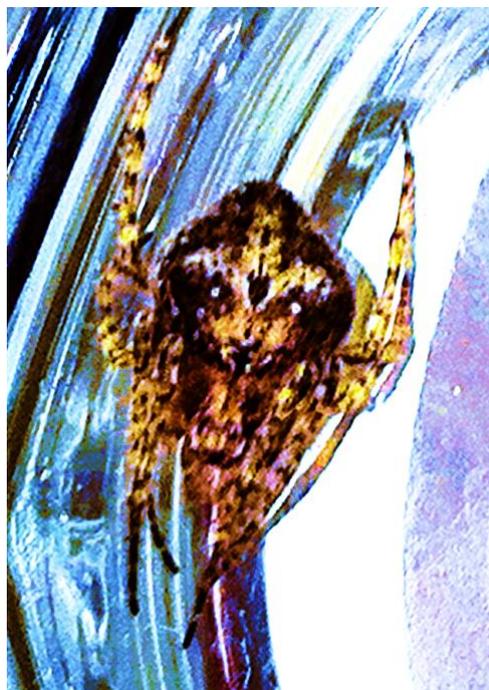


The Stabilising Influences of Tauihu and Taurapa on Māori Waka

Te ara o tukutuku pūngāwerewere

*The pathway of the spider. Said when something is intricate and very beautiful
(Grace, Grace, & Potton, 2006 p88)*



By Quentin Roake

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at

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Dedication

For my brother

Acknowledgements

To my wife Frankie, thank you for all your support, none of this would have happened without your even hand on the tiller.

To Hekenukumaingaiwi Pūhipi Busby, thank you for your generosity, openness and infectious enthusiasm for all things waka.

To Hoturoa Barclay Kerr, thanks for your friendship, encouragement and support. Time to head for the pass.

To Herman Spöring and Sydney Parkinson who didn't make it home. Thank you for your attention to detail. (Sydney Parkinson 1745 – 26 Jan 1771 (buried at sea) aged 26, Herman Diedrich Spöring 1733 – 24 Jan 1771 (buried at sea) aged 38)

To my Tainui tupuna who help me to stay focused on the bigger picture but are also there for me practically and in a whirlwind of activity likely to drop in to help change a tyre.

To my nephew Huka who thinks nothing of flying in just to give me some encouragement.

My supervisor and friend Professor Karen Nero, thank you for all your positivity, insights and encouragement in helping me find my way back after the earthquakes. My hope is that we continue these discussions.

To Tom Walsh, thanks for keeping everything going and giving me the space to do this.

I would like to also thank the Ministry of Business, Innovation & Employment for supporting this research.

And last but not least to my little mates that understand waka carvings. I see you.

The Stabilising Influence of Tauihu and Taurapa and the translation of Māori Waka into modern forms.

This multi-faced archival, interview and actions research project sought to understand the practical function of tauihu and taurapa in moderating canoe motion and their relevance to new generation waka. Knowledge of the dynamic stabilising role of the prow and stern carvings of Māori waka has dropped out of conscious use but still sits within the built and oral tradition.

This study forms a key part of Nga Waka Tangata kaupapa, a project developing contemporary forms of Māori waka in collaboration with Hoturoa Barclay-Kerr. Our approach has focused on maintaining the lineage of tikanga and of mātauranga within the construction of a new forms of waka which are intended to be used as the vehicle for a range of social, cultural and economic initiatives.

The research method took the form of a cyclical dialogue that explored understanding from the oral tradition through korero with waka tohunga, in conjunction with analysis of historic hulls, images (moving and still) and text. Findings were fed back into the on-going discussion. The first iteration of a contemporary waka was developed concurrently, built and tested with findings also contributing to on-going dialogue. This process culminated in a second generation design that embodies the research findings.

These results have made a significant contribution to the overarching kaupapa to reinitialise the fullest expression possible of traditional knowledge within contemporary waka culture. In the wider context it has aided in revaluing the significance of intellectual discovery through action, revaluing the significance of oral history, and promoting recognition of the opportunity that the breadth of this project presents to recreate the social and economic capital of Aotearoa New Zealand.

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Glossary of Māori Terms (Main reference Te Aka Online Māori Dictionary)

Ao	World, globe, the earth.
Aotearoa	The Māori name for New Zealand.
Ama	Outrigger float.
Atua	God, deity, supernatural being, ancestor with continuing influence.
Haumi	Extension, piece of wood used to lengthen a canoe hull.
Iwi	Tribe, nation, people, strength.
Kahikatea	<i>Podocarpus dacrydioides</i> , also known as White Pine.
Kaitiaki	Guardian spirit, caretaker, trustee.
Karakia	Incantation, ritual chant, chant, intoned incantation.
Kaunaroa	Main or central part of canoe hull, not including <i>haumi</i> .
Kaumātua	Adult, elder.
Kaupapa	Strategy, theme, fleet of ships.
Kauri	<i>Agathis australis</i> - largest forest tree found in the North Island.
Kete	Basket, kit.
Kōrerorero	Formal speech.
Mahi	Work, job, employment
Mana	Integrity, prestige, authority, control, power, influence, status, spiritual power, charisma - <i>mana</i> is a supernatural force in a person, place or object.
Manaakitanga	Hospitality, kindness
Marae	Courtyard - the open area in front of the <i>wharenui</i> , where formal greetings and discussions take place. Often also used to include the complex of buildings around the <i>marae</i> .
Mātauranga	Education, knowledge, wisdom, understanding, skill.
Paewai	The batten covering the joint between the dugout canoe hull and <i>rauawa</i> (top boards).
Pākehā	Non Māori, European, Caucasian.
Pounamu	Greenstone, nephrite, jade.
Rangatahi	Younger generation, youth.
Rauawa	Top boards, attached sides of a canoe above the dugout hull.
Tāne	<i>Atua</i> (god) of the forests and birds.
Tangaroa	<i>Atua</i> (god) of the sea and fish.
Tangata	People, humankind.
Taonga	Treasure, anything prized. ‘Taonga’ refers to all dimensions of a tribal group’s estate, material and non-material – heirlooms and <i>wahi tapu</i> , ancestral lore and <i>whakapapa</i> , etc. (Kawharu, 1989 p321)
Tapu	Sacred, prohibited, restricted, set apart, forbidden, under <i>atua</i> protection.
Taranaki	Region in the west of the North Island in the vicinity of Mount Taranaki.
Tauihu	Prow carving.
Taumanu	Thwart, a strut between the <i>rauawa</i> (top boards) of the canoe.
Taurapa	Stern carving.
Tikanga	Correct procedure, custom, code, convention.
Tipuna	Ancestor, grandparent.
Tupuna	Ancestor, grandparent - western dialect variation of <i>tipuna</i> .

Tohunga	Skilled person, chosen expert, artist, priest - a person chosen by the agent of an <i>atua</i> and the tribe as a leader in a particular field because of signs indicating talent for a particular vocation.
Tōtara	<i>Podocarpus totara</i> , <i>Podocarpus cunninghamii</i> - large forest tree.
Tūmatauenga	<i>Atua</i> (god) of war.
Wairua	Spirit, soul, quintessence.
Wāhi tapu	Cemetery, reserved ground.
Waka	Canoe, vehicle, conveyance, spirit medium.
Waka ama	Outrigger canoe.
Waka taua	War canoe.
Waka tētē	Fishing canoe.
Whai korero	Formal speech
Whakapapa	Genealogy, genealogical table, lineage, descent.
Whānau	Extended family, family group.
Whareniui	Meeting house, the main building of a <i>marae</i> .

Kawharu, I. H. (1989). *Waitangi : Maori and Pakeha perspectives of the Treaty of Waitangi*: Auckland, N.Z. : Oxford University Press.

Chapter 1

NGA WAKA TANGATA – A CONTEMPORARY APPROACH TO COLLABORATIVE WAKA CULTURE REVITALISATION.

1.1 INTRODUCTION

Pacific canoe traditions are awe inspiring in their complexity. The Pacific Ocean occupies one fifth of the earth's surface. Over four millennia men and women have voyaged to populate all corners of this vast expanse of sea. The *waka* (canoe) cultures of the Western Pacific that seeded this process have survived and evolved. Distinct waka cultures of newly settled island groups have evolved in answer to new climatic, social and material constraints. In each case voyaging and canoe building culture has been strengthened by adapting and extending core knowledge with new ideas and materials.

This waka knowledge system is holistic, drawing upon physical and metaphysical elements in a dense, interconnected matrix of understandings from which knowledge is recognised through a process of experiential revelation.

The effects of colonialism, disease and migration over the past two hundred years or so have had a devastating effect on Pacific cultures. Waka culture in particular has contracted through for example being banned in order to disrupt communications and isolate people.

Over the last few decades there have been a number of initiatives throughout the Pacific that have focused on the recovery of waka-based culture through cross-generation training programmes. Many of these have been centred on the practice of building, paddling and sailing of waka. Examples of these are the outrigger sailing canoe programmes in the Marshall Islands (Miller, 2010) voyaging canoes such as Hokul'ea and Makali'i from Hawai'i and Ngahiraka mai Tawhiti, Te Aurere and Hawaiki Nui (Kottmann, 2000) of Aotearoa . Other methods of making waka culture current and also more relevant to youth have been explored utilising digital technologies developed by researchers such as Vinente Diaz through his Virtual Atolls Project, (<http://www.anthro.illinois.edu/people/vmdiaz>) that looks to aid cultural survival in the Western Pacific through the use of advanced imaging technology . Diaz has also used film as a poetic means to invoke a deeper relationship with and experience of culture (Diaz, 1997). In these ways waka culture has re-established its currency and future relevance. This has been a process of re-learning rather than creating knowledge. Studies of Māori canoes and voyaging include *Te Waka! Life histories of two contemporary Polynesian voyaging canoes*. MA thesis (Kottmann, 2000), *The Waka As An Expression Of Māori Mana In The Twentieth Century* (Kerr, 2008)

This research is primarily concerned with the Polynesian experience. Polynesian voyaging culture was so depleted that it had to look to its parent cultures in order to relearn the holistically based knowledge required to reboot the composite structure of their localised knowledge. The key point is that they had to return to their origins to relearn the structure of this system of knowledge and re-establish a holistic attitude. In this study I have adopted this approach and received the benefit of broad support that flows from that attitude of mind.

In this study I will focus on the *tauihu* (prow carving) and *taurapa* (stern carving) of Māori *waka tētē* (fishing canoes) and *waka taua* (war canoes) and their role in moderating waka motion. I will also

look at the design of contemporary canoes of these types and their application enabling waka culture recovery in Aotearoa New Zealand. This process is viewed as another example of how waka, through innovation, may adapt to their times and maintain traditions of *tikanga* (custom) and *mātauranga* (knowledge).

1.2 BACKGROUND

This study addresses the need to better understand the technical and cross cultural issues faced by *Nga Waka Tangata Kaupapa* (The peoples waka project) in its efforts to revitalise traditional waka culture in Aotearoa New Zealand. This project stems from my on-going collaboration with Hoturoa Barclay- Kerr (Tainui).

Nga Waka Tangata Kaupapa aims to make available affordable, easily portable, contemporary Māori waka as the vehicle for a range of social, cultural and economic initiatives. By applying computer design/production techniques and modern materials to traditional waka a new form has been developed. These new waka are built of composite curved components bonded together to produce a sturdy lightweight hull. This form conceals buoyancy and ballast within strong traditional lines. The hulls are designed to take traditionally carved tauihu and taurapa with all wooden elements including *taumanu* (Thwart)and *paewai* (the batten covering the joint between the dugout canoe hull) and *rauawa* (top boards) being able to be lashed on using traditional methods, details and materials.

This is a multi-dimensional idea that has the potential to impact all of Aotearoa. It weaves together, in a practical tangible way, strands of our cultural identities. It has the capacity to change how we see ourselves and how the world sees us.

This work has been achieved in collaboration with *tohunga waka* (canoe experts). Through discussion and practical investigation members of the project have recognised knowledge that has dropped out of conscious use. Throughout this research work and the development of new forms of waka we have maintained the intention of preserving the lineage of tikanga and of mātauranga.

Māori waka tradition has suffered from long periods when due to restricted access to trees and or lack of resources no new waka were built. During these times it was not possible for tohunga to impart the depth of knowledge that is taught through practical demonstration. However, this knowledge is recoverable as it sits within surviving historic waka, oral traditions and memory in what may be seen as a contracted or condensed form. Our collaborative approach looks to develop new methods and ways of understanding waka technology and to embody this knowledge in contemporary forms of waka.

Northern hemisphere canoes i.e. Hawai'ian waka ama, First Nation North American sea kayaks and so called 'Canadian' canoes are now commonplace in Aotearoa, whilst Māori waka that have evolved for local conditions over several centuries are rarely seen. All these introduced forms have survived and flourished by adopting contemporary construction techniques and materials that make them practical in this time. For example, Hawai'ian waka ama that evolved in response to local sea conditions underwent a huge resurgence of interest with the introduction of fibreglass in the 1950s as an alternative to increasingly scarce Koa trees of suitable size.

Māori waka are the most recently evolved form of Polynesian canoe and are far more complex to translate into modern materials than Hawai'ian waka ama, because of the integrated nature of the different methods used in their stabilisation. Māori used much larger trees to develop waka that did

not require out-riggers for stability, instead using a number of strategies including both static floatation (buoyancy and ballast) and dynamic principles employing motion dampening techniques.

1.3 FOCUS OF THIS STUDY

This study advocates the importance of three main issues, a) the support of recovering the inter-related parts of the waka knowledge base and the holistic nature of its understanding, b) the re-understanding of the dynamic functions of waka elements and their role in developing new material waka, and c) the potential for Nga Waka Tangata kaupapa to act as a transformational praxis for our society.

I am Pākehā. This study has been undertaken in a collaborative spirit. What it has brought to the table is a different viewpoint, one that has revealed some key elements of knowledge and clarified a practical means of both restoring Māori mana and redeeming the relationship between Māori and Pākehā.

In the course of this study key relationships have been formed and strengthened, research into waka function has revealed pivotal understanding and its recognition has enabled new forms of waka to be developed and prototyped.

1.4 MAIN ISSUES

There are complex technical and cross cultural issues surrounding Nga Waka Tangata Kaupapa that require a deliberate and considered process for the recovery of knowledge and mana. This research report is seen as contributing to that process and providing a basis for others to build on.

This study started with the question ‘What is the practical function of the prow and stern carvings of Māori waka’? My thesis is that the physical function of tauihu and taurapa on waka taua and waka tētē is to adjust the ride of the dugout hull (with rauawa) to give the waka a controllable, comfortable motion.

Each tree used to produce a canoe hull is different. The density of timber in a log varies side to side. Pockets of rot and knots etc. all have to be taken into account during the hollowing out process. Because of this every finished dugout hull moves in a slightly different way. As detailed in chapter four, Māori have evolved a very sophisticated yet elegant method of controlling the motion of outrigger-less dugout canoes through the dynamic inertial influence of tauihu and taurapa. The dugout hull can be finished and then the final adjustments to its motion made through the addition of its carvings. Compared to the hull these elements are small, however they have a very noticeable dynamic effect in their resistance to rotational movement.

Knowledge of this aspect of Māori waka may not be currently understood or spoken of in western scientific terms. However I will demonstrate that understanding of the stabilising contribution of tauihu and taurapa is evident in traditional canoes and is articulated in the oral tradition. Those who build and paddle traditional Māori waka may not see the way they work from a scientific viewpoint, however they may easily recognise their knowledge from this new perspective. What is remarkable is that boat builders of the western tradition did not fully grasp these principles until the early 1980s. While understanding this aspect of Māori waka has formed the basis for this research, a wider holistic understanding of the field proved necessary.

The physical function of carvings was the starting point of this study, however this perhaps only reflects half the picture. The spiritual also plays a stabilising role through waka carvings in their articulation and embodiment of aspects of spirit. From a Pākehā perspective (and by this I mean a European outlook influenced and modified by Polynesian culture) the scientific outlook still holds sway. The scientific tradition works toward what can be proven and has a strong tendency to discount the spiritual. So while science provides a useful lens, in this instance it has shortfalls. As Hoturoa writes,

The waka contains within itself the answers to some of the great questions of history. Its mana comes not only from its power in action and from its beauty, but, above all, from its mystery. You cannot demand answers; you must discover them. First, you must ask the right questions. Just as the elders caution that understanding and wisdom cannot be obtained without humility and effort and will be denied to those who trust only in surfaces, so the mere presence of the waka stands as a challenge to those who judge without reflection, who rely on surfaces, and who seek information without understanding.' (Kerr, 2008 p2)

Waka have always been a focal point of Māori society and have become a primary symbol of Māori *mana* (Integrity, prestige, authority). Waka are well suited then as enablers of cultural revival and revitalization. We have a way to go before all cultures in Aotearoa are flourishing. Some refer to the current state of Māori cultural revival as a renaissance, however there is a great deal of cross cultural healing needed before this outlook can be said to be thriving. This study and the contemporary waka under development are intended to contribute to that process of revival and reconciliation.

1.5 METHODOLOGY

1.5.1 APPROACHES

The research allowed access to what has been in many cases privileged knowledge and this required a heightened level of surety in terms of the care to be taken of that knowledge, surety of both the mana of those undertaking the research and those endorsing it. Relationship is the key and fundamental element in this process. When I started this project in 2004 I first approached my local Iwi Ngai Tahu. Realising that this project required me to work at a pan Iwi national level I sought advice from two distinguished Professors of Anthropology at Auckland University Sir Hugh Kawharu (Rangatira Ngati Whatua) and Dame Anne Salmond (Pakeha). Both advocated the need for a collaborative approach. As Linda Smith writes 'decolonisation is a process that engages with imperialism and colonialism at multiple levels' (Smith, 2005) it is through this sort of close culturally embedded interaction that we may deal with the essence of hurt and find the means to heal. Through various introductions this led to my forming a close partnership with Hoturoa Barclay-Kerr (Tainui). At an early stage I travelled with Hoturoa to visit Hekenukumaingaiwi Pūhipi Busby the preeminent waka tohunga of Aotearoa. The involvement of waka tohunga Hekenukumaingaiwi Pūhipi Busby and Hoturoa Barclay-Kerr is of key importance. Hekenukumaingaiwi Pūhipi Busby is foremost in his knowledge and experience of Maori waka and Hoturoa Barclay-Kerr holds that position for the following generation being amongst other things; Kaiarahi Kaihoe Waka (Waka Programmes Manager) – Te Wananga O Aotearoa, Vice President International Waka Federation 2000-current, 32 Years Kings Waka Taua Kaihautu (War canoe captain) – Taheretikitiki, President NKoA (NZ National body for Waka ama) 1998-2004 and 21 years Waikato University Academic.

The method employed in this research is intended to reflect in nature and structure the state of being that the underlying *kaupapa* (strategy) intends for our peoples. I have been working in this sphere for eight years. In terms of research the process is now beyond collaborative, it is one of *whanau* (family) working towards a commonly held goal. The relationships established over this period form an indispensable foundation making possible a creative and restorative fusion of culture.

This process required a holistic approach, one that both holds and expresses understanding in the same light. It is a question of finding pathways to commonality, uncovering a shared understanding from within differing viewpoints. This process creates opportunities to become reacquainted with understanding that our cultural bias or circumstance has obscured. We share the same physical and spiritual makeup however each culture structures its understanding in different ways. Our experience may be the same but how we perceive it and what we make of it is very different.

1.5.2 ARCHIVAL, VISUAL AND ORAL HISTORICAL SOURCES

Very few complete waka taua or waka tētē have survived and detailed knowledge within the oral tradition is increasingly rare. There is also very little academic writing on the subject and pictorial documentation; drawings, paintings and photographs are scattered throughout collections.

Conventional data available can be divided into five sources.

1. Still images; drawings, paintings and photographs.
2. Historic waka hulls and carvings.
3. Film.
4. Interviews with waka tohunga
5. Text.

The research aims to recognise knowledge that is not lost but that may have dropped out of conscious practice, knowledge that is still embedded in historic waka and still sits within memory in a contracted form. The research method took the form of a cyclical dialogue that may be viewed as a helix through time. This dialogue delves into understanding from the oral tradition through consultation with *waka tohunga* (canoe experts) followed by analysis of historic hulls, images (moving and still), text etc, with each finding feeding back into the on-going discussion.

