, income potential, levies or royalties, research and development opportunities and / or grants; prioritise how income will be spent or allocated to the budget
    - Operational Plan; Marketing Plan; Training Plan as required
g. ***Communication Plan:*** develop a communication network and database of members with current postal and email addresses, phone contact details.

2. Healthy and sustainable life styles

To develop and maintain health, recreation and social welfare services with appropriate resources to ensure sustainability of better lifestyles.
The Mohaka district has a very proud cultural history and it is essential that the NPIS maintains this cultural richness by making better use of economic and social welfare opportunities.
Likewise the NPIS will develop governance and management strategies that will ensure sustainable outcomes from the Hauora Service and the Naumai Flats enterprise.

Activities associated with this goal are;

a. ***Social Services:*** offering health, cultural, education, sport & recreation services to the community as well as a wide range of life-skills training.
b. ***Feasibility:*** identifying key projects which will be investigated as to viability. These are likely to involve projects which require external funding and support.
c. ***WIIE funding:*** promoting whanau development and economic independence.
d. ***Housing and accommodation***: providing opportunities for members and their families to enjoy better living conditions.
e. ***Maintenance support:*** ensuring that urupa and other community facilities are well maintained.
f. ***Sponsorship:*** giving financial assistance to projects; groups and individuals showing potential in sport, recreation, education and cultural development.
g. ***Employment-based courses***: utilizing the land and activities undertaken on it to capture opportunities for employment and training which contribute to the well-being of whanau.

Five Year Plan 2012 to 2017

Sustainable Entity	**2012 – 13**	**13 – 14**	**14 – 15**	**15 - 16**	**16 - 17**
Strategies;					
Governance Manual	*Prepared*	*Approved*	*Review*		
TAS Audit Group	*Appointed*	*Review*			
Financial Plan (FP)	*Approved*	*approve*			
Operational Plan		*Prepare*	*Approve*		
Internal Analysis		*Prepare*	*Approve*		
Training Plan		*Prepare*	*Approve*		
External Analysis		*Prepare*	*Approve*		
Strategic Plan (SP)	*Prepared*	*Approved*	*Review*		
NPIS Constitution	*Review*	*Evaluate*			
TWMoT Charter	*Prepared*	*Approved*	*Review*		
TWMoT Governance	*Planning*	*Continuing*	*Approve*		
Marketing Plan (MP)		*Prepare*			
STEPP Plan		*Prepare*			
Goal: Healthy Lifestyles					
Staff Appraisals	*Appraised*	*Continue*			
Services	*Maintained*	*Review*	*Evaluate*		
Q.M. Appraisals	*Organize*	*Continue*			
P.M. Position	*Research*	*Continue*			
Naumai Flats (NF)	*Review rent*	*Continue*			
EIT Courses	*Horticulture*	*Promote*	*Continue*		
WIIE Fund	*Promoted*	*Continue*			
Diversification		*Promote*	*Continue*		
Work-based Courses		*Research*	*Continue*		
Sponsoreship Funding	*Distributed*	*Review*	*Evaluate*		

Annual Plan 2013 - 14

Goal 1 - Sustainable Entity	KPIs	Status	Comment
i) Building/Grounds (B/G)	Maintain B/G		
ii) Governance Manual (GM)	Review GM		
iii) Financial Plan (FP)	Approve FP		
iv) Board Appraisals (BA)	Carry out BA		
v) Governance Training (GT)	Organize GT		
vi) Strategic Plan (SP)	Review SP		
vii) NPI Constitution (NPIC)	Review NPIC		
viii) TWMoT Charter (TWMC)	Review TWMC		
ix) Asset Register (AR)	Update AR		
x) Public Relations (PR)	Address PR		
xi) Governance Committees (GC)	Review GC		
xii) Communication Network (CN)	Establish CN		
Goal 2 - Healthy Life-styles	**KPIs**	**Status**	**Comment**
i) Hauora Transition (H.T.)	Resolve HT issues		
ii) Staff Employment (S.E.)	Resolve SE issues		
iii) Hauora Services (H.S.)	Improve HS		
iv) Staff Appraisals (S.A.)	Organize SA		
v) Naumai Flats (N.F.)	Review NF agreements		
vi) WIIE Fund (W.F.)	Promote WF		
vii) EIT Courses (E.C.)	Promote EC		
viii) Sponsoreship Funding	Formulate SF policy		
ix) Communications (C)	Formulate C policy		
x) Office Equipment (O.E.)	Maintain fixed assets		
xi) Q.M. Appraisal	Organize QM appraisal		
xii) Project Manager (P.M.)	Appoint P.M.		