



NEW ZEALAND'S  
BIOLOGICAL  
HERITAGE

Ngā Kōiora  
Tuku Iho

National  
**SCIENCE**  
Challenges



# New Zealand's Biological Heritage

## *Ngā kōiora tuku iho*

### A National Science Challenge

*Landcare Research Link Seminar*

*Featuring Programme 1*

*Thomas Buckley, Melanie Mark-Shadbolt, Andrea Byrom*

*November 2016*

- Big strategic goals for NZ



# National **SCIENCE** Challenges

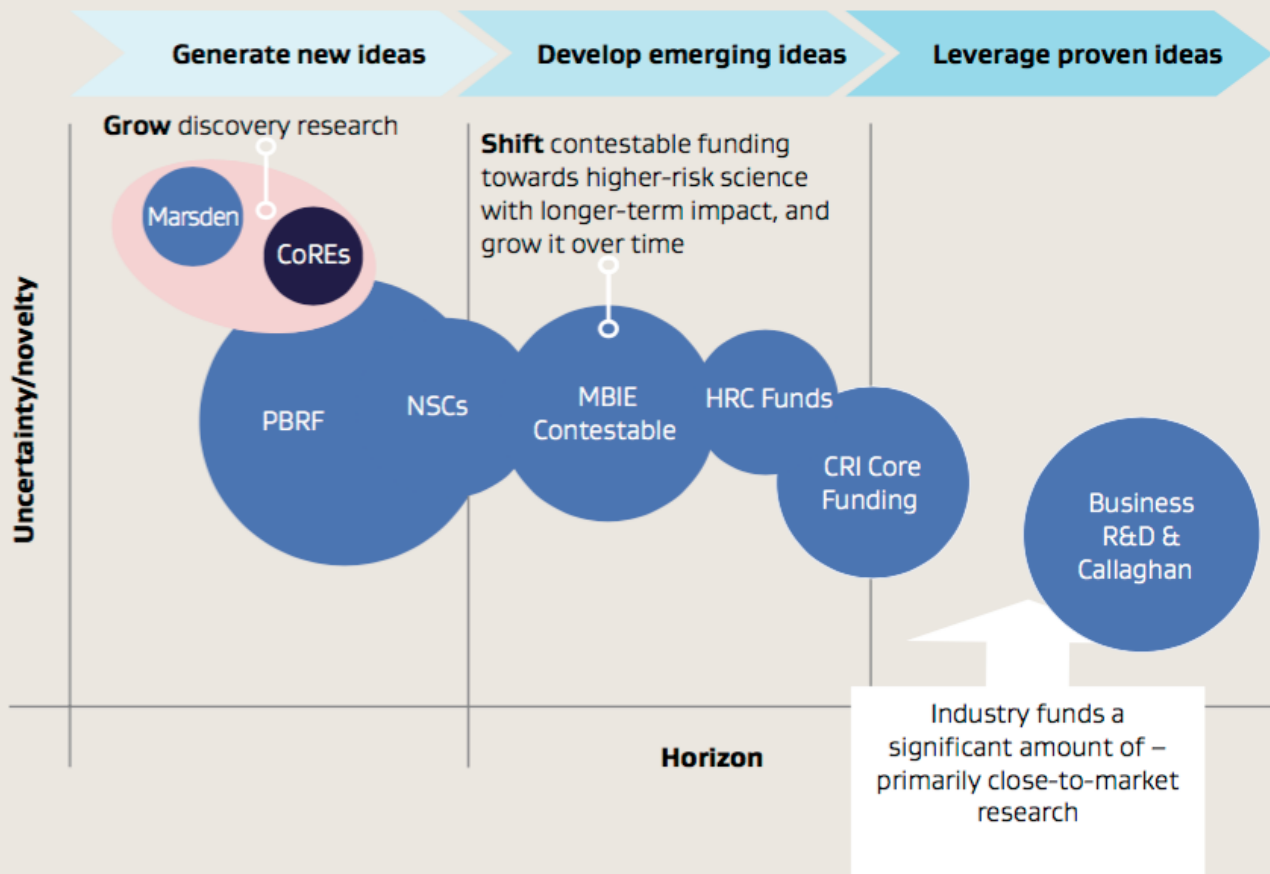
**NEW ZEALAND'S  
BIOLOGICAL  
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.....