1.5.3 EXPERIENTIAL OR ACTION RESEARCH

By way of illustration consider this, the method used could be characterised as ‘Intellectual discovery through action’ however this sparks different meanings to the western and Māori mind-sets. To the western mind this phrase is likely underpinned by observational science, a collective understanding built around individualised contribution. The Māori experience of this phrase I would observe as quite different. Within this outlook it points towards ‘experiential revelation’. This is a collective viewpoint conceived as part of a spiritual/temporal whole. Within this tradition action is multidimensional. There is an engaged mental and spiritual connectedness, a mindfulness where the articulation of ideas may not necessarily be in words. This perspective recognises the validity of experience within different states of awareness, dreams for instance being seen as a continuation of the waking experience. However in both mind sets the focus is upon active engagement in observing and learning through experiential participation – an active and at its best a collaborative endeavour.

1.5.4 CREATING PROTOTYPE WAKA OF NEW MATERIALS UPHOLDING TIKANGA AND MAUTARANGA

At a practical level, we concurrently developed our first iteration of a contemporary waka, built and tested it with these findings also contributing to the on-going discussions. This culminated in a second generation design that embodies the research findings. As an architect by training I took the lead in designing, building and testing the prototype waka (see Chapter 4.5).

1.5.5 CHAPTER CONTENTS

In Chapter one, I have provided the background to this studies purpose in pursuing a better understanding of issues faced by Nga Waka Tangata Kaupapa. I have laid out the principle issues surrounding the cross cultural nature of this work as well as the technical aspects of translating traditional Māori waka into the modern forms. I have also discussed the collaborative nature of the research methodology used and positioned the project within the wider field of waka based programmes in the pacific. The focus of this study has been defined and the adoption of a more indigenously based approach to scholarship presented by the studies application of intellectual discovery derived through action, acknowledgment of the metaphysical and recognition of oral history. Chapter two, focuses on the theoretical writings of Paulo Freire, Scott Lash and Homi K Bhabha in clarifying the way collaborative social programmes work, different approaches to regaining power and the nature of collaborative spaces that enable cross cultural ventures. Chapter three, concentrates on issues surrounding the collaborative recovery of Māori waka culture and revival of that world. Two aspects of this process frame my discussions; the issues faced and the major findings of the study and secondly the capacity of this process to restore mana and the inherent Māori /Pākehā reconciliatory opportunities offered. Chapter four explores how these principles and recovered understanding have been used in the support and maintenance of tikanga and mātauranga in the development of contemporary forms of Māori waka. In this passage I deal with attitudes to innovation, the use of non-indigenous technologies and the inclusion of aspects of spirit Chapter five concludes by drawing out the main issues examined throughout this research report, summarising the key issues. Finally avenues for further Māori waka based study and development are suggested.

1.6 OVERVIEW

This study is intended to bring back to light an understanding of some of the essential dynamic stabilising relationships between waka components. With a detailed understanding of the functioning of traditional hulls it will, for instance, be possible to ‘tune’ the period of motion (roll, pitch and yaw) of contemporary waka built of composite materials to move in a very similar way to traditional hulls. The intention is not to replicate traditional waka in modern materials but rather to sustain their unique qualities, to embed these within the construction and practice of new forms, in essence to install the *wairua* (spirit) of the old in the new. The hope is that this understanding and process will help gather together and rebuild knowledge frameworks in their fullness, with contemporary waka culture also building awareness and support of the traditional.

Attention to this level of detail is aimed at ensuring that paddling and sailing tikanga is not only maintained in the new form but able to be given its fullest expression. Overall Nga Waka Tangata kaupapa is intended to first enable the restoration of *mana* (integrity, prestige) and voicing of identity and secondly to provide an opportunity for all Kiwis to get to know each other better. In so doing we may share in the understanding, imagining, building and experience of a better nation.

Chapter 2

KAUPAPA CLARIFYING THEORY

**Out beyond ideas of wrongdoing
and rightdoing there is a field.
I'll meet you there.**

**When the soul lies down in that grass
the world is too full to talk about.**

Rumi

While there are many different theoretical issues that have been addressed appropriately by this study such as dealing with archival material, taonga, oral histories, the most critical theoretical question considered here has been the very sensitive issue of how we could best collaborate and work together across different cultural and scientific outlooks.

Nga Waka Tangata kaupapa is intended to bring the peoples of Aotearoa together and help navigate towards a 'better Nation'. Through engagement with theory this research has shed light on the nature of Nga Waka Tangata kaupapa's potential to enable change. In this chapter I have sought to better understand the workings of this project by clarifying both the mechanism of its action through referencing the work of Paulo Freire (*The politics of education, Pedagogy of the oppressed*), and the empowering motive force that comes into play through that action through the writing of Scott Lash (*Power after Hegemony: Cultural Studies in Mutation*). To better understand the nature of the space needed to enable this possibility I have drawn on the writing of Homi K Bhabha (*Cultural Diversity and Cultural Differences*).

Having worked within this process for a number of years I find myself somewhat in between Pākehā and my growing understandings of Māori cultural norms. There is a willingness to collaborate, however the lack of a structured space within which to work cross culturally checks progress. The theoretical writers below speak to me about the ways in which new relationships and restorative processes may be instigated and succeed. Our intention is to bring people together. How do we do this? Where do we start when we as a multicultural society don't know each other's stories? What are the issues that need to be dealt with and how have people gone about this in other places? Clearly the American decades of Civil Rights Activism provides one example of the difficulties of coalition politics. From South African Anti-Apartheid resistance and in particular the South African Truth and Reconciliation Commission heroic strategies to peacefully reconcile and bring together the full nation is another powerful model for action. From both we learn both the difficulty of learning to work together across cultural divides, as well the transformative power of such endeavours. It will never be easy, as American Civil Rights activist Bernice Johnson Reagon (http://womenshistory.about.com/od/quotes/a/reagon_quotes.htm) noted: "If you're in a coalition and you're comfortable, you know it's not a broad enough coalition"

There are different national and cultural sensibilities in Aotearoa, however we do have to deal with some of the same issues. In his writing Paulo Freire (Freire, 1996 [1968, English translation 1970]) encapsulates the mechanism of this sort of healing process. There is a need to create the

opportunity for rehabilitation and redemption for both sides. In speaking of redemption for both the oppressor and the oppressed Freire writes,

This, then, is the great humanistic and historical task of the oppressed: to liberate themselves and their oppressors as well. The oppressors, who oppress, exploit, and rape by virtue of their power, cannot find in this power the strength to liberate either the oppressed or themselves. Only power that springs from the weakness of the oppressed will be sufficiently strong to free both...(Freire, 1996 [1968, English translation 1970])

To my mind Freire's inference in the use of the word weakness (if an accurate gloss in the English translation of this work) leans more towards vulnerability. Vulnerability is not weakness but rather a show of courage in revealing one's heartfelt, innermost feelings. This type of vulnerability is the birthplace of creativity and change. It has an arresting power that exposes our similarities. In seeing something of ourselves reflected, a shared essence is revealed. The power that Freire refers to is the transformative power of forgiveness in its evocation of grace. Freire sums up this process

The pedagogy of the oppressed, as a humanist and libertarian pedagogy, has two distinct stages. In the first, the oppressed unveil the world of oppression and through the praxis commit themselves to its transformation. In the second stage, in which the reality of oppression has already been transformed, this pedagogy ceases to belong to the oppressed and becomes a pedagogy of all people in the process of permanent liberation. (Freire, 1996 [1968, English translation 1970] p36)

Nga Waka Tangata project may be seen in Freire's terms as a two phased praxis (action whereby theory becomes a practical social activity) firstly to restore mana and voice identity and secondly to share the creation of a new cultural space with all citizens of Aotearoa New Zealand.

Scott Lash's conception of motive power compliments Freire's explanation of the mechanism of redemption. Lash moves us towards a more comprehensive framing of power within indigenous expression in his description of a second conceptualisation of power. He identifies two types of power; the classical power of A over B in the age of hegemony and a second form that Antonia Negri calls *potentia* which has more to do with power as a force, energy, potency. Lash notes this change in focus as "a shift in power from the hegemonic mode of "power over" to an intensive notion of power from within...and power as a generative force."(Lash, 2007 p56) Lash connects this new notion of power '*potentia*' with invention rather than domination. "... in post-hegemonic cultural studies the notion of invention, or 'performing the exceptional', starts to replace resistance, which comes to be rejected for its negative connotations." (Lash, 2007 p59)

Nga Waka Tangata project takes the inventive form of 'performing the exceptional' as a next generational practice replacing and moving beyond 'resistance'. The holistic nature of te Ao Māori rests behind and supports the intention and working of this kaupapa. The depth of this world view draws to it the support of the spiritual realm through the application of understanding within its practices. Grace in the spiritual sense is always abundantly available to all but must be called, drawn in, aligned with, in order for that energy to be imbibed. Lash conceptualises this power, '*potentia*' as "...the motive force, the unfolding, the becoming of the thing-itself, whether that thing is human, non-human or some combination thereof". (Lash, 2007 p59) This corresponds to long standing awareness of the interface between the mundane and spiritual worlds in many traditions. The recognition and consideration of this aspect is an indispensable feature of this research. Before I started this study I questioned the depth of support for me as a Pākehā to undertake this work. There is great generosity in Māori allowing me to collaborate in this way. In working together my culture has been given the opportunity to help bridge gaps in understanding, giving support while knowledge is 'rebooted'. This provides an opportunity to help span the divide between our peoples. Developing understanding and appreciation of Polynesian achievements in design, seamanship and navigation amongst Pākehā fosters empathy. For Māori the generosity of accepting help from a colonising culture

provides an opportunity to reveal authenticity at a deep level. This generosity of spirit has allowed a certain vulnerability to be revealed, a wholeheartedness that nurtures innovation and creativity.

This study has highlighted the broader picture in which Nga Waka Tangata kaupapa sits. Homi K Bhabha's notions of 'hybridity' and 'Third Space' help in understanding how this space may look and work. "It is in this space that we will find those words with which we can speak of Ourselves and Others. And by exploring this hybridity, this "Third Space," we may elude the politics of polarity and emerge as the others of our selves." (Bhabha, 2006 p3) In Aotearoa New Zealand in order to make possible the creation of Bhabha's notion of a 'third space' a complete Māori cultural ecology must first be supported and re-established. Sovereignty as a state of being comes into being when people are sovereign to the power of their narrative, their cultural discourse. When standing fully present in their truth they are empowered and thereby authorised and enabled to treat.

Re-establishing the vibrancy of Māori culture is not a 'would like to have option', it is foundational. Meaningful interaction with Māori culture requires a cognisant, balanced response to Māori concepts, sensibilities and metaphysical frameworks all of which are fundamental to a sovereign state of being for individuals, Iwi and collectively Māori. In order for this to be achieved ways of building understanding and empathy between our cultures need to be found and encouraged.

Freire puts a handle on the healing process in his conceptualisation of a two stage praxis. Lash's conception of resistance through the performance of the exceptional is a mode that has been successfully followed by the likes of Mai FM and Māori Television. Bhabha on the other hand draws out the character of the space needed for this kaupapa to bear fruit but this has yet to be defined and created.

Establishing a 'Third Space' is difficult. In tackling the practicalities of this challenge we get down to the nub of the underlying issues. In seeking to change societal perceptions and attitudes we need to, as Freire tells us, first expose our underlying preconceptions and lay bare the skewed nature of the outlooks that have created imbalance.

I would like to illustrate some of the issues with a specific example. I am thinking of a Tainui uncle who would have appeared to most New Zealanders as simply a man making a living delivering firewood and doing odd jobs. That would be the perception from within the 'single story' of mainstream New Zealand society. In reality he was a fine man practicing his culture of manaakitanga in caring for his people within the constraints of the resources available to him. If elements of mainstream New Zealand society that have no knowledge of the workings of Te Ao Māori were given the opportunity to understand or experience the underlying culture of that situation they would find elements of courage, selflessness and compassion. They would perhaps see someone looking after his mates and recognise qualities that we all as New Zealanders cherish. In understanding their misconception of his situation they may also see that he and his culture have not had a 'fair go'. They may perhaps then make the connection that Polynesian and in particular Māori culture form an influential and formative part of the Pākehā outlook. Pākehā culture is significantly different to European having been influenced and modified by Polynesian sensibilities. This uncle was sovereign in his expression of self within his own culture. He was not expressing culture in the likeness of the mainstream but rather as a fully functioning entity that contributes to the collective Kiwi vibe. This is the danger of not understanding our roots, the whakapapa of our cultural outlook. We risk losing our perspective in a single story, in the dominant narrative's view. By maintaining multiple stories within a collective outlook we support the authenticity of diversity.

This shift in awareness is of the type Nga Waka Tangata kaupapa intends for Aotearoa. This cannot however be instigated through education. The application of a practical praxis as outlined by Freire has

the capacity to transform our collective outlook and this transformation may then be reflected in the education system that a revised society moulds.

...it is not education that moulds society to certain standards, but society that forms itself by its own standards and moulds education to conform with those values that sustain it. (Freire, 1985 p170)

Nga Waka Tangata kaupapa is intended to give the experience of a transformative outlook and this in turn, it is hoped, will precipitate a more regionally relevant approach to education.

...radical and profound transformation of an education system can only take place (and even then, not automatically or mechanically) when society is also radically transformed. (Freire, 1985 p170)

Change is underway through the work of Māori kura. The question we are asking is how in this time of transition may we reach everyone. How can we enfold the older generations of Māori who were cut off from their language and distanced from their culture by their formal education. How may we include Pākehā whose education failed to tell them the other stories, those of their Māori and Pacifica cousins? In our efforts to re-form our collective cultural imagination, are we reaching enough of our young Māori, Pacifica and Pākehā and at what age is it appropriate to do this? And what other ways might there be to expand this Third Space, this shared space?

Polynesian cultures have a tradition of big courageous projects that draw people together. Voyaging to discover new things about this world and also oneself is a defining expression of those outlooks. Nga Waka Tangata project looks to continue that tradition.

Chapter 3

RECOVERING SUPPRESSED CULTURE

.... we are never real historians, but always near poets, and our emotion is perhaps nothing but an expression of a poetry that was lost. (Bachelard & Jolas, 1994 p 6)

The process of recovering waka culture goes far beyond gathering facts and understanding. Māori waka are poetry in motion and the recovery of this living culture requires it to be 'written', 'read' and 'performed'.

...the waka ...represents, in its structure, in its history, and in its navigational potential, the totality of beauty, virtue, strength, courage, wisdom, understanding, co-operative endeavour and, above all, mystery. It exists on many levels. (Kerr, 2008 p1)

My use of the word 'suppressed' in the title of this chapter is in no way intended to be divisive. I have used this term as it best describes the treatment of Māori waka culture that led to its decline. Understanding the processes used to undermine waka culture is the key to regaining its complexity. Māori culture was disrupted in part by the colonial imposition of western sensibilities. Waka were targeted because they were a central part of Māori life. Māori culture was attacked through various means. Understanding the strategies used with the intent of dismantling this culture helps enable its reformation.

In this study western-based knowledge is used to help Māori and Pākehā in the process of reweaving the *kete* (basket) of waka knowledge and understanding. There is a redemptive element to this collaborative practice.

3.1 UNVEILING THE WORLD OF OPPRESSION

Indigenous culture in Aotearoa New Zealand has been held back in many ways. Waka were the central cultural artefact about which much of Māori life revolved, thus they were a natural target. Destroying waka disrupted vital aspects of life such as transport, food gathering and communications. Equally important as the physical destruction of waka, aspects of language and spiritual practice were undermined by the Tohunga Suppression Act 1907 and the banning of Māori language in schools.

This study focuses on the transformative potential that the recovery of Māori waka culture provides. As Freire so clearly explains this may take the form of a practical social activity that unfolds in two distinct phases.

In the first, the oppressed unveil the world of oppression and through the praxis commit themselves to its transformation. In the second stage, in which the reality of oppression has already been transformed, this pedagogy ceases to belong to the oppressed and becomes a pedagogy of all people in the process of permanent liberation. (Freire, 1996 [1968, English translation 1970] p36)

The path to liberation as Freire frames it involves building an understanding of what has been lost, as well as identifying and understanding the specific process used by an oppressor to inflict disruption. This is the first stage that enables a targeted, transformative response.

3.2 RECOGNISING AN INDIGENOUS OUTLOOK

This path of recovery also involves experiencing and understanding the principles, values, and evidence of early Māori waka culture.

If you have a particular understanding of what a waka is and what it does and where or how it is important within your culture, it frames your world view. (Barclay-Kerr personal communication, Whatawhata - 14 December 2011. Appendix A, P18)

The complexity and breadth of Māori waka culture encompasses all aspects of that world view. Māori waka both give expression to and experience of that viewpoint. In full flight waka have the power to reveal knowledge. They are the embodiment of experiential knowledge, a distillation of understanding rather than constructs resolved into physical form. They are enlivened through a process that recognises relationships rather than creating them.

...in terms of the Māori world view of their genealogy then somewhere in the distant past there's actually a genealogical connection between us and trees and everything else in this world so when we take on the responsibility of having a canoe and looking after it, we are actually subconsciously undertaking a responsibility to take care of one of our distant relatives. (Barclay-Kerr personal communication, Whatawhata - 14 December 2011. Appendix A, P15)

The Māori world is understood and experienced as being supported by sentient forces outside and independent of humanity. In life's voyage waka and the surrounding culture provide a vehicle through which to understand, experience, gain and transcend knowledge of the physical world, to better frame understanding of ourselves and our connection with elements of spirit. Waka are taonga, prized possessions.

Taonga represent pathways of understanding. They are items, empowered by the ancestors of the Māori, capable of communicating multiple messages to multiple audiences. They allow ancestral pasts to guide their descendants' present. Taonga represent the Māori genealogical end points of a myriad of 'ancestral flights' – journeys of exploration. (Tapsell, 1998 p1)

3.3 SOURCES OF KNOWLEDGE RECOVERY

The world view that waka culture provides is like a tapestry woven from many different threads. The power and beauty of that artwork is greater than the sum of its parts. However in its present unravelled state these elements have lost their connection to each other and the meaning inherent in their combination. In the following sections I have touched on some of the elements that can be drawn on to regain knowledge and an appreciation of its place in the wider scheme. I have also touched on processes that may aid in reweaving those threads of knowledge back into a complex whole.

In the retrieval of knowledge Māori and western techniques and understanding have been used. Having recovered elements of understanding the question then is how to piece them together. In some instances it may be appropriate to take the support of other similar cultural frameworks to hold knowledge in place while bonds are reformed and that cultural matrix re-empowered.

3.3.1 DREAMS

Dreams play an accepted, normalised role in the Māori world. In this context interactions in dreams are considered by many to be as real as those in the waking state. This form of contact with ancestors or

other elements of spirit is an acknowledged part of life and represents another source of guidance that may aid and inform the recovery of culturally specific knowledge.

After I had finished the first design for new waka to be built of modern composite materials I had a dream in which an old *kaumātua* (elder) showed me a number of ancient waka that appeared to have risen up out of the mud. I spoke to a friend about this and she asked, 'What are you missing?' So I went back over all the elements of the old and new waka and questioned how well I understood them. It was then that I realised that waka are technically much more sophisticated than I had thought. I could see that the carvings were much more than decoration, that they had a deeper practical purpose than I had supposed and that this was not just a happy accident. I could see that the way the carvings function was intentional and tailored to suit each canoe.

What I draw from this is that in rebuilding waka culture we are not limited to what remains recorded in objects, images and text. In the context of the Māori world, where the spiritual plays an integrated lively part, ancestors still have active input. This is my experience and the experience of many others. Regardless of how you understand, process or even acknowledge this, dreams play a role in this culture and make a contribution.

3.3.2 KAITIAKI

Kaitiaki (spiritual guardians) in various forms also play a tangible role. They appear in all cultures however the extent to which they are acknowledged or played down varies widely. In my western parent culture for most people such guardians are perhaps now things of myth or are seen as metaphorical symbols like a dove of peace.

According to Mau Piailug's ¹experience and teaching and the experience of his students', Guardians play an active role in traditional navigation and life. Within indigenous cultures understanding and interaction with kaitiaki is normal. Hotu tells the story of a communication he had with an outsider while at sea in which he explained that Orca are kaitiaki for his *Iwi* (tribe). The outsider acknowledged this information very politely with a faint smile and a nodding head, when out of the blue two Orca surfaced one each side of the stern. For that person the conversation suddenly became a little more real.

My father was British and in 1989 I moved to England believing myself to be European. However I soon came to realize that I was in fact Pākehā, my cultural outlook having been significantly influenced and altered by Polynesian culture. I had travelled to England via India spending three and a half months there. My father's family had been in India during the Raj and India also had a certain pull and familiarity. During that time I stayed in a small village that had sprung up around a Saint from Southern India widely known as Nityananda of Ganeshpuri. Though not looking for any sort of guidance I found Nityananda's and my world to be interwoven with the resulting changes in my outlook opening an experience of the Māori world previously imperceptible to me. My experience of the Vedic tradition has provided a closer parallel to the Māori experience of spirit with many similarities in practice and manifestation. The spiritual plays a large part in the Māori world and without meaningful engagement with this aspect within a study of this culture the result will not be fully representative.

On January 1st 2012, a first few moments into the New Year, I was thinking about the year ahead after the Christchurch earthquakes and considering the resources I had to continue my study. I was wondering how I was going to get through my research into waka carvings when I felt something bite

¹ Mau Piailug (1932 – 2010) Micronesian navigator from the Carolinian island of Satawal, known for teaching the ancient art and science of non-instrument wayfinding.

me on my back. I pulled my tee-shirt off and there was a large spider. This seemed strange. I had never been bitten by a spider before. I couldn't see where it had come from or why it had bitten me. I texted Hotu and asked if spiders were kaitiaki for any iwi. He then said that spiders were kaitiaki for some families and added that it was probably a Pākehā spider that thought I was a fly. I felt there was more to this and looking further came across the story of Rata, the first man to build a waka. In the story when Rata had finished the hull of his waka the spiders helped him with the carvings. I spoke with Hotu about this next time I saw him. I stupidly asked him if he had heard the story of Rata. Rolling his eyes he said he had possibly heard that story and then waited to hear more from me. I explained what I understood from what had happened and straight away he revealed that spiders were important to his family being waka people and that they were treated with great respect.

I believe that these types of experience are common to all cultures. In the west there are traces of this in stories and folklore which to my mind are reminders of understandings no longer experienced by most and without on-going confirmation have become disengaged. What varies between cultures is the emphasis placed on such things; how integrated the understanding of the temporal /spiritual is within an outlook and the extent to which this is noticed, expressed and acknowledged.

What I take from all this is an assurance that the foundations of Māori waka culture are broad and strong. Waka are the physical expression of this culture: they are the vehicle that enables an experience of a much wider and deeper underlying viewpoint, one that entwines a balanced spiritual and temporal aspect.

3.3.3 ORAL HISTORIES

To the western mind there is a tendency for Oral History to be regarded as recitation; a learned body of knowledge recorded mentally, taught and repeated generationally that may use painting, dance, music or ritual to aid that process.

The study of verbal arts and oral traditions has long seemed a Cinderella subject...But this position is changing...both these developing interests within anthropology and their links with concurrent intellectual trends in related disciplines. (Finnegan, 1992 p1)

Within the indigenous context practitioners of Oral History are more than just repositories or vessels, they are the medium, instrument or agent of that knowledge.

Māori oral traditions encompass both the mundane and spiritual worlds. Dreams, ancestors, kaitiaki (spiritual guardians) all provide real and constant support. While I have dealt with elements separately in this chapter I acknowledge their interconnectedness. It is important to recover knowledge from different fields even when the importance of that understanding is not apparent.

Visions, dreams, and hallucinations are quite common perceptions...All information of this nature is perceived as communication from the supernatural to the living.(Vansina, 1985 p7)

In my interview with Hector Busby at Waitangi (see appendix A) he recalled something that his uncles used to say comparing Pākehā boats and Māori waka.

My uncle who showed me how to lash [said] the difference between the Māori canoe and the pākehā boat is that the pākehā boat has got its keel underneath the water but the Māori canoe has got its keel on top of the water. (Busby, personal communication, Waitangi – 20 February 2012. Appendix B, P27)

This small element of the interview is of great importance as it demonstrates foreknowledge of the dynamic waka stabilisation principles that this study has brought back to light. This is the sort of

information we are losing as its importance in the wider context is not currently understood. Much of what is said gives context to traditional knowledge and provides valuable clues in piecing it back together. There is a need to record the oral elements of waka knowledge for each iwi so as to gather the maximum number possible of the treads that have been unravelled.

3.3.4 TOHUNGA

The word tohunga designates someone who may possess one or a number of skill sets. Tohunga may refer to a skilled person, chosen expert, artist or priest – ‘a person chosen by the agent of an *atua* and the tribe as a leader in a particular field because of signs indicating talent for a particular vocation.’ (Te Aka Online Māori Dictionary) Tohunga maintain a balance between knowledge and practice.

Māori waka are physical/metaphysical entities. Key to this understanding is an awareness of the interconnected sentient elements that form part of this picture. This is an important point of difference as nonindigenous cultures of Aotearoa perhaps have a tendency to view elements of spirit as ‘other’ or in some ways separate from the human condition. This is illustrated by the following excerpt from an interview with Hoturoa.

the waka, when its form as a tree has ceased but it has a new form as a waka ... you have that process that allows for the spirit of the tree to return to the forest but you also have the process that allows the tree to take on a new form and have its own spirit to do that. (Barclay-Kerr personal communication, Whatawhata - 14 December 2011. Appendix A, P15)

The understanding and intent of a master waka tohunga empower the waka they built. Their waka imbibe their vibrational signature in the same way that a church takes on an atmosphere through pray and worship in that space. A waka built by a gifted tohunga may enable a clearer more conscious communion with nature in the mist of mundane action, through the meditative clarity of action. Prayer, mantra or *karakia* (incantation) bring to light and energise intention. Mandala and other types of sacred physical designs have the capacity to encapsulate understanding, to hold and or concentrate that feeling in a way that empowers an experience of knowledge at multiple levels. Just as churches take on a presence over time, *wharenui* (meeting house) embody the *wairua* (spirit) of a people. In the same way waka may embody understanding in a way that enhances experience by enabling an integrated, temporal and spiritual experience

There is a pressing need for opportunities that enable the retention of practice-based waka knowledge. Much of this understanding becomes second nature to the practitioner. This type of knowledge is best transferred through the experience of understanding in action.

Over the last four or five generations very few traditional waka have been built. This has interrupted the flow of knowledge. This is especially so for understanding techniques taught by demonstration. In a workshop much of what is learned is not explained. Many skills are picked up by observation. This type of knowledge grows incrementally. An apprentice must first develop basic skills in order to have the facility to understand and master more advanced techniques.

Everywhere I see a waka... I measure it and I would check it and after travelling to so many different places doing the same thing, I found that... the shapes of the waka were virtually all the same. ... It took a lot of study for me to work out how. All my waka are very, very stable, and that's through just actually taking my time. I thought maybe different areas had different techniques but I find that the actual shape of the canoe itself is very consistent. (Busby, personal communication, Waitangi – 20 February 2012. Appendix B, P22)

The process of knowledge recovery can also be helped through the collaborative involvement of other outlooks. This process can be enormously fruitful for both sides. Material, experiential and body

knowledge spans cultural boundaries and provides productive common ground. During a visit to Aurere to see Hector Busby in 2006 we had a long, captivating talk made possible by a shared understanding of working with heavy timbers. Hector's experience of bridge building and my experience of repairing period timber buildings in England provided us with common ground on which to base our discussions. We shared specific material, structural and body knowledge surrounding the use of traditional tools and the transport of large timbers. We also had a shared understanding of the sanctity of trees and the responsibility that comes with felling a tree for a specific purpose. I would like to feel that we each gained something from that exchange. Musicians *Paul Simon* collaborating with *Ladysmith Black Mambazo* on the album *Graceland* 1986 and *Ry Cooder* working together with *Buena Vista Social Club* in 1996/7 are examples of collaborations where the equivalence of outlook had enormously creative outcomes.

3.3.5 WAKA

Very few historic Māori waka have survived. An even smaller number remain complete with their original carvings. However of those precious few canoes most were built by tohunga whose knowledge and practice was the continuation of an unbroken lineage that projected back in time hundreds if not thousands of years.

Digital technologies offer a means to recover a great deal of this sort of knowledge. While the lineage of tohunga has been disrupted, much of their knowledge remains accessible imbedded in surviving waka hulls. There are a number of scanning methods that enable highly accurate computer images of canoe hulls to be drawn. This information can easily be analysed with naval architecture software such as *Maxsurf Analysis and Design Software* <http://www.maxsurf.net/> through a process informed by knowledge of these hull types. This type of study can reveal details of for example hull shape, carrying capacity, weight. Scans may also tell us something of building techniques by showing tooling patterns that may be difficult to make out with the naked eye. They may also give a more accurate picture of the original depth of tooling around say the bow where adzing was used to produce a roughened surface that would aerate the water flowing along the hull enabling it to slip through the water more easily. This technology functions in a similar way to the indents on the surface of golf balls.(see <http://www.titleist.com/technology/details.asp?id=19>)Individually these studies may yield a great deal of information on individual waka but also by comparison of regional building styles that evolved in answer to localised sea and weather conditions. Collectively , the study of a number of waka may clarify and reveal a greater depth to the rules of thumb, the key guidelines or rules of construction that underlie the fabrication of traditional Māori waka.

3.3.6 FILM

There are two films that specifically record the building of Māori waka. The first MANA WAKA was filmed 1937 – 1940 by R.G.H.Manly and then *under the direction of Merata Mita* edited by Annie Collins and released in 1990 by the Te Puea Estate and the National Film Archive (National Film Archive reference number F4973). The second film TAHERETIKITIKI: THE MAKING OF A MĀORI CANOE was produced and released by National Film Unit in 1974 (National Film Archive reference number F1433)

Film stores something of body knowledge. For those who have experience with the tools used in this footage there is a lot to be learned from watching the craftsmen in action. An unbroken tradition maintains a certain confidence in its practitioners. The stories that surround and illustrate a craft give invaluable context to that skillset. In Waka Mana there is a confidence in moving the timbers and in the use of axes and adzes. We can also see the camaraderie between the men and the confidence they have in each other's movements. This confidence translates into the fineness of the finished hull. The second

film follows the construction of Taheretikitiki two generations later. In this footage we see a slightly heavier hull being built. There was a confidence in the Waka Mana footage that comes from a familiarity working with large timbers. This would have built up over several generations of forestry workers. Two generations later that confidence and ease moving huge logs, using axes etc. has naturally faded as fewer men were involved in working that size of timber. These observations are not intended to be critical. These films illustrate ways that skills can be regained and retained.

3.3.7 PHOTOGRAPHS

Photographs can provide a great deal of empirical information. For example from the image below (fig.2) we can scale the height of the taurapa from the height of the men. We can get a fair idea of the degree of tapering of the rauawa and the rise and fall of the sheerline²

These waka have been moored and the unloaded waterline is clearly visible along the hull. We can see from this that the waka hull floated bow down without crew aboard and from this and knowledge of traditional hull shapes we can extrapolate a more detailed understanding of the hull shape. The key lies in being able to combine elements of understanding in order to build a composite picture. Computer modelling helps in this process as understanding of a hull shape can be modelled and this digital model float tested with the resulting waterline being able to be compared with the photographic image.

High definition digital scans of photographs and photographic negatives now also allow for detailed examination at higher resolutions. The light balance and contrast of images can also be adjusted to reveal details that in the original form may not be visible to the naked eye.

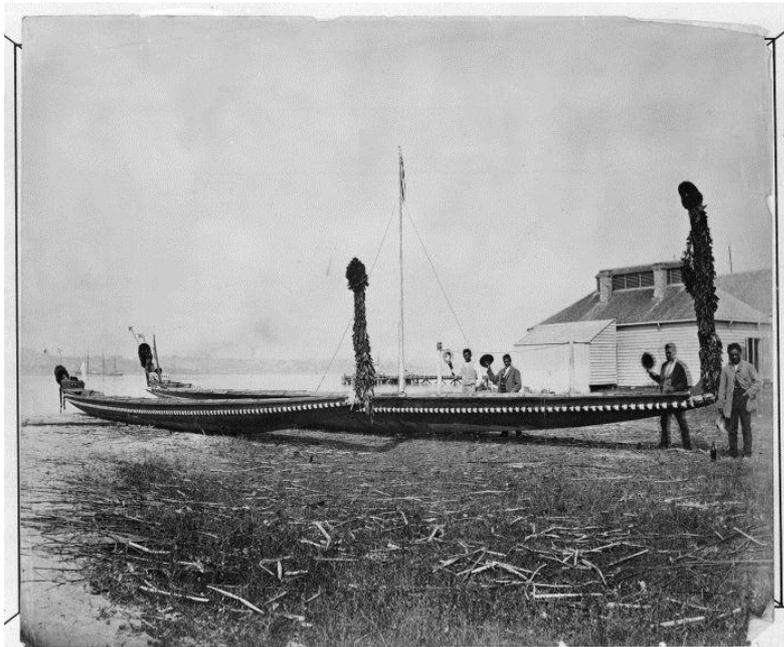


Figure 2. 'Two Māori canoes, possibly at Orakei, Auckland'. Ref: 1/2-029162-F. Alexander Turnbull Library, Wellington, New Zealand. <http://natlib.govt.nz/records/22587118>
The men alongside unidentified. Photographer unknown.

² The **Sheerline** is the longitudinal curve of the rail or decks, which shows the variation in height above water or freeboard throughout the vessel's entire length.

3.3.8 DRAWINGS AND PAINTINGS

The earliest drawn studies of Māori waka, tauihu and taurapa are from Captain Cook's first voyage on the Endeavour 1769 – 1771 (Joppien & Smith, 1985) and are by Sydney Parkinson and Herman Spöring. Spöring was Swedish-born and was employed by Banks as assistant draughtsman after the death of the artist Alexander Buchan at Tahiti in April 1769. Sydney Parkinson was a botanical illustrator and natural history artist. There is an uncertainty in some of the sketches of Māori carvings. This is highlighted by their accuracy in the drafting of European boats and views of waka in side and rear elevation on the same pages. The drawings of many of the tauihu look like adaptations of European carvings. The profile views of taurapa, however, are very clear and one image by Spöring is of particular interest and I believe importance.

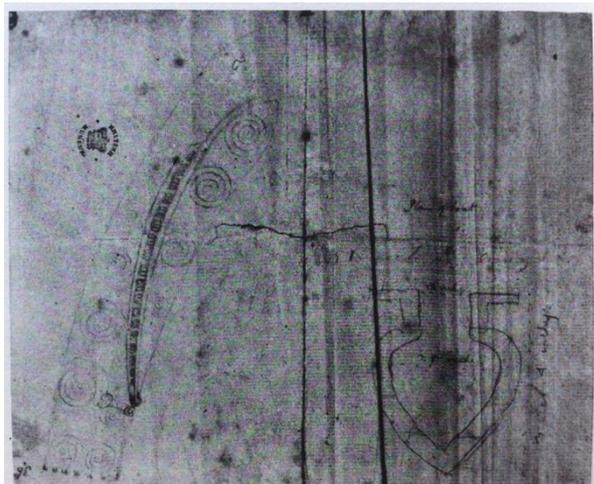


Figure 3. 'The stern, section and head of a Māori canoe' drawing by Herman Diedrich Spöring 1769 – 70. Pencil 159 x 194mm British library. Add.MS 15508,f.32c (no. 36) (Joppien & Smith, 1985)

These detailed sketches of a Māori canoe (fig.3) were made during Cook's first voyage. The image of the taurapa is inverted on the sheet. The drawn section of the hull is not a form that we are familiar with today.

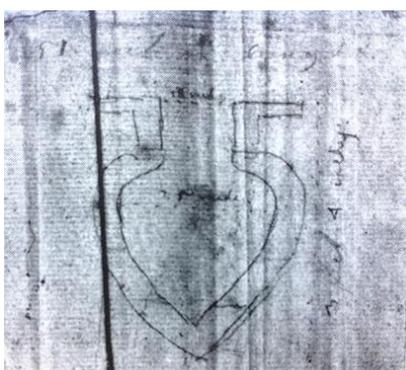


Figure 4. Detail from figure 3 'The stern, section and head of a Māori canoe' drawing by Herman Diedrich Spöring 1769 – 70. Pencil 159 x 194mm British library. Add.MS 15508,f.32c (no. 36) (Joppien & Smith, 1985)

The section is inscribed 'Plan of boat' and is annotated in what is thought to probably be Bank's hand. It reads: '3 feet 4 inches' (depth); '35 inches' (greatest internal width); '18 inches' (internal width at gunwale). This drawing shows a dugout hull with shaped rauawa added to give more freeboard. The log has been hollowed out in a way that maximises, with the addition of the rauawa, the size and carrying

capacity of the finished canoe. This shows a different rationale to the traditional waka of today. In the drawing the canoe is built following the constraints of the log. The traditional waka we are familiar with today are constructed from components made from logs. The tauihu and taurapa associated with the drawn canoe are of the same type used today. This is an exciting find. More research is needed. This finding may illustrate a different earlier method for the construction of waka taua that perhaps was superseded by for instance the introduction of metal tools.

New technologies were adopted very quickly as seen in this detail from a painting by Sir William Fox showing the European oars fitted to a waka tētē.



Figure 5. Detail from 'View of Blind Bay from W. Fox's house 1847. Artist FOX, Sir William, 1812 – 93. Hocken library call Number E F794

In this drawing by Angas (fig.8) the upper image shows a waka tētē fitted with oar rowlocks. Notable is the tiny sternpost. The builder of this waka obviously understood the balancing effect of the oars (like a pole used by a tightrope walker) and therefore saw no need to fit a taurapa designed to have similar effect. This image provides pictorial evidence of a clear understanding of the dynamic principles of motion employed in the construction of traditional Māori waka. The vestigial sternpost would have been included to provide a leverage point for a steering oar and to provide lashing positions for the stern ends of the rauawa.

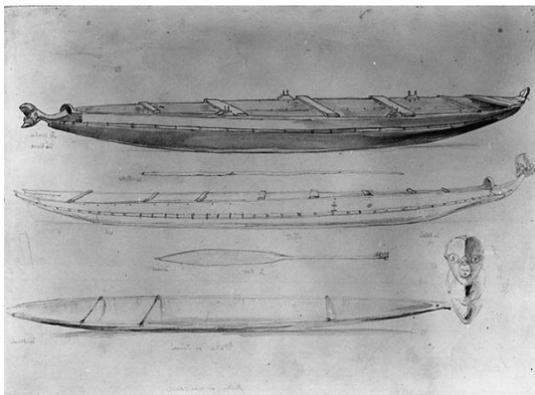


Figure 6. 'Pitau - or war canoe 1844' drawn by George Angas, 1822-1886. (A-020-012) Alexander Turnbull Library, National Library of New Zealand - Te Puna Mātauranga o Aotearoa. URL: <http://hdl.handle.net/1727.11/00000146>

3.3.9 THE ROLE OF DIGITAL TECHNOLOGIES

Very few waka have survived complete with their original carvings. At the start of this study it was proposed to use laser scanners followed by computer analysis using Naval Architecture software as a

means of understanding traditional hull shape and the function of carvings. With regards to hull shape this is not necessary (although it may be helpful in the future) as this aspect is very well understood by traditional builders such as Hector Busby who has undertaken extensive research. With regards to the function of prow and stern carvings scans may be helpful in recognising the finer workings of these components. Scanning technology is perhaps most useful in rediscovering the 'art' of waka building, in particular the finesse with which waka at the height of their development were built.

The fineness with which hulls are constructed results from generations of trial and error, of pushing the boundaries. Scans provide a rapid means to regain that knowledge and the confidence that comes with the backing of a continuing tradition. Scans may also aid in building understanding by providing a 'state of the art' vision of sophisticated traditional knowledge. The way knowledge is stored and the ease with which that method allows its appropriate use is a marker of its currency. Enabling the technology of historic waka to be projected into the digital age accords them the respect that their significance deserves. In maintaining their relevance it both confers and protects mana.

The western scientific based viewpoint gives us an opportunity to temporarily bridge gaps in practiced knowledge, it provides a splint to support healing, an alternative pathway to reawaken knowledge that sleeps within the oral tradition, surviving waka and in the 'body knowledge' of those that have maintained the practice of waka traditions. It provides a means to read the fine print of the 'text' of historic waka, the language of which while still spoken perhaps currently lacks some of the richness that arises in the exchange of whai korero (formal speech).