Ngā Koiora  
Tuku Iho

# National Statement of Science Investment

## A HORIZONS-BASED MODEL FOR THINKING ABOUT PUBLIC SCIENCE INVESTMENT



# Science Challenges are...

- A change in the NZ science system
- Intended to align research efforts nationally
- Intended to align stakeholder needs nationally
- Mission-driven and therefore outcome-focussed





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## MISSION

Reverse the decline of New Zealand's biological heritage, through a national partnership to deliver step change in research innovation, globally-leading technologies, and community and sector action

## OBJECTIVE

Protect and manage our biodiversity, improve our biosecurity and enhance our resilience to harmful organisms

# Production and conservation sectors



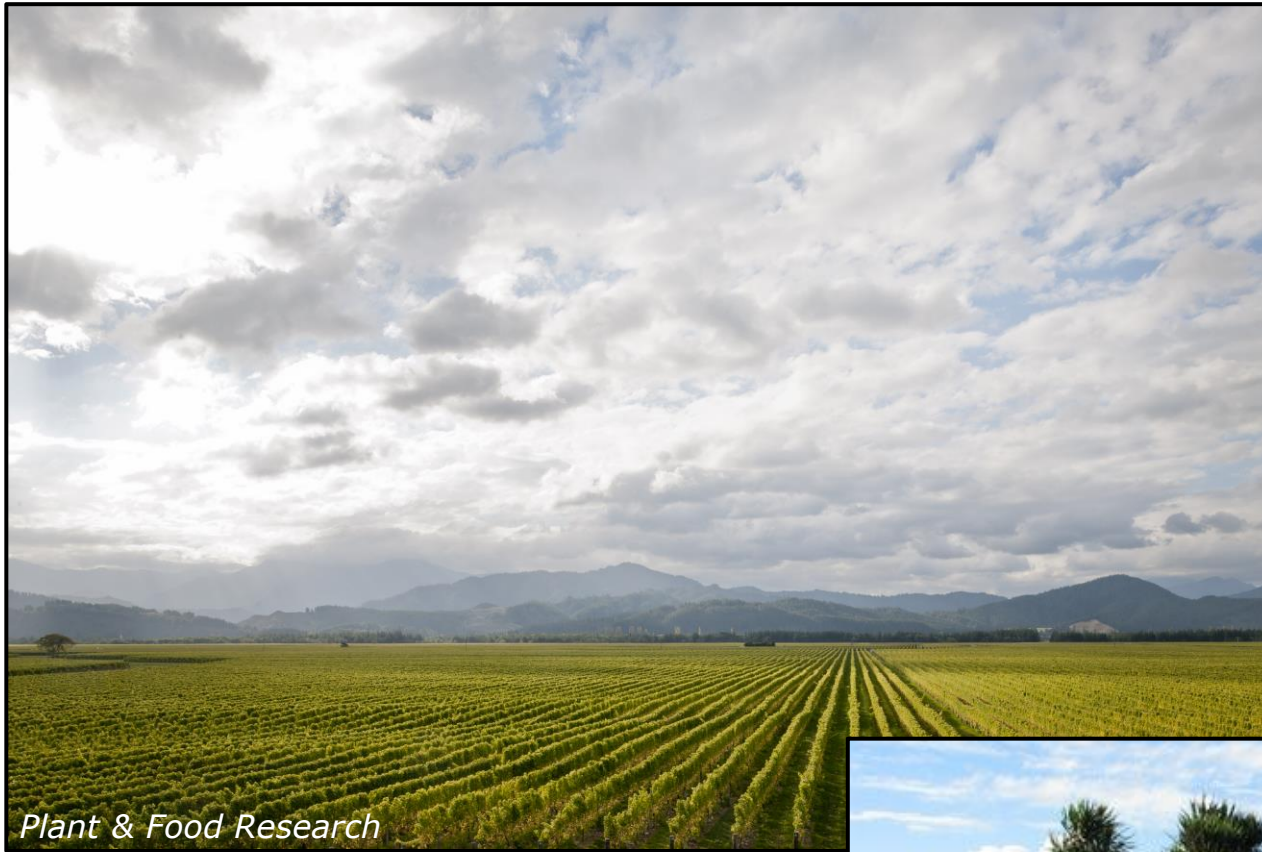
*Plant & Food Research*



# Terrestrial and freshwater ecosystems

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# Research Programmes

- **Programme 1:**  
Real-time Biological Heritage assessment
- **Programme 2:**  
Reducing risks and threats across landscapes
- **Programme 3:**  
Enhancing and restoring resilient ecosystems





# Research Programmes

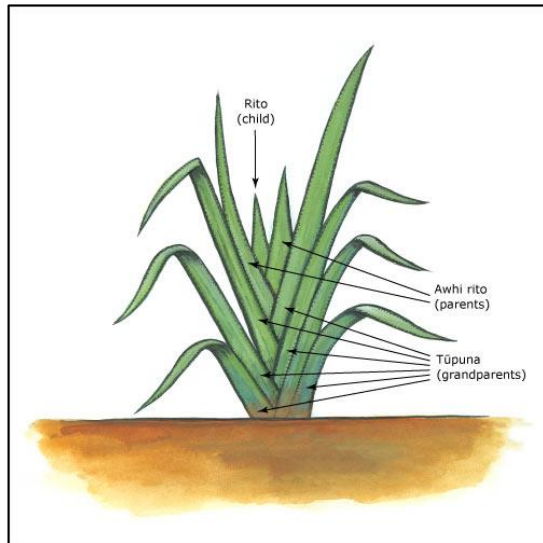
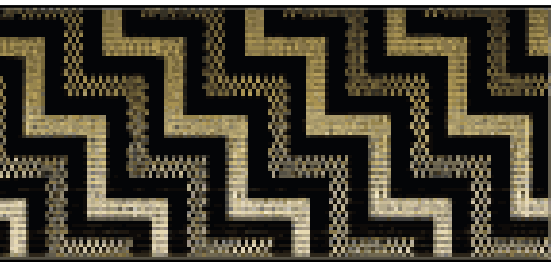
- **Programme 1:**  
*“What have we got”*
- **Programme 2:**  
*“Get rid of it  
(or keep it out)”*
- **Programme 3:**  
*“Take a whole-system  
view”*



# Programme 1

# “What have we got”

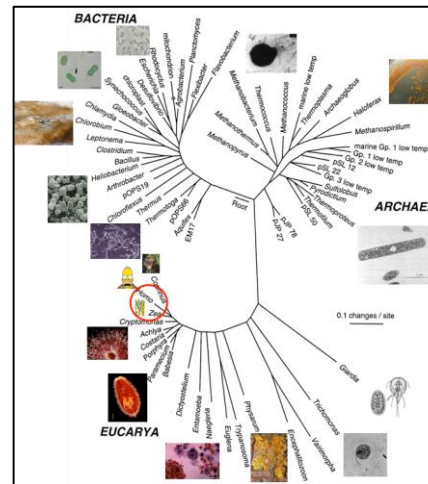
Mātauranga Māori  
characterisation  
of bioheritage