3.4 KEY FINDINGS – THE DYNAMIC CONTROL MECHANISMS OF MĀORI WAKA

When I started thinking about the practical purpose of taurapa and tauihu in the design of Māori waka tētē and waka taua I remembered an article in Yachting World magazine from the 1990s about research into yacht stability following the Fastnet disaster of 1979. The Fastnet race is a biannual yacht race from the isle of White to the Fastnet rock at the southern tip of Ireland. During the 1979 race there was a particularly bad storm that resulted in the deaths of eighteen people; fifteen competitors and three rescuers. The rescue effort involved around 4000 people in the largest ever British peacetime rescue operation. Ensuing enquiries found that modern hull shapes with light rigs fared worst of all. Innovation in hull shape in particular had taken several large steps with corresponding practice becoming out of step.

The research into yacht capsize following this disaster is interesting in two ways; it provides insight into the dynamic influence of the carvings of Māori waka on their motion and also highlights the differences in approach between western and Polynesian watercraft traditions .

Following the Fastnet disaster the United States Naval Academy Hydromechanical Laboratory in Annapolis undertook research in tanks equipped to make scaled waves. Researchers first learned how to make breaking waves in the test tank and then practiced capsizing a model hull. Then critics pointed out that in order to be thorough the model must be complete including a scaled mast. Returning to the tank they found that the model with a mast would not capsize in waves that had easily capsized the mast-less model. These results appeared counter intuitive to many people including a number of additional researchers who made the trip to Annapolis to verify the findings for themselves.

The results could not be explained just by flotation principles as a mast-less hull would be expected to be more stable floating upright than one with a mast.

An early finding from model testing was that, when the models were capsized by wave action, their behaviour was controlled by dynamic principles rather than by the static flotation that normally controls a boat's attitude. (Rousmaniere, 1987 p61)

The dynamic principles mentioned above refer to the effect of the weight of different elements of a boat on its movement. The inertia³ of each element influences the motion of a boat on water. Each element, mast keel, hull etc, has a different relationship to the centre of movement of the boat as it rolls, pitches and yaws. It is this rotational movement that tauihu and taurapa are designed to moderate.

In rotational inertia, the resistance to spin is called the moment of inertia. The moment of inertia of an object is calculated by taking each part of its total weight, multiplying it by the square of its distance from the axis of rotation, and adding all these up. An often used example of rotational inertia is an ice skater. An ice skater spinning with their arms outstretched has a large moment of inertia and spins slowly. If they hold their arms to their sides they will have a much smaller moment of inertia, much smaller resistance to spin however, they are spinning with the same amount of energy and so they spin faster.

One way to experience this is to stand with your arms at your sides and twist your body back and forth. It's easy. Now try this with your arms outstretched. This requires much more effort and you can't do it as quickly. Rotational inertia is measured as kgm^2 , weight multiplied by the square of the distance from the axis of rotation so the extra distance from the centre of rotation gives your outstretched arms much greater resistance to spin. The weight of your arms is the same, but it is harder to twist at the same rate because being twice the distance from the centre of rotation, the inertial effect is four times greater ie $2^2 = 4$.

The Annapolis naval researchers estimated the roll inertia of a representative group of yachts and found that the rig contributed over half the roll inertia for both heavy and light displacement yachts. It became clear that adding the masts to the test models had more than doubled the model's roll inertia and this was the factor that was providing increased resistance to capsize. Again this feels counter intuitive, a much lighter element having greater effect but this can be very simply demonstrated. If you take a yacht with 10 tons of ballast positioned 2 meters below the centre of roll rotation that ballast has a rotational inertial moment of $10,000 \text{ kg} \times 2\text{m}^2 = 40,000 \text{ kg m}^2$. A mast and rigging weighing 1 ton with the centre of that mass 10 meters above the centre of roll rotation has a roll inertia of $1000 \text{ kg} \times 10\text{m}^2 = 100,000 \text{ kg m}^2$.

With a yacht the mast slows its rolling because it increases its moment of inertia, its resistance to spin. This also applies to waka: the tauihu and taurapa increase the moment of inertia of waka and slow their rolling. This is the mechanism that tohunga developed to control the motion of dugout waka hulls enabling them to make outrigger-less hulls move with a comfortable, secure feeling motion.

Thinking back to the explanation using our arms, imagine two people lying toe to toe on the ground representing the hull of a waka; one person holding a book in the air at arm's length representing the taurapa, the other holding four books on their chest representing the tauihu. The moment of inertia of the books makes it more difficult for the 'waka' to roll side to side. The waka's motion remains balanced as four books held at half the distance from the centre of rotation as the single book produce the same resistance to roll.

³ **Inertia** is the resistance of any physical object to any change in its motion (including a change in direction)

For this example we should also imagine our two people lying on a row of books to represent the ballast of the wood along the keel line of the dugout hull, say one hundred. The books representing the ballast are very close to the centre of rotation and so they each have a smaller inertial moment. We can work out the contributions of the tauihu, taurapa and ballast to the roll moment of inertia of this 'waka' like so. If each book weighs 1kg the taurapa represented by a single book held at arm's length(0.8m) will have a roll moment of $1 \times 0.8^2 = 0.64\text{kgm}^2$. The tauihu represented by four books at half the distance 0.4m above the centre of rotation will have a roll moment of $4 \times 0.4^2 = 0.64\text{kgm}^2$. This gives a combined roll moment of inertia for the tauihu and taurapa of 1.28kgm^2 . The ballast represented by one hundred books 0.1m below the centre of rotation will have a roll moment of $100 \times 0.1^2 = 1\text{kgm}^2$.

This is a very simplified example however it illustrates that the heavier parts of the waka being close to the roll axis do not contribute as much to the total roll inertia as might be expected and that much lighter elements such as the tauihu being further away from the roll axis exert far more influence than would be supposed given their size.

The photographs below of Tainui's waka taua Taheretikitiki II illustrate these relationships well.



Figure 7. Tainui waka taua Taheretikitiki II, Waitangi February 6th 2009. (image from Hoturoa Barclay-Kerr collection)



Figure 8. Tainui waka taua Taheretikitiki II, Waitangi February 6th 2009. (image from Hoturoa Barclay-Kerr collection)

This technology is important in several ways. From a construction viewpoint, as every log is different there needs to be a method of controlling the finished hull's motion, a way of tuning it to be both comfortable and stable. The size of tauihu and taurapa appropriate for a given hull size would have been known and these could then easily be adjusted by removing more material from the carvings without compromising their design. Yachts when dismasted are known to have a skittish, jerky motion. The weight of the mast slows the speed of motion and regulates the boat's reaction to the movement of the crew, influence of waves, wind etc. Tauihu and taurapa work in the same way, their inertial resistance to roll dampening the effect of waves and crew movement giving a steadier ride.

Waka have three axes about which they can rotate. Rotational movement about these axes is referred to as yaw (horizontal turning movement about a vertical axis), pitch where the bow and stern rise and fall about the centre of the canoe, and roll rotation about the fore/aft axis. Tauihu and taurapa of both waka tētē and waka taua have a moderating influence on all three axes of rotational movement.

My review of documentary material led to my appreciation of the ways waka builders tried to keep the influence on roll motion of the bow and stern balanced. If we look at the carvings of a waka tētē we see that while the tauihu in the bow is much heavier, it sits closer to the centre of roll rotation and can therefore be carved to exert a similar moment of inertia in terms of roll to that of a much lighter taller taurapa mounted on the stern. The extra weight of the tauihu is advantageous in controlling yaw and pitch as its inertial moment in those axes resists and lessens the action of waves slapping the bow sideways or kicking the bow up. The lighter taurapa in the stern can be balanced to have the same inertial influence on roll as a much heavier tauihu. This lightness is advantageous in a following sea where it has less resistance to being lifted by waves and so avoiding being swamped. The upright blade of the taurapa may also help by parting any waves tall enough to broach the stern.

This knowledge is embedded within the Māori oral tradition. In an interview with Hector Busby he recalled his uncle saying:

The difference between the Māori canoe and the Pākehā boat is that the Pākehā boat has got its keel underneath the water but the Māori canoe has got its keel on top of the water. (Busby, personal communication, Waitangi – 20 February 2012. Appendix B, P27)

3.5 COMMITTING TO TRANSFORMATION

Understanding the damage done by an oppressor and the specific processes used to inflict that disruption are the first stages that enable a targeted, transformative response. What is being rebuilt here is a composite picture. Waka are more than the sum of their parts, they take on a spirit of their own and this may also be said of Nga Waka Tangata kaupapa.

There is a need to have equivalence in outlook in order to build deep and lasting understanding. In Aotearoa there are differences in the way our cultures weigh the value of knowledge. There are many parallels that may be drawn between the recovery of the language of waka and of Te Reo. The craft of building (whatever the material) and the art of paddling and sailing must be practiced in order to recover this waka culture's expression.

To revive and move the art of waka culture forward requires its practice, the art of its practice being the expression of the spirit of its people. The virtuosity expressed in Māori waka lies in their ability to frame an experience of both the temporal and spiritual aspect. In this art Māori are gifted. In the words of the painter Pat Hanly, "Masters are distinguished by the realisation of the gift as having the presence of the metaphysical in their thinking and works, and it is that which others sense and seek to know." (Hanly, 2005)

Chapter 4

INNOVATION - RE-EMPOWERING TRADITION

4.1 MAINTAINING THE LINEAGE OF MĀTURANGA AND TIKANGA

Boats may appear to be very simple, or perhaps elegant, however behind that graceful appearance is a complex set of relationships that have built up and been refined over time. Canoe designers, builders and paddlers understand the complexity of these relationships as an art that is practiced rather than a body of knowledge that can be fully articulated. I use the term 'art' as it denotes skill that is the result of knowledge and practice. The waka are a key aesthetic locus of Māori society, with a high attention to the style, symbology and beauty surpassing their purely functional requirements. I am using "aesthetic locus" as developed by Maquet to include "the class or classes of objects that are localised in these areas of heightened aesthetic consciousness" (Maquet, 1971 p11).

The 'state of the art' of a culture's watercraft depends on the maintenance of its traditions of both knowledge and practice. Knowledge and practice inform and support each other. When limited knowledge or practical experience is applied to a design, the result lacks the elegance that refinement over time produces, it lacks the cultured sophistication that comes from a balanced understanding of the whole picture. i.e. waka, water, weather, wairua.

When design changes are made to a traditional form there is never full foreknowledge of the resulting effects, there may be unforeseen practical implications. A designer trialling an innovation in say hull shape will not be able to foresee all the structural, constructional and dynamic implications that that innovational shift from 'state of the art' knowledge will bring. In the same way when practice is restricted (ie. the building techniques or tools or uses of waka) then the local, body, constructional and materials knowledge that has been refined over centuries dwindles. Constraining practice debases knowledge, while limiting knowledge checks practice. This has been the case for Māori where the destruction of large numbers of waka and restrictions, in various forms, that have obstructed their replacement, has had a damaging impact on waka knowledge and practice.

Full recognition of the knowledge base of Māori waka culture requires both the practice of their use and construction. Some aspects of that knowledge only becomes clear to practitioners with time, when patterns emerge from the multitude of constructional, structural and experiential understanding and an overarching clarity reveals itself. As with many art forms this clarity has the capacity to mirror in its expression deep seated relationships between the temporal and spiritual aspects, relationships that are difficult to intellectualise or to pin down. These are complex understandings that are more easily experienced than conceptualised. The clarity of this expression perhaps represents part of what is referred to as mana. In this way we can see dynamic relationships between elements of Māori waka that require considerable experience and understanding to grasp. These relationships are often so embedded that they are difficult to extract but at a deep level are still understood, are still sensed. With

the disruption over several generations of traditional waka building and usage, the art of the employment of these complex yet elegantly simple relationships has lost some of its fine-tuning.

This study seeks to aid the recovery of knowledge of the complexity of Māori waka function seen as an integral part of a tradition that is the culmination of centuries of years of Western Pacific migration and over 450 years of development in Aotearoa.

4.2 THE ROLE OF TAUIHU AND TAURAPA IN THE DEVELOPMENT OF DISTINCT WAKA FORMS IN AOTEAROA.

The tauihu and taurapa are the principle elements added to the main body of a canoe to complete its construction. Their addition completes a waka by both enabling an intended pattern of motion and by giving form to understanding of spiritual / temporal relationships. Their carvings enable waka to frame understanding within an experience in a way that renews knowledge. Māori waka are physical/metaphysical creations. While this study is principally about the physical stabilising effect of tauihu and taurapa I acknowledge the complexity of the spiritual component of their make-up.

The evolution of new forms of waka in Aotearoa New Zealand represents the latter part and in some ways the pinnacle of the wider on-going Polynesian tradition, a dynamic tradition that values creativity and innovation. I acknowledge the rich contribution of Buck, Best and the many other scholars who have provided the rich material that has enabled a fresh view in this time. I particularly speak to those that studied, recorded and kept alive their culture through, by necessity, their working within an alien framework. They utilised fully the means available to them in their time.

The body of knowledge held by the canoe builders within the early settler groups built up over centuries. This provided the pool from which inspiration was drawn when after arrival in Aotearoa canoes were needed for everyday uses. The development of new forms of waka did not happen overnight nor did it start from scratch. Early waka built in Aotearoa New Zealand would have been versions of known waka types perhaps modified to accommodate the characteristics of unfamiliar timbers and local climatic conditions. Earlier forms of Polynesian waka, types that would have been familiar to the first settlers in Aotearoa, mainly had double hulls or outriggers. These canoes had stern and prow pieces that however served different physical purposes to the prow and stern carving of Māori waka that we are now familiar with.

Voyaging canoes would have had skilled waka builders as part of the crew and they would have carried the tools of their trade with them in order to maintain their vessel and to make repairs when needed. On arrival those tohunga would have been keen to test the unfamiliar trees to find suitable timber for canoe building and also appropriate stone for making replacement tools.

There would have been a number of drivers for change that led to distinct Māori forms of waka: improvements in building practice (tools and techniques), the structural advantages of new materials (timbers and fibres) and evolving practical requirements. Each phase of settlement; exploration, consolidation, expansion etc, would have placed different practical requirements on the design of waka. For example in a time of conflict when security of numbers and a means of transport independent of the wind were desirable, large paddled waka would have been favoured giving security of numbers. Periods

of rapid innovation in response to change would have been interspersed with phases of design consolidation during which use and construction practice would have been refined.

Though the materials available within this new land with the size of trees and also the quality of stone for tools offered fresh developmental possibilities, it is important to understand that the drivers of change and the economic conditions allowing greater commitment of human resources were not always aligned. Building a canoe involves a large investment of resources of time and materials. Innovation would not have been carried out on a whim. The scale or quality of the new materials available would have made possible the logical extension of existing technologies and these gains in size of waka, performance, strength, ease or quality of construction would have led to changes in performance that in turn required innovation in the practice of waka use. This is a cyclical process with changes in usage alternatively driving innovative adjustment in design and construction. There would also have been pressures to maintain tradition both in terms of the knowledge of hull forms and the skill base needed to build and maintain them, to not move too far or too quickly away from accepted norms.

Larger trees provided opportunities to form a hull shape that didn't require an outrigger float for stability, the possibility of seating paddlers side by side instead of single file paddling on alternate sides and being seated in the hull rather than on it gave some protection from the colder climate.

We've changed from a people that slept on the land and lived on the water to people that live on the land and sleep on the land and just go out on the water for the most minimal amount of time that they can. (Barclay-Kerr personal communication, Whatawhata - 14 December 2011.

Appendix A, P14)

A stable single hull was developed that naturally retained traditional Polynesian shape and performance characteristics. The features that made this possible were flared sides provided by the rauawa that increased the buoyancy of the waka as it was loaded or heeled over, and the use of the rotational inertia of the tauihu and taurapa to reduce the period of rocking motion of the hull giving a more comfortable stable ride.

In discussing rauawa with Hector I said that my understanding was that with the extra freeboard (height above the waterline) and flare (rauawa lean outwards slightly giving the waka more beam (width) made waka more stable. My point was that as a waka heels over (rolls to the side) the extra beam increases its buoyancy making it more stable. Hector's (Busby, personal communication, Waitangi – 20 February 2012. Appendix B, P27) reply was *"It's the paewai that actually makes it more stable...the paewai is the one where you get that extra pull."* By this he is referring to the effect of water on the paewai when a waka digs into a wave the edge of the paewai catches the water and pushes the canoe back towards an upright horizontal position. (See figure 9) Te Rangi Hiroa (Sir Peter Buck) in writing of canoe structure refers to washboards fitted to a voyaging canoe *"inclined at an outward angle to fend off (paewai) the breaking sea."* (Buck, 1950 p42) So the paewai fends off water helping to right the waka when pitched or rolled by waves. This device is used in modern motor boat hulls where a narrow horizontal surface is built into the chine (the line where the bottom and sides of the hull meet) to help correct rolling and pitching when underway.

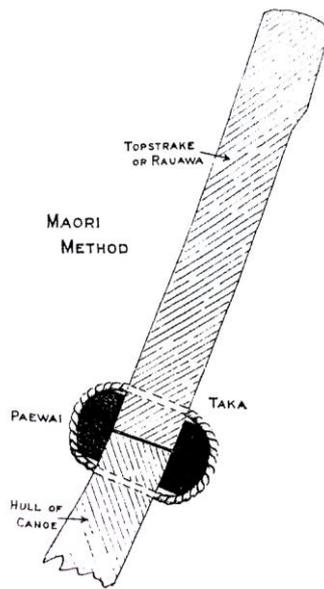


Figure 9. Cross-section detail of Māori canoe elements from Best, (2005) p130.

This is very interesting as it goes to the heart of the way waka need to be understood. I had been considering waka at rest on the water but Hector's thinking considers the whole picture: the waka, the water, conditions and the crew, all in motion. Though I had been thinking of the waka as a complex whole, in considering one element I had however fallen into a simplified way of looking at these issues. Each element of a waka fulfils a number of different roles, i.e. structural, constructional, functional. Paewai are no exception, in addition to providing stability underway they; give extra strength to the hull as it flexes when riding waves, provide a wide radius bend for the lashing cordage reducing stress on the fibres, help waterproof the joint between the hull and rauawa and spread the effect of side impacts protecting the vulnerable edges of the dugout hull and rauawa.

The spiral carving of tauihu and taurapa also works in several ways. It allows the wind to move through the carvings reducing windage and the heeling over that this may cause. However to a certain extent this is used to advantage in that it does provide some stability in the same way as a small staysail was used on traditional fishing trawlers with the pressure of the wind on the sail helping to control roll.

The functional aspects of tauihu and taurapa are a distinctive component of Māori waka and the recognition of this technology completes a deeper understanding of their evolution. This also holds exciting possibilities for contemporary waka design and revives knowledge pathways for carvers giving new direction for their contribution to contemporary waka development and practice.

4.3 INNOVATION – AN ATTITUDE OF PRACTICE

Innovation is a key element of Polynesian waka tradition however the application of better solutions have always been underpinned by traditional knowledge.

It is important to understand and to maintain an awareness of the whakapapa of an outlook or viewpoint, the genealogy of a frame of reference. Interestingly I note that with all the scientific knowledge, those involved in western boat design were not able to see the full complexity of this issue until the 1980s. Perhaps this is because of a tendency towards specialisation in the roles of boat builder, designer, marine engineering etc. reducing opportunities for cross-pollinating awareness. Also within western society perhaps there is a tendency for people to operate more as individuals rather than working collectively.

The flaws in the western yacht designs that became so tragically apparent during the 1979 Fastnet Race highlight differences in approach. The key issue for the European yacht designers was that the evolutionary process in developing new lightweight hull forms was so rapid that the ‘body knowledge’ that understood fully the experience of the vessel as a whole could not keep up with the pace of change, with the all the altered relationships and shifting dynamics between the different parts of these new vessels.

The scientific process tends to isolate issues in order to drill down into essential relationships or phenomena: to consider the key influences in for instance a structure by simplifying that investigation so as to be able to consider the central issue of a problem in say the language of mathematics. In this method, issues are simplified by excluding less significant influences.