Genomics: risk-  
based analysis  
of pathogens



eDNA  
monitoring  
frameworks

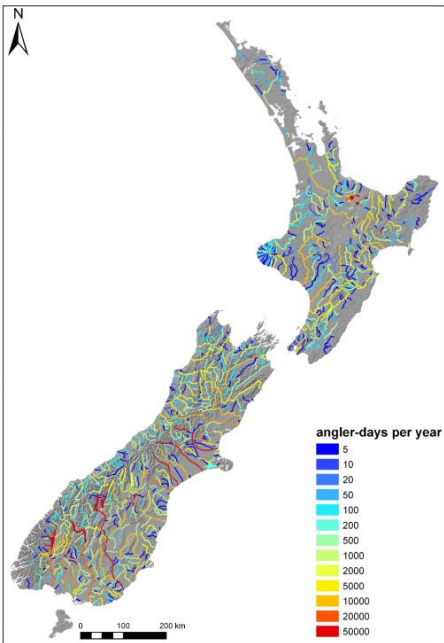


Conservation  
genomics  
for restoration



# Programme 2 *“Get rid of it – or keep it out”*

Biosecurity networks



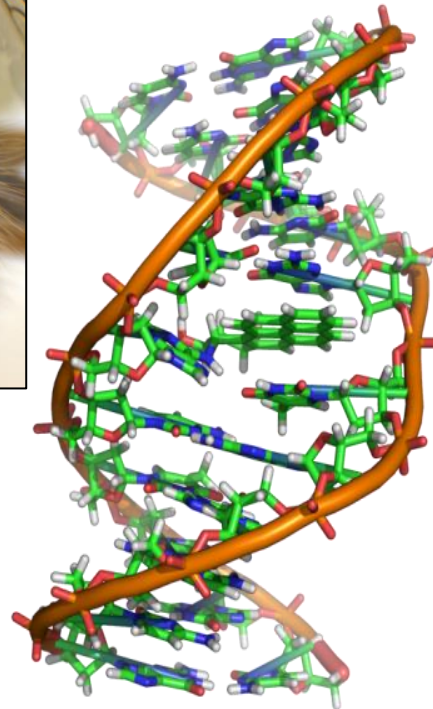
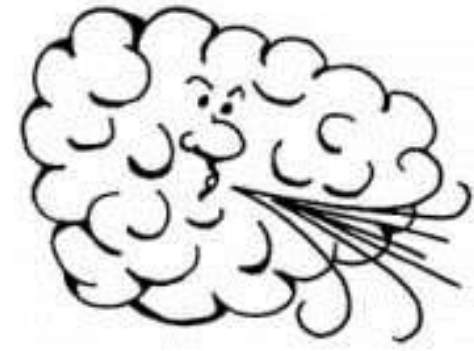
Novel technologies for wasp control