The Polynesian approach tends to be more holistic, one where the vessel, water, sky etc. are all taken into account and understood and experienced together, so that patterns of interrelationship are felt and acknowledged. Within this cultural outlook the act of dismantling those relationships to consider them as component parts diminishes the appreciation of the whole. Within the Polynesian approach experiential, constructional and body knowledge are developed concurrently; they evolve together.

Simplification may allow essential relationships to be seen, however in doing so a great deal of detailed understanding can be sacrificed. This really goes to the heart of the issue. In the 1970s new forms of yacht hulls were developed from first principles, simplified understanding that was set apart from the experiential and body knowledge of sailing those types of yacht. So perhaps simplification is best regarded as a tool that is used to highlight tightly woven patterns without having to unravel the design.

4.4 MAINTAINING TRADITION

The development of new forms of Māori waka requires an understanding of and alignment with the values and knowledge systems that underpin that tradition. Inherent in this viewpoint is an understanding that waka are a practical physical expression of a temporal/spiritual awareness. They evoke ties to deep-seated knowledge and offer a means to experience something beyond words. Just as waka construction has been refined over time so too has the power and clarity with which they invoke and recognize multidimensional relationships.

Māori waka are an offshoot of the wider Polynesian tradition. In Aotearoa New Zealand this foundational Polynesian knowledge was applied to new materials, different climatic conditions and changing transport needs. All of these influences contributed to the development of distinct forms of waka. The cultural approaches that evolved in answer to these challenges were and remain distinctive and perhaps comprise the essential core attitudes needed to successfully translate or innovate traditional Māori waka into modern forms. The underlying values and knowledge systems of this culture frame the solutions adopted in answer to new challenges.

In the modern era the challenge is to now develop affordable, practical, durable hulls that can hold their own against imported canoes from other traditions. Northern Hemisphere waka ama, sea kayaks and what have become known as Canadian canoes are now produced in modern materials and are in use all over the world. Developing modern forms of Māori and Polynesian waka is intended to help maintain these distinctive cultures and knowledge bases and to develop their currency by being competitive with imported forms.

4.4.1 AWARENESS OF DIFFERENCE

Maintaining Māori/Polynesian waka traditions when developing new forms requires an awareness of the distinctive mindfulness that has led to those forms. This is particularly important when the materials and development methods used are not indigenous. Maintaining a distinctive cultural perspective is key. The development and evolution of motor cars provides insight into this. In the last one hundred years the car has evolved enormously however there may still be seen distinct cultural differences between makes. German, Italian and French vehicles all reflect distinct cultural characteristics. There is a certain solidity in the engineering of German vehicles. With Italian cars the focus is weighted towards the driving experience and an expression of contemporary styling. The French look to the future with their design, technology and love of innovation. In a similar way Polynesian values and knowledge systems have evolved in distinct ways in different locations and these distinct outlooks are reflected in the waka of those locations.

4.4.2 SAME PROCESS – DIFFERENT MATERIALS AND CONSTRAINTS

Over time the different aspects that make up waka knowledge and practice have evolved and been refined down into a complex, tightly interwoven essence. This process works in a similar way to writing a letter where several pages may be condensed into one without losing anything of the depth of sentiment. The words and evocations used by the writer to distil a text are intended to allow the reader to unpack what is being said in full. The author of a letter intends an experience for the reader. The letter unfolds for the reader as understanding of what is being said grows.

The tools and materials used to write a letter have a subtle effect. The Word Processor changed the practice of writing. Before its introduction journalists would have to write several drafts as they refined an article. Word Processors allowed writing to be reshaped, paragraphs moved etc. Writing with a word processor evolved a distinct style and thought process.

Using different materials or tools to construct a traditional form will inevitably introduce subtle changes. Hector Busby has evolved techniques to build traditional Māori waka using modern power tools. These methods address issues that have limited the production of waka i.e. the difficulty of sourcing suitable logs and the cost of labour. His intention has been to maintain traditional forms of waka within current resource constraints. His innovation in developing jigs to control chainsaw cuts

for example has conserved timber and reduced build costs however there are subtle changes in the finished waka.

In translating traditional waka into modern composite materials we need to maintain both the text of what is being said and the possibilities that the experience of 'reading' it offers. The intention is to maintain the lineage of both knowledge and practice. Creative innovation is a fundamental part of Polynesian waka building traditions. Evolving, inventing or adopting better ways of constructing waka, stronger structures or more efficient sails and paddles is a process that continues to this day. Digital technologies provide the means to rapidly change designs and develop new construction techniques. However, as seen in the Fastnet example it is important that design innovation evolves alongside and not independently of practice.

The physical form is just one aspect of waka. From discussions with Hotu, (see appendix C), enabling modern waka to maintain the ability to interface with elements of spirit is essential. The use of wood in waka built of composite materials is key to this process. [The following is a paraphrase from a transcribed discussion between myself and Hotu. The full text can be seen in appendix C.]

The gunnal, taumarū, taurapa, tauihu – all that wooden carving that surrounds you is like a mandala, a representation or evocation of the spiritual, a spiritual/ temporal interface. It is important that it is made out of a material that was once living because otherwise it's just a boat, otherwise it's just a model of something... It is soul-less. (Barclay-Kerr personal communication, Whatawhata - 14 December 2011. Appendix C)

Distinct forms of waka developed in Aotearoa over a period of a few hundred years. Each innovation in that evolution added complexity however with each waka built ways of simplifying construction also evolved. Elements like the peawai that fulfil a number of roles evolved in a way that enhanced the structure and improved the construction process. As detailed in 4.22 the peawai provides additional stability when underway, gives extra strength to the hull (especially those where the dugout hull is made in several pieces) and protects and water proofs the hull to rauawa joint.

Innovation is a central element of Polynesian waka culture. It gives space for expression. Waka knowledge doesn't stay still. It enables Māori culture to move with the times while maintaining a depth of resonance with the past. It enables culture to stay current without its story being abridged, to speak to and of those to come and to give voice to those that have gone before not in memory but through an evoked tangible presence of their wairua.

4.5 DEVELOPMENT OF CONTEMPORARY WAKA

Waka have always been a focal point for Māori. Creating a new form of waka that addresses current issues of affordability, portability, and durability is a natural step towards Māori waka regaining their currency. This process requires a conversation, a constant dialogue between practice and knowledge and this conversation needs to be conducted in the language of Māori waka.

Functional design innovation often seems obvious in its simplicity, however elegant solutions are usually reached through a long series of incremental improvements, developments that slowly bring

all the parts of a design into a balanced relationship with the improved, innovative element. The interconnected workings of innovations are more often than not unforeseen.

The process of developing contemporary Māori waka as outlined in this study has been deliberate. From the outset the process has been collaborative. A new construction system has been designed. Key knowledge of waka function has been recognised and embedded in the new form. The on-going iterative cycle of consultation, design, prototyping, testing and refinement has produced a scalable solution.

This is an account of the process to date. The first design was drawn in pencil. The intention was to translate a traditional hull into fibreglass while as much as possible maintaining its characteristic appearance, hydrodynamic performance and motion. The hull was designed to be constructed of three composite curved shells; outer hull, ballast tank and deck with the finished hull gaining stiffness from these elements being bonded together. The composite hull also had a built in buoyancy tank. The goal was to produce an inexpensive, durable, lightweight hull that could be carried on the roof of a vehicle. To launch the waka it would be lowered onto the water with an underside port open, once the ballast tank was flooded this port was to be locked off.

Care was taken to allow the inclusion of traditional carvings and to enable these to be lashed to the hull with traditional materials and techniques. It was planned for the paewai to cover the edge of the deck moulding giving the visual impression of a traditional canoe inside and out. The top of the gunnel was to be wood the idea being that elements that were constantly handled would be of natural materials. The taumanu (thwarts) were to be lashed to the gunnel traditionally with the cordage passing through the fabric of the gunnel and protecting it from wear. Tauihu and taurapa were to be wooden, traditionally carved and lashed on also.

The pencil drawings were then scanned and used as the basis for a digital model using Max Surf and Rhino software. A three dimensional model of the dugout hull was developed using two surfaces. A third surface was then added to form the rauawa. The stiffness of that surface within the computer model was set to imitate a plank with the surface being more easily bent longways than across its width. In section it was intended that the three mouldings that were to make up the hull would encapsulate a water ballast tank along the keel line with a buoyancy chamber above. Bonded together the three mouldings would produce a very stiff, strong but lightweight structure. When the hull shape was complete we were then able to cut three-dimensional 1/12 scale models in high density polystyrene foam. The physical models allowed us to compare different detail resolutions, discuss and make adjustments until we reached the best possible option at that scale.

Frames were then cut from MDF to produce a female mould using a technique pioneered by Ian Farrier of Farrier Marine. 10mm x 30mm battens were then fixed to the frames. Cedar strips were laminated in place to form the edge of the gunnel. 10mm high density foam was then bent into the mould and temporarily held from below with screws. With the hull shape completely formed in foam the joints were filled and the inside surface of the hull fibre glassed and faired.

Formwork for moulding the deck was then built into the hull. MDF frames were CNC cut and temporarily glued in place. Longitudinal battens were then fixed to the frames and 4mm MDF panels shaped to give a smooth surface. This was then covered in packing tape to prevent the resin sticking to the formwork and the deck fibre glassed. After curing the deck was removed. The hull was taken

out of the mould, turned, faired and glassed. A ballast tank was then fitted inside the hull and the deck fixed temporarily in place.

Temporary taumanu (thwarts) were fitted and the waka taken for testing in an indoor swimming pool. The hull was put into the water and the ballast tank filled. The rolling motion of hull without taurapa and tauihu was then measured at 1.46 Hz cycles per second. Timbers were then attached to replicate in form and weight of a tauihu and taurapa and the rolling motion measured at 0.96 Hz cycles per second. The waka was then successfully paddled with a three man crew. The canoe was stable however its motion was twitchy and more ballast was added using gym weights and water filled buckets.

The water ballast tank was then removed and a new one formed with greater volume. Totara taumanu were then lashed on. A tauihu and taurapa were carved from *Macrocarpa* (*Cupressus macrocarpa* an introduced species with similar density to Totara) and fitted. Kahikatea (*Podocarpus dacrydioides*) paewai were also fitted inside and out. The finished hull weighed 68kg.

Following testing, consultation, discussions and further research a second iteration has been designed. Following this feedback the latest waka hull has been refined to more closely matches the traditional form. The water ballast tank and buoyancy chambers are no longer separated out but integrated elements of the waka. The water ballast is held between the hull and inner deck just as in a dugout hull where the weight of the wood in the keel provides stabilizing ballast. This gives the waka the inertial mass needed to maintain direction in a seaway the inertia of that water resisting waves altering the canoes course. In the new waka design the ballast is also held more evenly away from the centre of rotation maximising its dynamic effect.

The other advantage is that this design can be built with two mouldings instead of three. This has several advantages, importantly reducing manufacturing costs. All the exposed surfaces will be moulded and the rauawa element being two layers allows additional structure to be concealed when building larger waka with this technique.

Chapter 5

POTENTIAL VOYAGES

“Work as if you live in the early days of a better nation.”

Alasdair Gray⁴

Writing this research report has highlighted the differences in western and Māori approaches to knowledge. Understanding something of such cultural complexity as a waka requires an approach that matches the makeup of the subject. I have had to swim with the subject in its natural habitat.

Waka are an art form and as such knowledge of them is not a destination that can ever be arrived at but rather an on-going journey. The experience of this journey has built up layers of connected understanding. This process has shaped a form of knowledge that perhaps more fully uses our capacity to experience understanding, an approach that carries an awareness of connectedness.

At the beginning of this study the plan was to apply state of the art digital tools to the task of better understanding an element of indigenous culture. While these tools have helped, the largest gains by far have come from interventions and exchanges with elements of culture that in the western tradition are often discounted.

By engaging with waka culture and asking questions of it, the strength of this culture has been revealed and emerged. It is hoped that the research in this report will help enable waka culture to regain its currency, its creative influence in shaping our future. In doing so it may once more speak its compelling story and captivate the next generation.

The intended output of Nga Waka Tangata kaupapa is to reinitialise the fullest expression possible of traditional knowledge within contemporary Māori waka culture. In the wider context it aims to revalue the significance of intellectual discovery through action, revalue the significance of oral history, and promote recognition of the opportunity that the breadth of this type of project presents to recreate the social and economic capital of Aotearoa New Zealand.

5.1 KEY FINDINGS

In this study I sought to understand the holistic structure of this indigenous knowledge system. In the process of undertaking this work I find that I have aligned with that world and received the

⁴ Alasdair Gray attributes this epigraph of his, now engraved on a wall of the Scottish Parliament building, to the Canadian author Dennis Lee describing it as a loose paraphrase of a couplet from Lee's "Civil Elegies": And best of all is finding a place to be in the early days of a better civilization.

benefit of broad support that flows from that attitude of mind. This knowledge does not differentiate between race or colour but rather is revealed to those that align with it.

In the revitalisation of waka culture in Aotearoa it is vital that its holistic, composite knowledge system is revived. This needs to happen in a way that re-establishes awareness of the connectedness of all the elements of Māori waka culture. This knowledge system operates in a different way to that of western cultures and has its own evolved forms of scholarship that create knowledge through the experience of understanding, that enable a powerful form of intellectual discovery through action, action supported by both physical and metaphysical elements.

Through this research Hotu and I have finally recognized the physical workings of tauihu and taurapa. This is of key importance, as their multiple functions unlock a level of complexity for waka builders and carvers that had been veiled. This knowledge together with the innovation provided by digital design and production techniques now offers the means to build contemporary, affordable, practical Māori waka.

5.2 NEW DIRECTIONS

Nga Waka Tangata project has the capacity to launch a number of voyages, voyages that may encompass dimensions we rarely consider. Voyages to repopulate our history and re-form our collective imagination. Voyages of rediscovery that may reconnect us with our ancestors and provide the opportunity to realize the best of their intentions.

In Māori culture waka are a central artefact, key symbol (see 'On Key Symbols' (Ortner, 1973)), or aesthetic locus "*the class or classes of objects that are localized in these areas of heightened aesthetic consciousness*" (Maquet, 1971 p11) In terms of cultural revitalisation waka are well suited to act as vehicles enabling the re-establishment of conceptual frameworks that have been suppressed, intentionally dismantled or purposely destroyed. Waka make possible opportunities for reengagement at multiple levels. They provide a means for individuals to reconnect to a familiar cultural matrix and add their voice to a collective reawakening as their world is brought back to health.

To redeem the relationship between our peoples we need to talk through the damage done to our indigenous culture, to understand how that came about and through this process navigate our way towards a more caring relationship. Within this process Waka culture has the capacity to catalyse something exceptional. Working together we in Aotearoa have the opportunity to create a third space, common ground upon which all may speak their truth.

In that third space, we hope that small, affordable waka following tikanga and mātauranga will become available for our youth to both rediscover the joy of paddling and sailing and share this proud heritage with each other.

"It is in this space that we will find those words with which we can speak of Ourselves and Others. And by exploring this hybridity, this "Third Space," we may elude the politics of polarity and emerge as the others of our selves." (Bhabha, 2006 p3)

This is the sort of project that encompasses all the necessary components that may define our future Aotearoa New Zealand. It offers an opportunity to reveal through action our true potential as a

Nation, to help restore the mana of our indigenous people and to refine the constituent parts of our relationship with each other. Nga Waka Tangata kaupapa has the potential to fire our national imagination and enable us to repopulate the landscape of our history, make contemporary the technological achievements of ancestors and breath into being a more regionally resonant future.

Nga Waka Tangata kaupapa is intended to realise the full potential of these findings. We are currently in the stage of negotiations with a number of potential partners. The types of project under consideration include inter-related projects:

- Waka building, paddling and sailing programmes.
- Further research in collaboration with the National Carving School - Te Wānanga Whakairo Rākau.
- Language recovery - reviving Māori waka based words and expressions.
- Digital programmes recording oral histories and scanning surviving waka.



Stanley Conrad with his son Te Moana-nui-a-Kiwa

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APPENDICES

INTERVIEW TRANSCRIPTS

The following are true transcripts. No attempt has been made to indicate emotion, pauses etc. Some repetition has been removed for clarity. Numbers indicate the position in the recording for ease of reference.

I have been working with Hoturoa for seven years. The interview conducted on 14th December 2011 at Whatawhata was of a more formal structure than the discussion held on 24th June 2013 at Ōtautahi.

I was directed by Hoturoa to interview Hekenukumaingaiwi Pūhipi Busby (Hector Busby) having visited him with Hoturoa at his home in Aurere. The interview with Hector took place at Waitangi.

1. Appendix A.

**Hoturoa Barclay-Kerr converses with Quentin Roake,
about the evolution of waka in the Pacific and in particular Aotearoa New
Zealand at Whatawhata, 14th December 2011**

Quentin To start with was thinking it would be good to talk through Polynesian hull shapes to get an idea on your take on the underlying principles and variations that have evolved around the Pacific, in the differences in hull forms. I know there are definite differences between, say, Hawai'ian and Tahitian hull shapes.

Hoturoa What we're looking at... We've got quite a big range of hull shapes. I remember when I was at university, Bruce Biggs actually described the canoe-building culture in Aotearoa as a 'devolution'. He cast it that way mainly I think because we shifted away from having canoes with outriggers or double-hulled forms and just went with single-hulled vessels. I think in many ways if you look closely at a lot of the canoes, say from Hawai'i or Tahiti and places like that, they sort of had to make do with long skinny trees for the kinds of hulls they have so there's a tendency for them to be kind of long and narrow and therefore unstable so they have their amas, their stability taken care of through the use of the **ama** but I think in the end, for instance with the Hawai'ian canoes versus the Tahitian canoes, because more in Hawai'i there seems to have been more of outside of the reef activity for a lot of Hawai'ians. I'm not sure if that's because their lagoons and their reefs that they do have there aren't as far out, as offshore as they are in Tahiti so they actually have to go out a lot more and you start to get the development of the hulls that have quite a bit of rocker in them. They're quite full and rounded at the back and actually quite good surfing canoes, whereas a lot of Tahitian canoes had big long fairly flat kinds of hulls and so they're mostly for lagoon work. There's been a bit of changes, I guess from about the 1970s, in Tahitian hulls because they started getting into this long-distance canoe racing, which was in Hawai'i and they became quite good in the seventies and won quite a lot of races in Hawai'i and I think they've managed to incorporate the in the hull designs in Tahiti a little bit of knowledge to allow their canoes to become good surfing canoes as well.

Quentin Is that like having a rounded hull for when you can slew across rather than a V which tracks and doesn't manoeuvre as well?

Hoturoa Yes I think one of the things they've come up with is these hulls that can actually... So if you get a sharp V shaped at the hull going down waves once it starts to broach it's really, really hard to recover. The thing about the Tahitian hulls that I've looked at and been involved with building canoes like that is that they have a central high point in the bottom of the hull and then everything sort of tapers off from there. Not so much tapered at the front but a little more taper at the back. Everything is rounded and what we should do sometime is have a look at Hinemanu, take some pictures of Hinemanu because then you'll see what I'm talking about. You'll see there's a sort of a high point because when we built Hinemanu we had a Tahitian canoe builder when we built that canoe...

Quentin That was Papa Jacques.

Hoturoa [5:17] Yes Jacques Wong When we built that canoe, we had to be really really careful when we were sanding it because he wanted that high point and then he wanted everything rounded so that what happened was that we got a hull a fairly good flat water canoe but seems a really good ocean canoe.

Quentin So when you say 'high point', you mean when the canoe was upside down?

Hoturoa Yes. When the canoe is upside down you've got a high point in the centre, well just a little bit back from the centre and then you'll actually see the slope, you'll actually see like a keel line when you look at it from the end. It's not a sharp keel line, but it's curved enough that it's just noticeable. We had to work hard on not eliminating that and not flattening it out when we were sanding the canoe down.

Quentin Is that a similar hull shape to say the OC6 which have a wide ish beam two-thirds back from the bow and a shallow entry?

Hoturoa Yes, it's a bit like that. I think what would be good sometime is to turn Hinemanu upside down and then turn one of the fiberglass W6s that I race today and you'll see the difference. Because of that gradual drop-off from the centre point, actually see that with a lot of the canoes today especially the fiberglass ones are actually quite flat. They're just flat all the way along and just round near the... They're still rounded hulls but if you look at them straight along there's actually a very flat part of it that goes all the way through. And I think some of the Hawai'ian canoes were like that. They're flat and then they bulge out, whereas the Tahitian canoes bulge out almost immediately from the keel. Comes right around. That would be something worthwhile having a look at.