High-tech solutions small mammal predators



Māori biosecurity solutions



# Programme 3

# *“Whole-of-system view”*

Tipping points



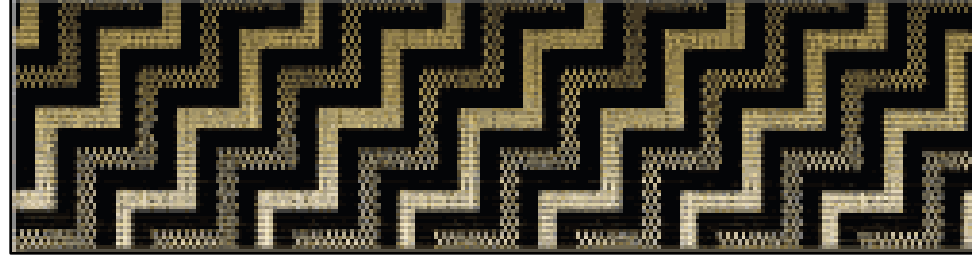
Customary use



Ecosystem  
connectivity



# Partnership with Māori



*To support industry*



*To protect tāonga species*

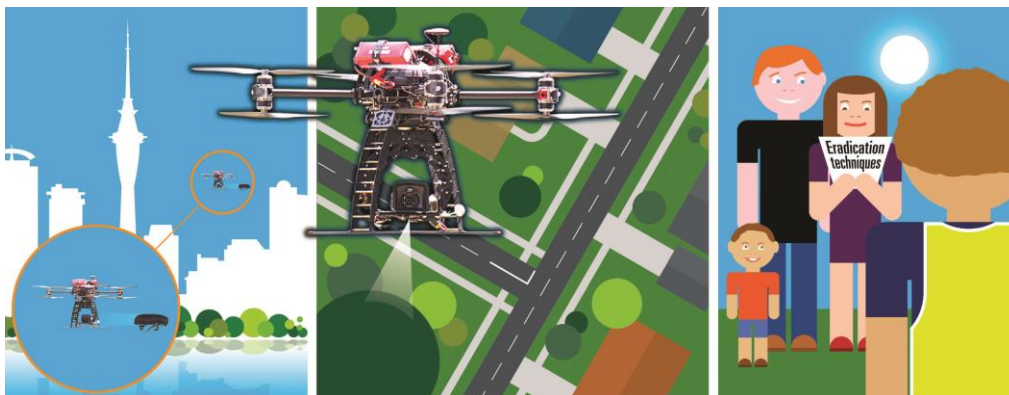


*To build capability*

# Aligned Research

- Challenge funding alone can't deliver Mission
- Parties have agreed to:
  - Align research funded from other sources
  - Contribute to priorities
- CRI core funding
- University funding
- Private sector

*Scion's  
'urban battlefield'  
project*



**SCION**   
forests - products - innovation

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# Real-time biological heritage assessment

Thomas Buckley  
Programme 1 Leader

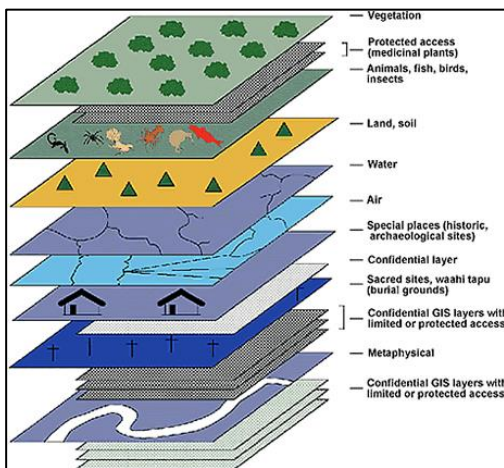


# Programme 1: Real-time biological heritage assessment

- What is biological heritage assessment?
- Broader science & technology context
- What will the Programme deliver?
- Overarching science questions
- Specific projects



# What is biological heritage assessment?



# Biological heritage assessment: applications

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The top image is the cover of the 'Environment Aotearoa 2015' report, featuring a scenic landscape with mountains and water. Logos for Environment New Zealand and Statistics New Zealand are visible. Below it is a smaller image of a waterfall with the text 'Progress toward achievement of Environment Waikato's Regional Policy Statement objectives: Biodiversity and natural heritage'. To the right is a diagram of a 'Biodiversity monitoring and reporting system' structured as a triangle with three tiers: TIER 3 (Research), TIER 2 (Managed places monitoring), and TIER 1 (Broad-scale monitoring).



**IF YOU FIND ONE OF THESE:**

**CATCH IT. CALL US.**

EXOTIC PEST & DISEASE  
HOTLINE 0800 80 80 80

Exotic pests like the brown marmorated stink bug are a threat to our primary industries and environment. If you're from overseas, or received parcels/ shipments from overseas, check your luggage or parcels before you board.

New Zealand Government  
Ministry for Primary Industries  
Mauri Ora - Te Matua

# Technological drivers

## Data:

- Cheap
- Easy to collect
- Open access



# **Social context**

**Anyone can measure the environment**

**Challenges to intellectual property & data  
sovereignty**

# What opportunities do these technologies offer New Zealand?

comprehensive monitoring  
rapid detection  
better understanding of function



more accurate tools & predictions

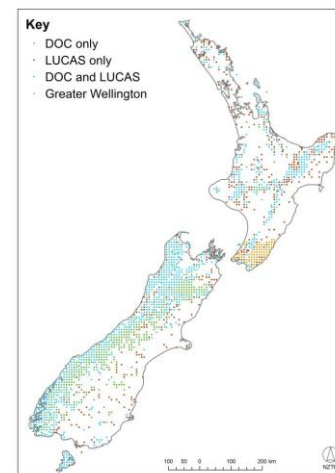
# What science is required?