Quentin It's interesting too that you say it's in the centre. So it's more like something you can pivot?

Hoturoa Yes, it's not exactly in the centre. It's probably back a little bit but I don't think it's back as much as the two-thirds which is I guess the traditional view of how Polynesian canoe hulls work. But there's still that understanding that you need to have this wider point astern of your beam, of your mid-point beam, rather than having your widest point right in the middle.

Quentin Yes, I think there's a lot of subtlety in there. People like Dominique Presley who was the president of the French naval architects, and Bruce Farr they understood – or re-understood – those principles in the seventies.

Hoturoa Yes I think when Bruce Farr was designing boats he took into account a lot of those principles. And when they went into looking at it... I'll try to find it because I've got a bit of paper that Sir Tom Davis actually went through and did all the engineering equations to show why that ratio of beam to hull length works. There's actually some kind of...

Quentin It's like a semi-displacement.

Hoturoa So you get to a certain point where it's pushing water it creates a small bow wave, which actually isn't created at the front, it's near the middle and so what happens is that once it has created that it provides its own kind of momentum by riding that wave and that's why it's said to be a fairly efficient kind of shape.

Quentin I think there's a lot of knowledge that resides in understanding people like Papa Jacques when he talks about as you're fabricating or making the canoe, understanding of where that high point is and maintaining that keel line because I think that with those sorts of technologies you need, not a rule of thumb, but you needed a means to build it that didn't require a lot of measuring you needed something you could see by eye or feel. It made it practical for a group of people to build it, not just one super-talented guy but a group of people to know exactly what they were looking for and needed to keep an eye on it.

Hoturoa It's quite like that generic formula that people get. You can be close enough to it that it works – it doesn't have to be exactly perfect but still it's a kind of general design kind of aspect of the canoe that even if you're like a couple of inches off one way or the other it's still going to do the job.

Quentin And then I think that's where you get variation and people adding to the knowledge because each tree is different so you have to work within those...

Hoturoa It's what the tree gives you... It's like him. Even though we were laminating but the bottom line was that he didn't get a tape measure and measure it all out, he was just standing there and saying, "OK, this is how we'll do it," so that when we set our profiles up, as long as they were straight, he was just going on about "OK, up here, down here, down here," because he could already see the canoe and we were just his little flunkies running around and doing what he wanted us to do. And that was it. But then once we started making, putting everything together, we could see exactly what he... We were able to actually make something real from all that he had from his head.

Quentin In terms of re-understanding or recognising that sort of knowledge alongside historical waka, it's important to have an understanding like Papa Jacques so that you can then see in say drawings or these older waka...and can start to extract that knowledge... or rediscover that knowledge that comes with a continuous tradition of building. That's what's exciting about being able to study the older waka like Te Toki a Tapiri is that we have an opportunity to re-learn some of those subtleties...

Hoturoa I think you're right because what happens is there's actually canoe builders out there, Maori canoe builders who to build waka but they don't actually understand issues like two-thirds back widest point kind of formula actually provides you quite a lot of stability in a single-hulled vessel. A lot of people think a Maori canoe is just a long piece of wood just hollowed out. Might as well just stick up our three bath-tubs and use that. That's that kind of model so that's what they build – like Hector's really cool 'coz he understands that and when he builds it and he has all those angles and all those measurements and he knows, "Well, I might... These are the amount of people I could put in there so it won't slip or swamp and it'll still be easy enough to paddle but still also be really really stable." Whereas the opposite end of that is people who think, "O, just building a waka is just hollowing out a log," and so they'll end up with a canoe that once they put that canoe in the water just tips over straight away.

12:49

Quentin It was interesting last night talking with Uncle Napi He was talking about... because his club races Koa canoes up in Hawai'i because his club races in Hawai'i he was talking about the modern fibreglass canoes of round about 400 pounds and how in his time he can remember paddling canoes that were up to about 600 pounds. But then, I think in the fifties,

somebody built a waka and they made it about 250 but it was decided that was... It weakened the timber too much, it would crack more easily, it wouldn't last as long and they settled on around about 400 as being as light as you would want to go... for a durable canoe. Once you have that knowledge and there's a progression of people building it you start to understand how thin you can make it and re-learn those weights. Because I'm sure that when there was a continuous tradition of canoe-building here, before that was disrupted, that people would want to be making the lightest but strong... They would have understood those parameters and sailed on a pretty tight line to get the best out of the tree.

14:07

Hoturoa Yes, I think that's right... especially so say in islands like up in the Marshall Islands, the Caroline Islands. Those guys who sail all their canoes as a matter of everyday life and they sail off to get food and things from the other islands. They've had a fairly uninterrupted marine tradition for hundreds and hundreds, maybe even thousands, of years so what they've done is they've slowly developed hull shapes and sizes where they're reasonably thin and reasonably light but still strong enough to go fast and light enough to go fast but still be safe, or reasonably safe. Those are the kind of things that probably would have developed here. Because Maoris have only been in Aotearoa for a few hundred years, relative to all the other islands in the Pacific, we're pretty new to this land. I don't think that there's been a long enough period of time to have had a chance to really fine-tune all of that.

Quentin I'm always amazed at how far culture developed here from say, arriving in the thirteen hundreds, discovering pounamu, figuring out which trees were the best and developing those sorts of carving styles and that sort of technology, I think it's pretty rapid.

Hoturoa O yes, it was pretty good kind of development. If you look at canoes like Te Toki a Tapiri [15:55] and those types of waka, and you see not just the functional beauty but the physical beauty of those vessels as well. And then you start to see that there's actually quite a lot of development. If you compare the canoes from Aotearoa to a lot of other Pacific Island canoes, they're very different. Not so much in terms of hull shapes, but in the other bits and pieces on them. The way they've been ornamented, the time and effort and energy and expense, I guess, put into building the tribally different waka that represent the tribes as such it's quite an awesome sort of development. I think the fact that this is such a big land and the people have slowly been withdrawn into the land and have lost the long-distance voyaging needs of the other islands... so have really just started to evolve the type of craft

that was required for around here; coastal work, and river and harbour work and lake work. And it works.

17:30

Quentin I know that with Boulton there are drawings from the 1820s when they were still using double-hulled for nets and in Tasman noticed double hulls.

Hoturoa With the rowers...

Quentin It's an interesting process.

Hoturoa It's not just a Maori thing. Generally, as maritime knowledge grew and developed in the Pacific, I think everyone was always trying to build a faster canoe. A lighter, faster canoe with inherent strength.

Quentin The ones I've been looking at and talking with Hector, the way stability is achieved in a single hull leaving weight in the keel-line. I suppose there's a certain amount of meat you leave on the sides of a waka, especially with totara, which isn't that hard a wood – I mean it's got a similar density to macrocarpa actually. So in order to make something that's going to be serviceable for a number of years being pulled up the beach – you can't make it as thin as something you can easily just lift and carry.

Hoturoa And that's the big thing the difference again between a lot of the canoes here and the Hawai'ian Koa [wood] canoes is that they can pretty much lift their canoes and carry them out.

Quentin The one man ones can just be carried on the shoulder.

Hoturoa They could do all that but with the kind of waka that were developed here they were just built for dragging up. You've got quite a lot of that weight. I guess it has two functions there; its function as a nice thick piece of wood for dragging the canoe up on to the beach on; its secondary function is having that extra weight that acts as a ballast, keeps the waka as upright as possible.

Quentin A forty-man traditional canoe – what, you're looking at about six to eight ton?

Hoturoa Our one Taheretikitiki well, there's thirty-six guys on there, I think it weighs in at about three tons.

Quentin You're still about eighty kilos per man.

Hoturoa Plus, compared to the other ones, the older waka at Tūrangawaewae are a little bit more than Taheretikitiki but they're a lot wider. Taheretikitiki is quite a very tippy canoe

but I think part of that is because it is really quite narrow for its width, for its height. It's quite high for its width.

Quentin The rauawa are quite perpendicular?

Hoturoa And also the hull's quite a sort of deep V.

Quentin There's not a lot of flare?

Hoturoa It's very fast so I guess what they've made up for in stability and width is that it actually goes faster. It's a bit like narrow surfboards, or fighter jets. When they're all narrow, when they're going at slow speed they're hard to manoeuvre but when they're going fast they can go fast.

Quentin Can we talk a bit about the development of the dug-out form in this country?

22:00

Hoturoa I think here it was like a bonanza. When people got here they saw these humungus giant trees so I think their knowledge of adding rauawa to the inside of a waka to add freeboard is something I think that comes from out of the Pacific because a lot of the old drawings and descriptions of waka like Tipairua and even some of the same canoes up in the Caroline Islands. They actually are planked up, sewn together and caulked to give them high sides. That happened here in Aotearoa but I think that what happened is because there are such big trees here, you could make quite wide waka that were fairly stable and you only need to put one rauawa on the side and then you're all good. But in saying that, we still got all the developments like making the lengths, like making Te Toki a Tapiri is just one log but then you got some of these other waka that are quite big that have got those Haumi joints in them. I think that's a pretty cool thing. Whenever I see waka in Aotearoa that have been sewn together like that and they're very very strong.

Quentin Is that a unique way of doing it?

Hoturoa I think there's different island groups around that actually do joint like that because I was talking to some some guys from Pukapuka which is an island up in the Cook Islands and they were talking about building a canoe and I went to talk to one of the old canoe makers and he said that like in the Maori version how they have a splice then they have almost like a male and female joint that they'd slide in together and then lash there. The guys from Pukapuka reckon they just get two flat edges, two hulls cut them flat and just sew them together. But then those canoes aren't that big. I think the biggest canoe they were building is something like eight metres long.

Quentin So with it being so thin, you're not going to get so much in the way of tensions building up as the canoe dries.

Hoturoa And I think also there's not a lot of people using it as in a waka taua you sort of pile on a lot of people and gear and all that kind of stuff. It's a whole different concept, I guess. I think the hull in its dug-out form has a whole different... just your basic... I've always described them as having a if you're a three-car family if you regard your tribe as like a three-car family well you have your little single dug-out canoe without any sort of carvings or sides like that that would be like owning a bike or a little run-down ute or a tractor just for carting stuff around and then you'd have your other car for your everyday sort of stuff like a waka tētē and your waka taua would be like your Ferrari, that you just parked up. That you just pull out on special occasions and do all that kind of stuff with it. So, what you find... Well, when I've talked to old people here on the river (they've all passed on now) [about] when they were kids, that was how they used to get around here. They'd just have a single dug-out hull that they just used to paddle down the Waikato River down to Ngaruawahia, go down to the shop, go buy their flour and all that stuff and then cart it all back home again. They'd just move up and down the river. Just small, maybe five or six metre long canoes that maybe only one or two people would jump into.

Quentin Just a straight dug-out?

Hoturoa Yes. They'd still keep a reasonably thick hull not like inches thick but still enough there but they'd still try to work the sides out so they're still quite thin so they'd still have quite a nice light canoe with really good carrying capacity but they weren't built super-thick. It obviously had enough weight down the bottom for stability, so that was good.

Quentin I've spoken to you in the past about logs being pulled out of the forest and all the issues surrounding that. The ways of evaluating the right sort of tree, checking it doesn't have rot inside it...

Hoturoa My main sort of experiences of hauling trees out – well it's easy now because you can go to the forest and look for a tree and find your tree wherever it may be and somehow if you got the right kind of money you can get it out, whereas before – even when I was probably about eleven or twelve and went on this log-hunting expedition with these guys who wanted to build a small canoe, well they found a tree that they wanted and they cut it down and it was on this small island in the middle of the river and it was like a swamp. It took four weekends just to get it from where it was to the edge of the river so they could roll it in the river and haul it out. And they even got to the point where they ended up bringing a

barge and tying it up against the island and had a bulldozer on board with a winch. It was still hard work. So when I sat down and talked to some people about that after, probably when I was in my twenties, and I asked “What was that all about?” And they said, “Well, firstly we went through this whole thing about when you pick a tree, you need to pick a tree, if you going to haul it out if you’re going to expect a bunch of Māoris to haul it out you need to choose a tree were its going to be easy to get it out of the place. So even though we got a decent tree, it was a real headache. It probably took four times longer to get that tree than it was worth. We could probably have gone somewhere else and got a tree that would’ve taken us one weekend to get it out. So there’s just little things like that. I think too that because that was part of a re-learning process as well because they wanted to teach more guys about how to build waka and stuff and so it was a real practical learning session on how where not to pick a tree to cut down.

Quentin I remember talking to Hector about – he got a log out of one of the national parks but they would only allow him to cut it in, I think, the summer...

Hoturoa It’s just the wrong time for cutting a tree for canoe-building.

Quentin The sap was up and was much much heavier. It’s not only re-learning but getting other people to understand the issues involved.

Hoturoa They have really specific timing to do stuff. It’s quite important to be able to deal with those kinds of things.

Quentin And choosing a tree – have you been involved?

Hoturoa I’ve had some good talks with Hector so I can talk about it a little bit but at the end of the day why don’t you talk to Hector because he can talk about that stuff too. Basically, stuff I’ve learned about choosing a tree has always been around which side has had the most weathering. So whichever side is hitting the prevailing wind, the weather’s hitting that side, is usually going to be that side of the tree that is the most dense. So when you’re looking at a tree you’re looking around to see if there’s any rot or deterioration and all those kind of things associated with the tree. Really the only kinds of teaching that I’ve had about it is just knowing how to tell which side of that tree is going to be the most dense because that’s going to become the keel of your waka. That’s what they’re looking for and checking. But in saying that, you still need to check the branches and that all around just to make sure there’s no kind of disease and things in the tree...

Quentin Or pocket rot...

Hoturoa Yes, all those kinds of things, all those bits and piece which is probably just the kind of stuff that anybody who has a reasonable idea of trees and all that kind of stuff would be able to tell that kind of stuff anyway. You can walk around and poke at a tree and you can usually tell if there's a bit of , if it's starting to get too rotten...

Quentin I think too that from my experience with oak in England, you can get a feel for what a healthy tree looks like. When they're stressed, differences in the bark, funguses starting to take hold and so on...

Hoturoa They're kind of like skungy-looking...

Quentin It's always surprising when you open up a tree there's always something you weren't expecting... You need that kind of knowledge to be able to change it.

31:30

One of the things with my work with building the little waka tētē I've been thinking about and looking and trying to understand the shape of the canoe and how that evolved and thinking about that in terms of the stresses in the timber, how you can shape the dug-out form in such a way that with the drying and wetting you don't get bits of the top of it, the edge of the hull, breaking off where it's got end-grain at both ends.

Hoturoa I've never really thought about that sort of stuff. You're right, because once you start trimming it, the bow and the stern you will have all that end grain but I think that from the waka that we've used all this time, we've always made sure that we've covered those ends, protected them in some way. I know that in the old times, that they just did it with the ochre and stuff that was made with shark oil to keep making sure that they had it on there. Same as what we do with our waka now. We paint them, it's the same kind of thinking. So it doesn't draw water into those ends.

Quentin I think it's in Best's book, *The Māori Canoe*, there's a photo of a river canoe that's taken end on and you can see that the gunnels, it's got no rauawa but the gunnels drop away... The prow and the stern are a lot higher. Then when you look at a lot of the canoes of that size that have rauawa, the rauawa tapers in a lot, it's much wider in the middle so that the shear line has a little bit of rock in it but not a huge amount – maybe only two or three inches.

Hoturoa I think that's one of the big things that happens with a lot of the waka that are built today, the rauawa has just got a six by two board that goes the whole way and doesn't maintain that... like you might still have a flat top but it doesn't have that gradual tapering to

the ends like a traditional old-time waka had. I think that's part of that whole misconception that a waka is just a hollowed-out log that you stick some sides on it and you got a Māori canoe.

Quentin I find it fascinating to see the way things have developed in this country – the refinement applied to a new size of material. There is a lot of innovation and to me that's where the real juice is.

Hoturoa It's the same as the stability stuff. I never really thought about it – about the effect of a taurapa and tauihu on a waka and that pendulum effect that we've been discussing lately. I never really thought of that until you brought that up and it actually makes heaps of sense. The only time I'd ever really thought that way at all was when I thought about it all about canoes in general was when I used to look at Inuit kayaks.

35:27 They're quite high at the bow and the stern and I always wondered say when this guy built... This friend of mine he had a sea-kayak and when I saw it I said, "That looks just like an Inuit boat," and we started talking about it and I said I'd always wondered why these things are up there and he said he didn't know either so I started playing around with it. They actually stop tipping over. Well, they minimize the risk of tipping over and if you do tip over, and having those high points you know when you do an Eskimo roll when you paddle in, that's what makes it come up right again.

Quentin I was thinking about Inuit sea-kayaks made out of Kevlar in the eighties that were very close to the traditional design and they had much higher bow and stern and where you sat, you were almost at water level, much much lower, so your centre of gravity was really low.

Hoturoa Trouble was that when you went to shoot a polar bear you shot the front off your boat.

Quentin I must get you a copy of that book. That's hilarious. That's the one change to that traditional kind of kayak design since the advent of rifles.

36:57

Talking about the rauawa. My understanding is that they obviously give you more freeboard, but also what I see on some of the traditional surviving canoes is that they give quite a lot of flare.

Hoturoa And they help minimize capsize again. If you go and have a look at Te Winika in the Waikato Museum, it's got quite a lot of flare on it. Me and Hector had a big talk about that

when he came here one time... We were sort of throwing ideas around about it and we both agreed that it just made the top of the waka so much wider and gave so much more angle that as the waka rolled, it actually got wider and so was more stable. So when people would be afraid, "O this canoe is listing to this side," they think it is going to tip over ... It's actually more stable and it comes back again. The difference I think here is as opposed to how they add top-strakes to the canoes in the Pacific because they're so narrow. The top-strakes on those canoes are specifically for freeboard. Not only here have more freeboard but I think here they're not just for freeboard but add to the stability of the canoe as well.

Quentin In the Pacific when you add freeboard you still have to close of the top-strake with something like a spray skirt.

Hoturoa If you look at some of the canoes at the Auckland Museum, the actual gaps in the tops of the hulls are really, really narrow you can only stick your leg and that's it.

Quentin That's sort of come up in the Pacific where it's warmer, people live in the sea.

Hoturoa They sit on top of their waka and go anywhere.

Quentin They sleep on land but hang out, the sea's their home. My understanding is that as you come further south, it gets a bit colder, perhaps it's become more that you're on the water rather than in the water.

Hoturoa You're on the water and only go out on the water to get your food and that and then to come back. Down here, we've changed from water people to land people... And I think that's evidenced in the fact that in Pacific Island cultural and belief circles is that Tangaroa is really very important, but here in New Zealand it's Tāne that is the focus of who the main god is. It's switched to Tāne. I think that's just developed from people changing from ocean people to land people.

Quentin Do you think that's also developed since pākehā disrupted the whole canoe culture here?

Hoturoa No, I don't think so because... But you're right, there was a disruption in the canoe culture but I don't think that made any real change in the amount of the time that Māori spent on the water. There's lots of stuff all around the country where they change from using waka to using whale boats. They were still out on the ocean but they just changed the kind of car they used. But I think what's happened though as the people moved from the coast inland the whole focal point of who became important in terms of in the spiritual world changed to be someone from the forest. Think about Aotearoa then, it was just one

big forest, and so as you gravitate inland, the forest becomes your world. And so Tāne Mahuta becomes the very big, the important deity in their lives and Tangaroa is the one from out there, there's a shift. That's why I believe here we've got that big difference between us and Pacific Island people. We've changed from people that slept on the land and lived on the water to people that live on the land and sleep on the land and just go out on the water for the most minimal amount of time that they can.

Quentin Do you think that pre-European waka were still the central cultural artefact?

Hoturoa Yes, in many ways... And in saying that it's not even like having a really big finely-carved canoe as your central cultural artefact. I think that a waka was something that you needed and so became a very, it became one of those items that you needed to have and so culturally it was important... What's the definition of 'culture'? It's stuff that you learn. So you learn how to use it, you learn how to make canoes as you learn how to use them and so a waka becomes an invaluable part of your existence because you need that to get around and visit because it's way faster. Even today, it's way faster for us to paddle up and down the river, than to walk. I can paddle from Hamilton to Ngaruawahia in a canoe in an hour and twenty minutes; if I were to walk it would take me half a day. In that sense it's a vital piece of equipment. In saying that it's a vital piece of equipment for your people, then it is an important cultural artefact.