How do we go from data to state & trend?



# What science is required?

- Understand the data
- Scale up
- Integrate data
- Infer function & process





# Programme 1: Projects

- Four projects
- Challenge priorities
- Address critical science questions
- Interrelated
- Interdisciplinary
- Vision Mātauranga
- **Implementation**

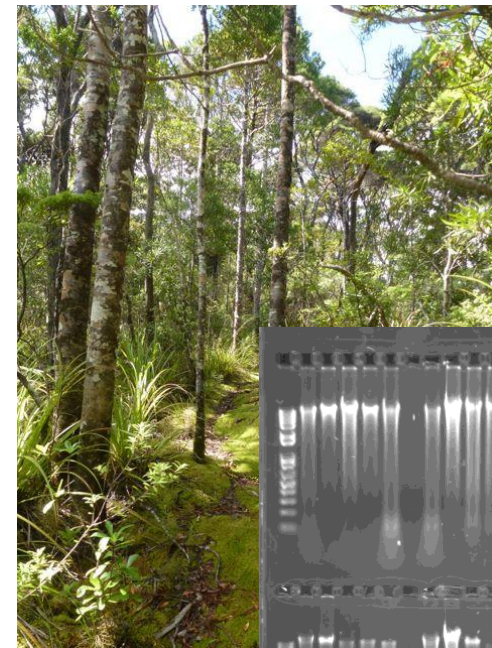


# A national framework for biological heritage assessment across natural and production landscapes

Robert Holdaway (LCR)

**PRIMARY GOAL:** To develop a New Zealand-wide framework and platform for biological heritage assessment using eDNA

- Standardised eDNA methods
- National eDNA platform
- Large scale questions
- Tools



# Genomics to fast-track risk-based analysis of pathogens

Bevan Weir (LCR)

**PRIMARY GOAL:** Use genomics to assess risk in pathogens

- Predict pathogenicity with genomics
- *Phytophthora* case study
- Survey environment
- Build Māori capability



# A conservation genomics approach for building resilience in threatened taonga species

Tammy Steeves (UC)

**PRIMARY GOAL:** Use genomics to build resilience in our threatened species

- Meet growing demand for translocations
- Develop best practice
- Implement with iwi, restoration groups, DOC



# Whakatika nga mahi pi tauira: engaging Māori communities in genomic and genetic research on indigenous biota

Project Leaders: Melanie Mark-  
Shadbolt & Simon Lambert (LU)

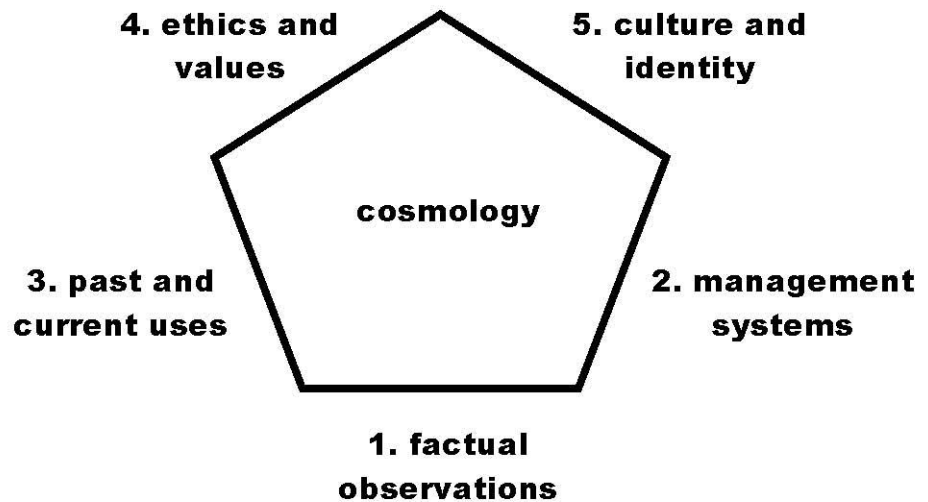
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# Programme 1: Real Time BioHeritage Assessment

## Project 1.1. Mātauranga Māori characterisation of biodiversity

- How do indigenous communities gather, retain and secure traditional knowledge?
- What challenges do rapidly evolving digital technologies present in managing IK?
- What challenges do rapidly evolving technologies in the bioheritage space present managers of IK?
- What is 'best practice' when using catalogues/collections and DNA?