Quentin What you're saying is that there has been a shift from somewhere like Hawai'i where you could live a lot of your life in your canoe... The difference from having a car to go to the shops where everything...

Hoturoa Everything centred around that. Like Uncle Napi. When I'm in Hawai'i, he's always paddling, always doing stuff with the canoes. Always down where his canoes are on the beach. All the time. Whereas it's kind of changed out of that for us so... And I think part of that too is kind of becoming westernized – in terms of having cars and stuff like that. Lots of people just have a tendency to use a waka for fun stuff now, or ceremonial stuff, or recreation. It's not a central – well I think ceremonially it's a central part of Māori identity, but I think that one hundred and fifty, two hundred years ago it was a central part of identity for the Māori in just about everything they did. If you look at those old pictures of the waterfront in Auckland, there's hundreds of waka tētē all pulled up on the side – it's a car park for wakas. If you look at that and then you compare that to car parks of today, that gives you an idea of the major role a waka played in Māori society. Like the car does today. You needed one.

Quentin When you have that and it's tied into your spiritual world, there's not such a differentiation between the mundane and the spiritual. When you remove the **waka**, something comes along and axes your canoe down the river.

Hoturoa It's a big cultural disconnect that's happened from an outside source. It would be like if someone came in today with some kind of special weapon that rendered all the vehicles in New Zealand useless. "O, what are we going to do now?" Then that person that's done that comes in with an alternative and says, "Here you go. Use these from now on." "Oh, OK." And you're off. "Where did these come from?" Well you don't need to know that, all you need to know is you need to get one. Whereas with the waka there's that whole whakapapa of where a waka come from... from the forest and all that. And going through all the right processes so that the waka, when its form as a tree has ceased but it has a new form as a waka so you have that process that allows for the spirit of the tree to return to the forest but you also have the process that allows the tree to take on a new form and have its own spirit to do that. And that's where the cultural connect lies whereas with a car it's not like that. Although kind of is because whenever I get a new car I, we, always go down to the river and we do stuff and so then a car for me is like a waka. So I don't like selling cars, like I don't like selling waka because there's a connection. So I have a car, I keep a car until it stops going... I suppose if we look at it in terms of that association of the waka coming from the forest in the old days, in terms of the Māori world view of their genealogy then somewhere in the distant past there's actually a genealogical connection between us and trees and everything else in this world so when we take on the responsibility of having a canoe and looking after it, we are actually subconsciously undertaking a responsibility to take care of one of our distant relatives. That's kind of where that lies. For many people that has transformed into – well for people like me anyway... That's why I was really hacked off when my truck got stolen. Not just the fact that it cost money but this truck has done these things that I've expected of it and it's done it well and so I've always responded to that by making sure that the truck is always maintained and looked after. It's that kind of reciprocal thinking around that.

Quentin So that understanding is still embedded.

Hoturoa It's manifested with different...

Quentin I think it's manifested with you but perhaps for a lot of Māori that is not the case?

Hoturoa Yes, I agree with that... They just feel de-cultured. In that sense they've become colonised in their thinking. Something like a car is just a commodity, not actually an integral part of your existence. And that there's a give and take to that relationship.

Quentin Even the manufacture is still part of creation and so on...

Hoturoa It sounds weird but when I'm sailing or paddling on Taheretikitiki, when I'm an Haunui or Pumaiterangi I talk to them, "I need you to do this." Same as when I'm driving my truck, I'm going, "This is what we got to do today. I need you to make sure that we get through this what we've got today... if we've got big stuff to do today..." Some people think that sounds weird.

Quentin From an understanding of a Vedic tradition I think it's wonderful.

Hoturoa You know my old brown truck – you've seen that running around? I've had that since Turanga was born, for eighteen years. "Why don't you get rid of it?" I says, "No, because one day something will allow me to use this truck." And then our truck getting stolen and the kind of series of events that happened allowed me to get that truck, things that I needed, back on the road running again and I was really happy. It was like welcoming back a friend, an old friend into the family. Better than just leaving it to get wrecked.

Quentin So in some ways in creating an object like a canoe, you're establishing a vessel for a deity?

Hoturoa Yes. You're creating an understanding that your life... you'd achieve less stuff without these things helping you.

52:11

It's a kind of understanding that it's a relationship I think is the important thing.

Quentin That's what excites me about working with waka is that they are the vehicle or they are the repository, or the vessel that allows expression of that culture and also holds it, cradles it.

Hoturoa It shapes your world view. If you have a particular understanding of what a waka is and what it does and where or how it is important within your culture, it frames your world view.

Quentin Sometimes I wear a watch. I don't need to because my cell phone has a watch in it, there's a clock in it, but when I look at my watch it reminds me that in my culture, where my

father's from, the chronometer was a big deal that enabled the British to develop accurate navigation. Wasn't so good for you guys but...

Hoturoa It also allowed the British to go and get the new land.

Quentin It stopped them losing whole fleets and sailing into cliffs and stuff. I have an understanding of the kind of whakapapa of that view of that culture and in my family my links to sailing. It's more to me than just a watch.

Hoturoa That's right. Like to me, my truck is more to me than just a truck because it's a friend that I can call on to do a job when I need that job done.

Quentin And again it's a vessel, a repository that holds and enables all that culture to be maintained...

The last thing I wanted to talk about was your understanding of the development of tauihu and taurapa I've seen in the collection in the Auckland Museum those two pieces, they're very early, that Hector – I think he copied for Te Aurere. And they're fairly early, I think pre-1500. And then I've seen the taurapa in the Waikato Museum which is very upright but very solid very heavy-looking. And then there's the developments of the much lighter later, post-1800s styles. What's your understanding of those design principles that have evolved?

Hoturoa Like I said before, I haven't really thought about it in terms of the engineering, the associating the weights and the heights and all that with the swinging moment of the waka. It wasn't until you actually talked about it that it made sense. It made sense and now that we've started discussing that, I think that the original builders knew that. Because, if we could go back to the Inuit example, that's why they did it because they knew that.

Quentin On the west coast of the United States the Cedar canoes, they have similar things.

Hoturoa Same thing – quite high in the back, high at the front and the back.

Quentin Also the Solomons – the canoes that don't have outriggers, the war canoes.

Hoturoa They've got that quite high. I've been in those ones that the West Coast Indians use, I've actually been in one. And yes they're really stable. My first thought when I first saw them was, "These are just like Māori canoes," but now when you think about it more, you're right. This is a part of the ancient canoe building knowledge that the old people here they tried to incorporate that knowledge in a way that was decorative as well, which is really cool I think. And what I think has happened – maybe Taheretikitiki and a few other waka that have been built recently – is that it's the same thing. People think they are solely for

decoration and there's no practical purpose for them other than making a canoe look beautiful, but I think somewhere in the transmission of knowledge, that wasn't transmitted.

Quentin The way you built it would have been known but not articulated. Imagine is a Morris 1000 car was put in the garage and left there for fifty years and someone discovered it in fifty years' time and there were no more cars in the world but there was some petrol, oil and an instruction manual, they'd know how to start it, you could drive it around but all those little tricks for tuning it... would've all been lost. All that subtlety, the sort of thing you pick up through osmosis by being around the craftsmen. I'm sure there is a lot of that sort of knowledge that is still embedded in the objects waiting to be rediscovered. That's what I find a real joy and fascinating. If you have a western science view of the world there's actually some use to that.

Hoturoa Yes because you think "Why is that like that?" Then you go back in and you research and "Ah, now we've found a reason for that." And you are right, when we built that six-man canoe, when Papa Jacques was saying, "O we need to do this, this and this," so we just did it. It wasn't until we actually used the canoe that I said to him and he said, "Yes, that's why we did this and that's why we did that." That's only because I asked him. Otherwise if it was just a normal canoe-building process, we would have just done that and carried on building it in the same way.

Quentin To him it was probably just self-evident.

Hoturoa Yes. We just have to do this. And that's probably what would have happened in the old days. And as you say, there's that time period in New Zealand history where there was like a big cut-off in the use of waka. And once you do that there's actually a cut-off in the requirements for canoe-builders. It's the same as navigation. There's that big cut-off when boats with outboard motors turn up into the Caroline Islands, suddenly the navigators aren't needed anymore then twenty years, thirty years down the line everyone's going, "How did that navigation stuff work?" But it's too late already. And it's the same with the canoe-building stuff. So what we've got is to a point where people want to build waka but just build it by looking at what they see. But they don't understand the individual characteristics of each waka that's been built dictates the kind of taurapa and tauihu you might want to put on there.

Quentin And what's fascinating for me is the way that fits together – the pākehā scientific world view that has something to offer in that process to help that process but by the same token, the view that the spiritual and the mundane are interlinked that the Māori world

offers has something to offer to the pākehā side of the equation. I've noticed that there is some variation in the tauihu and taurapa and looking at some of the drawings from Cook's early voyages and just recently looking at some of the carvings on model canoes that were gifted round the turn of the nineteenth-twentieth century. You can see that there have been some developments since then. There's a difference between waka taua the tauihu is quite different from the southern tribes.

Hoturoa There are tribal differences like on Taheretikitiki everyone kind of agrees that the tauihu on there is a northern style of design. But you look at all the canoes that Hector has done, most of them are like that.

Quentin I suppose if you've got really big planks of wood you can make something really imposing.

Hoturoa You've got those big trees up there and you can get quite a big slab of wood and carve it up and make it look quite flash, whereas once you go further and further south you've just got to make do with what you've got. You might end up with a block of wood that wide so you might just carve up a little man, make some little arms and tie them on and then that works for down here but up there you might get a big slab six feet high and three feet wide and you say, "We can make something flash out of this."

Quentin I suppose the idea would be to not only make it function but also be imposing, awe-inspiring...

Hoturoa The more ornate that tauihu and taurapa, the more mana that your iwi can portray. There's that kind of underlying thinking as well, I reckon...

1:03 [Quentin thanks Hoturoa]

1:03:35

Hoturoa I know how serious the loss of navigation knowledge was, and while we're talking I say, "Yes, that same kind of thing has happened to the canoe-building knowledge of Aotearoa." There's some things that people know, but then there's other things that we're actually on a bit of a rediscovery to find that stuff. That's why I think that stuff about the swaying motion of a waka in relation to the taurapa, tauiwī, I think that's really important because what that does is slowly reveal to us some of that finer tuning business that real canoe-builders knew about...

Quentin When you think of the knowledge – if you were a fifth or tenth generation waka-builder, there would be a huge amount of knowledge that you probably weren't aware of...

Hoturoa Yes, you just do it. You're right. It's the same as when we do stuff. Like Turanga, he does stuff on the river now, or out on the ocean, not because I stand there and say, "You need to do this, this this," but because he's come with us and we've done so much together. He just does it.

Quentin Say you're trying to learn a woodworking or carving technique – you can look at books and suss it out yourself, but if you go and have ten minutes watching a master craftsman, you suck up so much knowledge or technique. And that's the sort of stuff we need to rediscover by using technologies like laser—scanning...

Hoturoa It's great. Even all that research you did about our hull shapes and then going through this whole process, making the little models – now that we're having our talk, I can see the value in a lot of that stuff.

Hekenukumaingaiwi Pūhipi Busby (Hector Busby)

converses with Quentin Roake

at Waitangi, 20th February 2012

Quentin What I'm looking into is the evolution of waka in this country and in particular the stability of them. What would be really helpful to start with talking about the Polynesian hull shapes and your understanding of the underlying principles behind those forms so we can get an idea of what came to this country and then was evolved into what we have here, the Māori waka that evolved from that tradition.

Hector All I can go by really is some of the knowing about the double-hull, is just some of the drawings I've seen from different people in those days about the shape of them. The double-hull was actually the same as our waka tete today. The tauihu wasn't very big. Mind you we've got one tauihu in the museum there, the Auckland Museum that looks like a Marquesan one and also the taurapa as well.

Quentin Is that the little one that you used as a basis for Te Aurere?

Hector Yes, Te Aurere and they were both bound up with the building of Te Aurere and that's why I decided I was going to use that.

Quentin In my reading I've come across references to the way waka hulls are shaped being the widest two-thirds back from the bow, shallow entry, that sort of thing...

Hector That's how I used to shape my hulls in the first place and still do most of them now like that but when I want a specially fast waka I change...

Quentin Do you go to a deeper V?

Hector No, the V is still the same but the shape is a little bit different – the beam is not where I usually put it. The beam is actually... putting it there makes it suit. We have a lot of heavy guys normally and the beam being two-thirds at the back is good for the whole waka that the heavyweights are high at the back and the lightweights are at the front – just for a team, for a crew

Quentin Is that because that shape tends to lift over the water and cut rather than passing it and folding it behind?

Hector The shape of even those ones there with the beam two-thirds back – see there's hardly any shoulder on the shape to actually hold the canoe back. But when you're building a special one for speed, it's different. We have the beam somewhere else...

4:40

Quentin The Hawai'ian waka have hulls that are very rounded, which I understand is for manoeuvring. The Tahitians have less freeboard and theirs are designed, or have evolved, for use in lagoons without so much seam ? with less draft. I suppose that those are the waka your ancestors, that's the understanding or the technology that they would have brought here. Then there would have been the possibilities with the much larger trees...

Hector We all understand that the waka ama is the oldest waka in Polynesia really right through and, as far as the waka taua goes, that was virtually done here, after getting here. Most of the waka were waka hourua but I know one of the waka from down the line, they claim that they had an outrigger, just very close to the main hull for stability... Fair enough, I think. Most of everywhere I go when I was starting to build waka, everywhere I see a waka, if it's up against, under the tree or something like that, I would go and measure it and I would check it and after travelling so many different places doing the same thing, I found that the waka, the actual freeboard formula. If it was small... In actual fact, the shape of the waka was virtually all the same. A lot of the new waka they build these days... O, I don't know... They just don't know how to do it properly, you know. It took a lot of study for me to work out how. All my waka now are very, very stable, and that's through just actually taking my time. I thought maybe different areas had different techniques but I find that the actual shape of the canoe itself is very consistent.

Quentin I've seen variations say in Tolaga Bay splashboards, a second board on top of the rauawa...

8:00

Hector There's only one thing in our books at home, our family books, there's nothing about waka at all. But there was a question in our family books – the only thing about waka – there was a question being asked, "How do you build a waka?" And the answer was, "Ki ara mua, ki ara muri" Keep the front up, keep the back. up.

Quentin That's fascinating. I can understand how that works in terms of having waka being able to turn to pivot on the centre. Hotu spoke about speaking with Papa Jacques from Tahiti... They built that waka ama and there were rules of thumb that Papa Jacques was employing. Hotu described himself and the others that worked on it as the 'flunkeys', and at the end when it was finished, Papa Jacques could explain to them the high points and what that hull shape was about and what fascinated me was that there seemed to be a rule of thumb understanding that he could easily see and apply and a group of people could

execute. Which is what I think you are talking about when you say that every hull you see follows the same principle.

Hector Yes.

Quentin One thing I'd be really interested for you to talk about is the dug-out part of a waka and how that shape maximises what's on offer from the tree. I'm thinking about my experience in England... the house that I restored... use different logs for different functions. I made this little model. What fascinated me when I've been working on these little waka tete with Hotu was trying to understand the shape of the dug-out and the reasons for that and looking at then how the rauawa was used to get more height. For me the important thing was how the shape of the dug-out was constructed so that it was stable and so that it wouldn't crack as it got wet and dry. If you cut the profile of the hull (upside-down) and then you cut the profile in plan, the side of the waka, the gunnel, drops away because otherwise the side of the log rolls in. And this is my interpretation: if you left that wood as it rolls in, it's end-grain either end and there would be a tendency for that to snap off.

Hector Well, all my hulls, my number one cut is to the top.

Quentin Yes I remember you saying that you could do the bulk of the cutting of a log with five cuts.

Hector Yes, five cuts. But I normally what I do first before the final edition/addition is taking out enough timber for the rauawa and kaunaroa.

12:30

Quentin Do you think that in the past... I've seen photographs of hulls that have been roughed out before they're dragged from the forest.

Hector Yes that's right. And there's a reason for that. They never had the machinery to pull them out.

Quentin And they would've cut them in winter?

Hector That is number one – you do cut them in winter.

Quentin Last time we spoke, we had a conversation that you had been forced to cut one of the trees in summer and it was so much heavier.

Hector It's so different. The reason being that in the winter the sap is down and the tree's asleep. That is the main reason why but the other thing is you go and pick your trees and the best ones are not the ones in the gully but the ones half way up the ridge.

Quentin Are they more difficult to move or do you have the weights?

Hector No, it's not a case of moving. Those trees up on the side of the hill have a heavy side and a light side because one of the sides is facing the winds and rain. That's the side that

gets hit by the winds and the rain and it actually slows that side of the tree up from growing... The grain is much tighter. Although the heart is right in the middle of the tree when it's young, but as it grows up, the eastern side is the side that grows quicker than the other side so therefore, after it's matured, you'll find the heart is closer to the sou'western side of the tree which is the side the winds and the rain are always coming [from] and slows it up. Therefore that is the heavy side of the tree and that side goes down to the bottom of the hull.

Quentin So if you found a good tree on a ridge, you wouldn't be able to put it in water to see how it floated?

Hector I don't even bother to put it in the water, but if you did put it in the water straightaway it'd just find its stable point with that side on the bottom.

Quentin How do you evaluate a standing tree? Do you look for signs to tell you it doesn't have pocket rot or...

Hector With kauri you hardly have any problems. If there is a bit of rot, it's not worth worrying about... I've been using a little bit of tōtara lately and you can't tell what's inside. Beautiful on the outside but...

Quentin In England with the oak trees... it would look fantastic on the outside and there's be something going on right in the centre.

Hector Mind you, the tōtara I've been using has been down sixty years. I've never had the opportunity to actually knock down a green tōtara but I have seen waka from tōtara. beautiful and no pocket rot.

16:50

Quentin When you're roughing out a waka you make the first cut across the top so you have that timber for the rauawa. How do you think they started in the old days?

Hector They had plenty of timber and they had plenty of time.

Quentin Would they cut the shape, the line of the keel first?

Hector Well I've seen a few pictures in books like Elsdon Best's *The maori canoe* and they show the half-finished hulls and that's all you can go by but I wouldn't know. When I decided that I was going to build canoes the first thing that came to my mind was the quickest way and the easiest way...

Quentin I was blown away by what you can do with a chain-saw.

18:07

Hector I made my own jig and a lot of jokers I've noticed can't get over it really. But I can cut around corners and all sorts with a chainsaw.

Quentin When you're opening up the log, I know it's much faster now with mechanical tools... What I'm wondering about is the process of opening up a log is so you don't set up tensions in it. Some dug-outs from different island groups, they leave part in to hold the shape... while it's drying out...

Hector That's why I always like to work on a dead tree so I don't have to worry about that. It's all settled. If I want to build a canoe in a hurry, I look for a dead tree in the forest.

Quentin In this country, it was the rauawa that gave you more freeboard...

20:05

Hector And also strength... for the haumi, the joints. The middle of the rauawa was always over the join and that's that extra foot or so of three inch by a foot over that join.

Quentin I've heard it said that a haumi on a large canoe it's a little bit like having suspension. If you're coming through surf or a swell pattern, there's a little bit of flex in it.

Hector There is flex. You tend to think the flex is opposite but it's not. I've proved that for myself. When we did this voyage from here to Whangaroa just forty miles and on the way up we never had any swell so I couldn't tell. But on the way back we did and the minute these swells started, I ran right to where the rauawa was joined and there was a gap about that much on one of the joints on one side and I sat there.

Quentin Three or four millimetres?

Hector Yeah, not very much but of course the waka was mighty big and had a fair bit of freeboard and it didn't matter whether it was open or not. But, as the swell came through, when the swell got to the join, and the back was inclined to be up, I thought that that join would open up a bit more having the swell right under it and with the stern halfway above the water. I thought it would open up like that. But it didn't move at all. But when the swell got to the stern, it closed up. And then... a dozen times. I didn't want to have it come apart. I thought, "I'll prove this damn thing, what it's up to..." And that's what it was. In actual fact, the design of the waka, the design of that haumi has a lot to do with it.

23:00

Quentin It's quite a complex joint, a bit like a key.

Hector Yes, just yesterday I was looking at one of the canoes that was made for 1990 – they've got that same shape but there the angle. Not right... Because when you lash them down, they lock up. And I noticed my uncle that taught me and had worked on canoes, when we were tying the joint one time, the first joint on the big waka, Ngatoki because we had to cut all the lashings because after 1940 when they took it up there, when it got up there it was just amateurs on the lashings...

Quentin So when you had it open you could see...

Hector No, no. While we were lashing it, we had a timber jack at the end and lifted it up and while we were lashing it the haumi... You got the waka like that and the haumi like that, that's how the haumi sat, when we put the Oakum in it, we lashed, we held the front up so this was open here. After we lashed these two tightly – the first one there – after that was done, tight, and then we let the timber-jack off here to settle right down.

Quentin Into the keel line?

Hector Ae. And kept the lashing right down there.

Quentin So you would've understood that join from your bridge-building days?

25:21

Hector Yes, it was quite easy for me to understand straight away and having a lot to do... I knew which was right you see. The waka I was looking at yesterday, like that This joint here was spread across like that, cut straight across, so if you knock the bow or the stern, there's nothing to stop it from slewing and loosening. But if you had them like this, ninety degrees from the shape, a different story altogether. It can't go anywhere. Especially with your paewai over the join on the inside, you see.

Quentin So there's also a **paewai** on the join on the inside?

Hector Yes.

Quentin So you have some sort of material to keep the caulking in?

Hector No, that's all you need. And with the rauawa like... Say that's the stern post there and from there the rauawa is always the centre spanning over the haumi.

Quentin Spanning over the joint of the haumi. Clever stuff.

27:00 One thing I'm becoming more aware of is that the rauawa not only gives more freeboard... There's a photo in Best's *The maori canoe* looking right down the hull and the gunnall of the dugout drops away and up again. It's very... Like a rocker in it. I looked at that and thought... When you see the rauawa on an old waka, they taper quite a lot to the end but there's still a little bit of rocker in them. I think "rocker" is probably not the correct term. There's a bow in the shearline.

Also in the old photos, I've noticed that the rauawa flares out.

Hector Slightly.

Quentin Slightly, yes. So not only do you get that freeboard but my understanding is that it also gives you more stability when it rocks over it increases...

Hector It's the paewai that actually makes it more stable... When you look at it like that... so you get the paewai there and the rauawa there and the paewai is the one where you got

that extra pull, extra beam. That one and this one, see? So it's four inches or more and of course it's normally about two inches thick... It steadies it.

Quentin In English, it acts like a spontoon...

Hector When it rocks over, it goes to that and doesn't go any more.

Quentin Like some of those motor launches that have a little kink in the hull that just catches the water.

Hector Yes. The way I do it with mine... All the waka are usually that rauawa there, that paewai there is about... The actual way I do my hulls is like that and then like that, like that and then that... Always set that in the bottom... That rauawa, that paewai is there, so that when the waka is loaded, the waterline is about there.

And of course your holes are up here for the lashings, not on the corner? So we got about that much there and, as I say, the paewai makes it that much wider. So when the boat goes like that, the paewai stops it from going any further.

Quentin I'd never thought of it like that... So that takes us to the evolution of the tauihu and taurapa. Some other canoe traditions have a similar thing going on and I'm also thinking of the taurapa and tauihu that you based those carvings on on Te Aurere. Looking through the collections, coming forward in time, there's one waka taurapa in the Waikato Museum that seems very very heavy. Then moving forward in time, they seem to become more elegant. Do you have any thoughts about the evolution of those shapes and forms?

Hector Well, going back to my uncle who showed me how to lash, the difference between the maori canoe and the pakeha canoe is that the pakeha boat has got its keel underneath the water but the maori canoe has got its keel on top of the water. That's why you see the taurapa - all the holes - there's a reason for that. It's a wind-break and when the wind is blowing, it actually - and the tauihu - same thing. They actually steady the canoe.

Quentin Like a fishing trawler having a small sail just to steady it...

Hector Yes, that's the idea of it.

Quentin Especially with the northern form of the tauihu...

Hector Yes. It's big. Now if there were no holes right through it, it would be hard for it to come back, level itself up again.

Quentin It's having that effect, of the wind moving through it, having that effect but it's not too great.

Hector But if it was just a big slab, with no holes in it, it would stay on that side of the wind. But it comes back because of the wind blowing through the carvings.

Quentin With Hotu, I've been trying to understand the functions of tauihu and taurapa... [In England in 1979 there was a yachting disaster... where fourteen people drowned... research into stability of yachts... tank testing of hulls and halfway through that process somebody pointed out that they hadn't modelled, scaled the rig, the mast of these yachts and that they should have all these elements. When they put the masts on the hull, they couldn't get them to capsize as easily... What they found was that as a wave hit the side of one of these yachts, it would knock the hull but if the mast was there the weight of the mast would resist the urge to roll because of its the weight and would slow it down] Is that one way the tauihu and taurapa functioned?... The higher up the more slowly... It works on three axes. That design slows rolling, the weight being in the bow and the stern also slow pitch, and especially with a waka tete, the weight in the bow, if you're hit side on or to one beam with a wave, it resists...

Hector I think that's where what I said earlier "Ki ara mua, ki ara muri" You still got that same shape of the canoe, all the way through, right to the end. When I set my jig, and as we get up to the front, there's hardly any hull at all. It's just the tauihu. Also, that part of the waka is out of the water most of the time. You get it if there's a fairly heavy swell but it only just goes in and out again.

Quentin Looking at some of the waka tete tauihu in the British Museum, the design of the head and the eyes, leaning forward and looking outward like this, it looks like a surf ski. If it digs into...

Hector It won't go right in...

Quentin It'll lift it.

Hector Even the shape of the head

Quentin Perhaps later on it seems they've become more stylized...

Hector Today they're more or less looking up a bit more than what they were in the old days when they were looking down. One of the reasons for that looking down, there's a custom for that as well. Really he's Tūmatauenga the sea god – no, the war god - more or less saying to Tangaroa that "Your younger brother Tāne is approaching your domain... Some waka taua have just got the one bigger figure, just the head alone on the boat.

Quentin And with the waka tētē the head on the front, is that the same?

Hector It represents the same thing.

Quentin I'm sure that most of your waka are carved in the northern style...

Hector Well, it depends. The last two I did for Wellington was Taranaki style.

Quentin Could you perhaps say something about those regional variations?

Hector I don't know too much about the variations. All I know is Taranaki and the North. They're very similar. And they are related through one of the tipuna who came over from Ngāti Ruanui down at Taranaki.

Quentin Do you think that some of those carving styles are influenced by the materials available? The size of the timbers or the trees?

Hector I don't know. I didn't carve very much. My baby is a good carver but I never had time to carve really. Before carving, I was a bridge builder before building canoes. When it comes to the construction of hulls and such... One of my great-grandfathers was a Scotsman and he was a boat builder. John Boredale was his name and he built three schooners when he married my great-grandmother. And he was a bit of a moon-shiner as well. He used to hock off whisky and all that kind of stuff. He built his first schooner up here and launched it at Ahipara. Then he went down to the Coromandel and built one there. I'm not quite sure but I think he may have built the third one there as well. That's what he used to do when he left here. He left here with his oldest and his youngest sons and finished up at Matakana Island. That's where he died and they brought his remains back up here a few years after.

Quentin Did you have a waka building tradition through your Māori family?

Hector No. I took that on – one of the reasons I took that on was one of my ancestors went back so when the Hawai'ians landed here, right here, in 1985, our chief then he praised them because they had done it the same as our ancestors had. Then he said that he hoped in the near future that we would build a canoe here and go back to the Hawai'ian style of voyages of discovery. So after Sir James died in 1989, I decided I would take the challenge on. So I did. I got sick of camping out with my job because I'd done all the bridges up the North here and I was down as far as the other side south of Whangarei building bridges. And I was sick of camping and this and that. So I chucked it in just in time for the Year of the Canoe, 1990. I had the opportunity to build it and my first canoe I looked at it alongside the big one over there Matatua...

Quentin It's survived very well,

Hector I had to redo it. Somebody, a young fellow, burned the prow and I was getting sick of the people who were looking after it. They weren't doing a good job and after it was burnt, that gave me the opportunity to go and get it and fix it up. I wasn't going to let it go back. The reason it is here now is that the intention of our ancestors, when this one was built in 1940, their plans were to have two canoes built and stay here. So what they didn't do then, I covered that...

Quentin The Crown Research Institute has a new kind of laser scanner that is able to scan very long objects and put it into a form that you can put on to a computer. And talking with the museum in Auckland, they're looking at using that technology to look at the old hulls and maybe learn some more from those shapes. It would be interesting to show you some of that work.

I'm doing my Master's thesis and wanting to continue to do a PhD and use that as a basis for a book about Māori waka very like Tommy Holmes' book *The Hawai'ian canoe*. To use that [research] as a nucleus for putting together a book that covers all aspects. I'd be very interested, if you were interested, to come back and talk further about different subjects... and [perhaps] even to film that.

Hector I spent a lot of time studying. The first couple I built were just guesswork. But fortunately I had just enough tips from the older ones. Matatua, when I first built it, was a little bit tippy. But after I redid it – lucky I had enough wood in the hull to trim it up. I knew I wanted to get it stabilized.

Quentin I could show you the process I went through with Hotu... we can use a computer to design the shape... has water ballast... the taumanu are lashed on.....

Hector You know what I did with my second one? My first waka was Matatua, the second one was Te Ika a Maui, which has been all over the world but that was the light, the light end, the light side of Matatua. So what I did was after I shaped it, I cut a groove in it right along, from about a third from the front and a third from the back then loaded it with lead. Boy, oh boy! It was very, very stable. It was not very much, it wasn't very deep. But you know how lead is.

Appendix C.

Hoturoa Barclay-Kerr and Quentin Roake

Excerpt from discussion, Ōtautahi (Christchurch) 24th June 2011

Quentin Just getting back to what we were talking about on that little waka... The gunnal, taumaru, taurapa, tauihu – all that wooden carved stuff, the stuff that sits around you and is like that mandala or representation or evocation of the spiritual, temporal... Like an interface.

Hoturoa Yes.

Quentin I think it's important that it is made out of a material that was once living.

Hoturoa Absolutely, because otherwise it's just a boat, otherwise it's just a model of something... Its soul-less.

Quentin Yeah it's just made out of some manipulated petro-chemicals.

Hoturoa Yeah, that's right. And that's why I like – even with *Huka*, it's really cool that we have all those little carvings with him. But the other thing about *Huka* is that he's still got wood in him. The thing is to be able to maintain that... Because what it is is that it's a connection between us guys and all those old guys. And it's got to be through the wood... It's got to be through the wood. Because this is the conduit, here. It's like a lightning rod that connects us straight to those guys.

Quentin Yes it's the equivalent of a photograph – we haven't forgotten...

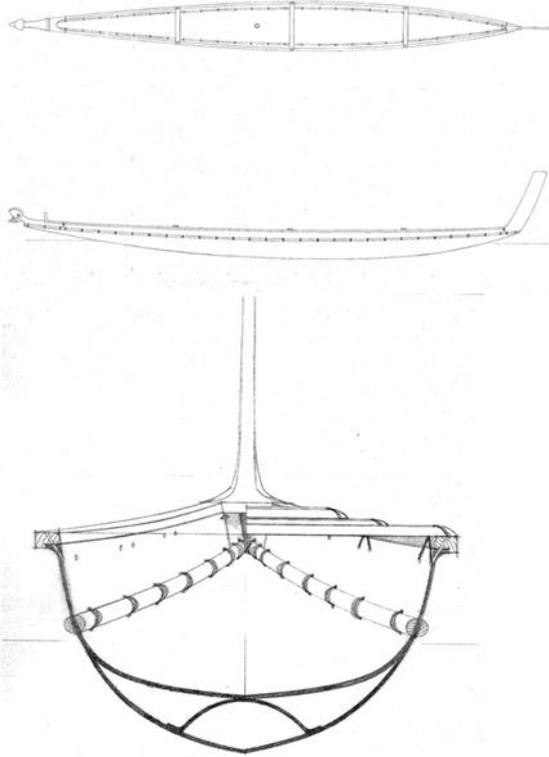
Hoturoa That's the DVD of where we came from and where all our tupuna are... this part here. Because what happens I guess in the shaping and that... even if it's only a small part of the canoe - that's the last bit of connectivity you have with the earth and all those other guys and everything else that's happening.

Quentin That's what you hold on to and touch, and it takes on... like a cathedral takes on a spirit, an atmosphere.

Hoturoa Yes.

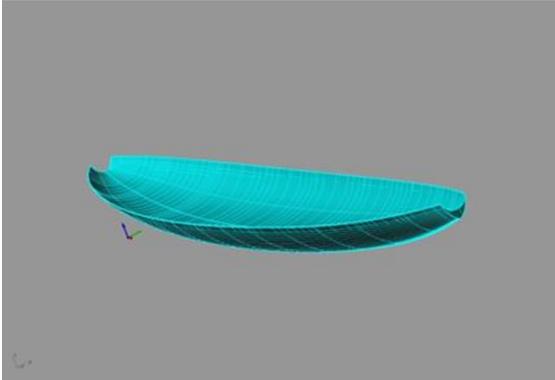
Appendix D.

The following are photographic images illustrating the design process and building of a new form of waka constructed in fibreglass.

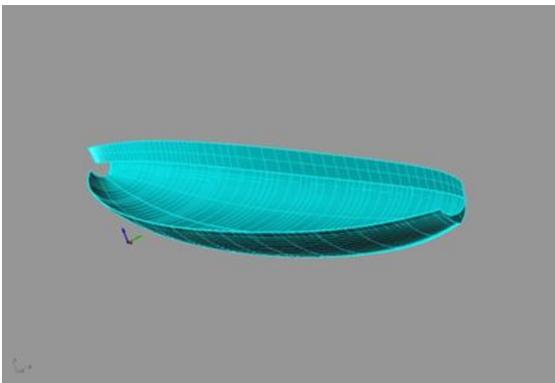


The new design was first drawn in pencil.

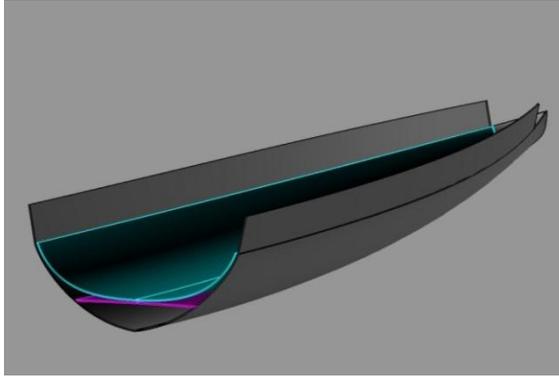
The hull was designed to be constructed of three composite curved shells; outer hull, ballast tank and deck with the finished hull gaining stiffness from these elements being bonded together.



The hand drawn waka profile and plan were then scanned into Maxsurf software and a three dimensional model of a dugout hull developed using two surfaces.



A third surface was then added to form the rauawa. The stiffness of that surface within the computer model was set to imitate a plank with the surface being more easily bent longways than across its width.



In section it was intended that the three mouldings that were to make up the hull would encapsulate a water ballast tank along the keel line with a buoyancy chamber above. Bonded together the three mouldings produce a very stiff, strong but lightweight structure.



When the hull shape was complete we were then able to cut three dimensional scale models of the form, discuss and make adjustments until we reached the best possible resolution at that scale.



Frames were then cut to produce a female mould using a technique pioneered by Ian Farrier of Farrier Marine



10mm x 30mm battens were then fixed to the frames. Cedar strips were laminated in place to form the edge of the gunnel. 10mm high density foam was then bent into the mould using battens fixed from above.



The foam was then held in place with screws from underneath.



With all the foam panels in place the joints were filled and the inside of the hull fibre-glassed.



MDF frames were CNC cut to form a mould for the deck and temporarily glued in place.



4mm MDF panels shaped to give a smooth surface. This was then covered in packing tape to prevent the resin sticking.



The fibre glass deck was then hand laid into that surface. After curing it was lifted out and the formwork removed.

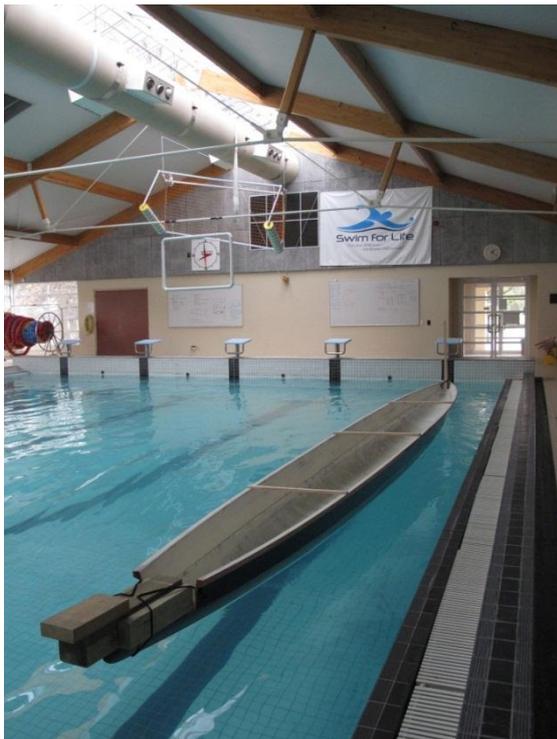


The screws holding the foam panels of the hull were then taken out and the hull removed from the mould.



The hull was then turned, the foam surface faired and fibre glassed.

A fairing compound was then applied and the hull faired and painted.



A ballast tank was then fitted inside the hull and the deck fixed temporarily in place.

Temporary taumanu (thwarts) were fitted and the waka taken for testing in an indoor swimming pool.

Timbers were then attached to replicate the form and weight of a tauihu and taurapa.

The waka paddled well but its roll motion was a little rapid.



The ballast ratio was then optimised with the addition of more weight.



A taller and heavier taurapa was then fitted to further slow the roll rate.





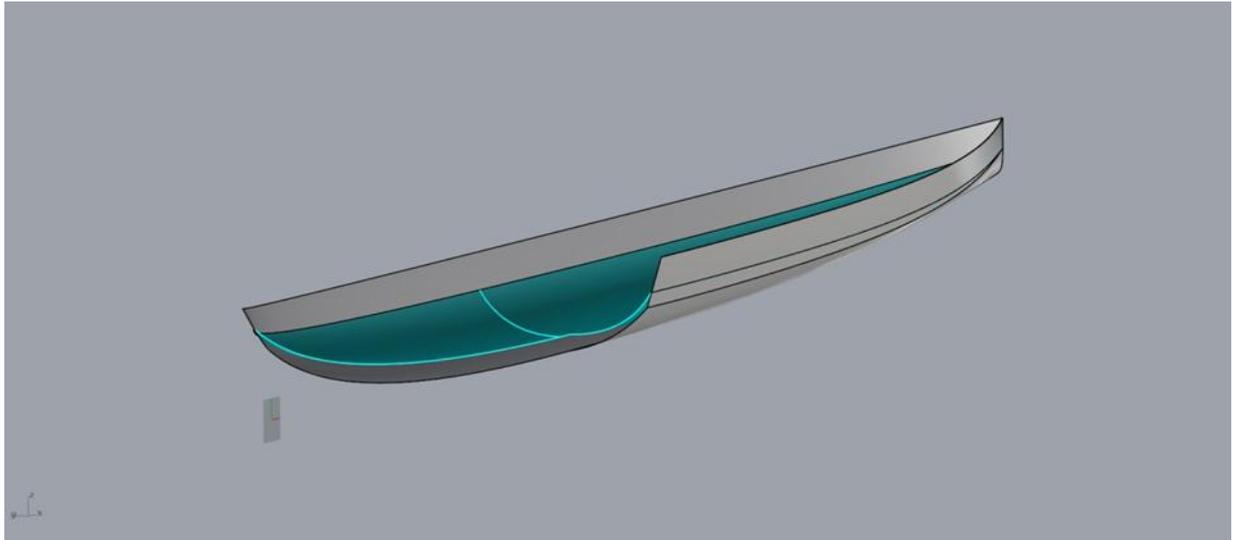
A traditionally shaped tauihu was fitted to the bow and paewai attached.



Launch day on the Waikato river.



Waka exhibited in Hamilton.



Second generation hull development.