# Why?

- Māori 15% of NZ population
- Treaty Obligations: Partnership, Participation & Protection
- Treaty settlements & Māori social/economic/cultural revitalisation = expectations of participation
- Traditional Māori ecological knowledge (TEK) is part of Aotearoa/NZ biological heritage
- Government (funder) wants incorporation of Māori in this NSC and other research.

*“Iwi play an increasingly active role in New Zealand’s economy and in the management of natural resources. Unlocking the science and innovation potential of Māori knowledge, resources and people will have major economic, social and environmental benefits for New Zealand.”*

Māori Development Minister Te Ururoa Flavell

# Establishing the BHNSC

- Variable level and nature of engagement by Māori and Māori communities
- Need to address review panel issues
  - Greater involvement of kaitiaki / Māori / iwi
- Not business as usual, expectations of:
  - Māori roles in governance, management & research
  - Incorporation of Māori priorities across Challenge
  - VM & MM as assessment criteria for funding



# Issues for BHNSC

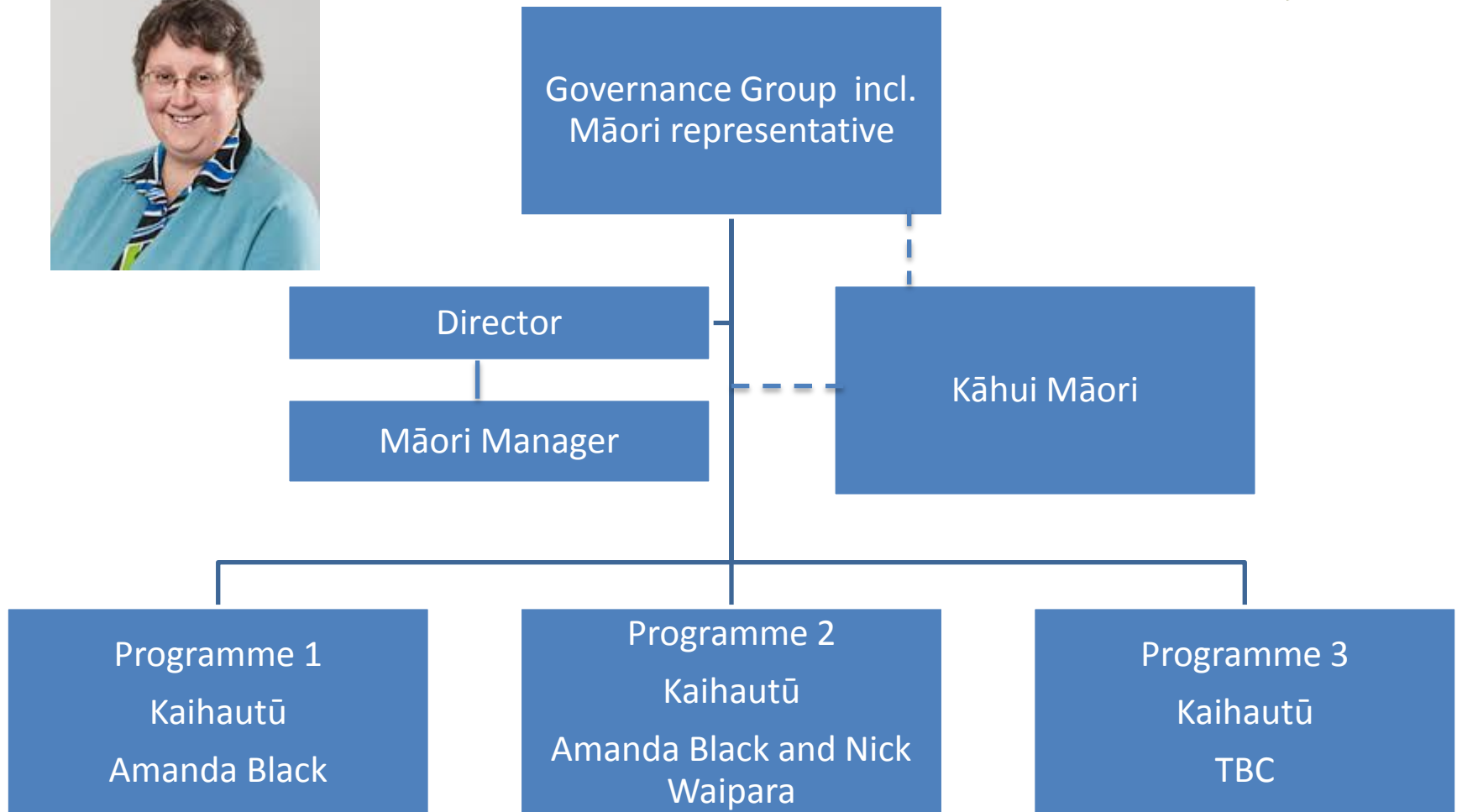
- Will need to address Māori expectations
  - Reconnect indigenous knowledge and peoples with indigenous species
  - Partnership and co-governance
  - Research does not exacerbate existing grievances
- Data access an issue
  - Tapu nature of Mātauranga Māori
  - Importance of DNA sequence information (whakapapa is a taonga)
  - Mistrust / biopiracy concerns



"It's a question of control, not a question of location of that information"

- US district judge Loretta Preska

# Māori Structure



# Role of the Kāhui

- Ensure *Te Tiriti o Waitangi* is upheld – hold the Challenge accountable
- Provide strategic advice and guidance on complex issues such as Wai 262 Flora and Fauna claim
- Provide cultural support to the Kaihautū and other Māori researchers within the Challenge



# Role of the Kaihautū

- Develop and integrate VM and MM into the research programmes
  - Working alongside programme and project leaders
- To develop stand alone VM projects that are specific to the needs of Māori end users that contribute to the Challenge Mission
- Support the inclusion of Māori in all aspects of the Challenge
- Support and liaise with the Kāhui Māori



*Left to Right*

**Amanda Black** (Tūhoe, Whakatōhea), Bio-Protection Research Centre, NZBH Kaihautū

**Nick Waipara** (Rongowhakaata, Ngāti Ruapani), Auckland Council, NZBH Kaihautū

**Melanie Mark-Shadbolt** (Ngāti Kahungunu, Ngāti Porou, Te Arawa), Bio-Protection Research Centre, NZBH Māori Manager

# Healthy VM – According to MBIE

Creativity  
Aspirations  
Worldviews  
Priorities  
Social infrastructure  
Access to communities & significant resources  
Unique brand value  
Indigenous networks  
Māori frameworks, processes, practices  
Capital

Pools of knowledge & experience  
Environmental practices  
Guardianship role & practices  
Indigeneity  
**Māori bring distinctive contributions**  
Whanau, hapu, iwi experiences  
Proven collaborations  
Knowledge of materials

Te Reo Māori  
Conceptual Knowledge  
Processes

New product development  
New market development  
Relevant environmental research  
Stronger economies  
Relevant technology  
Relevant approaches to sustainability  
Specific health & social solutions – healthy whanau, prosperous communities  
Better integrated research process approaches  
Tikanga & Te Reo flourishing

**Māori require distinctive outcomes**  
Indigenous best practice  
Protection of taonga

# How to connect with the Challenge

[www.biologicalheritage.nz](http://www.biologicalheritage.nz)

@BioHeritage\_NZ



New Zealand's Biological  
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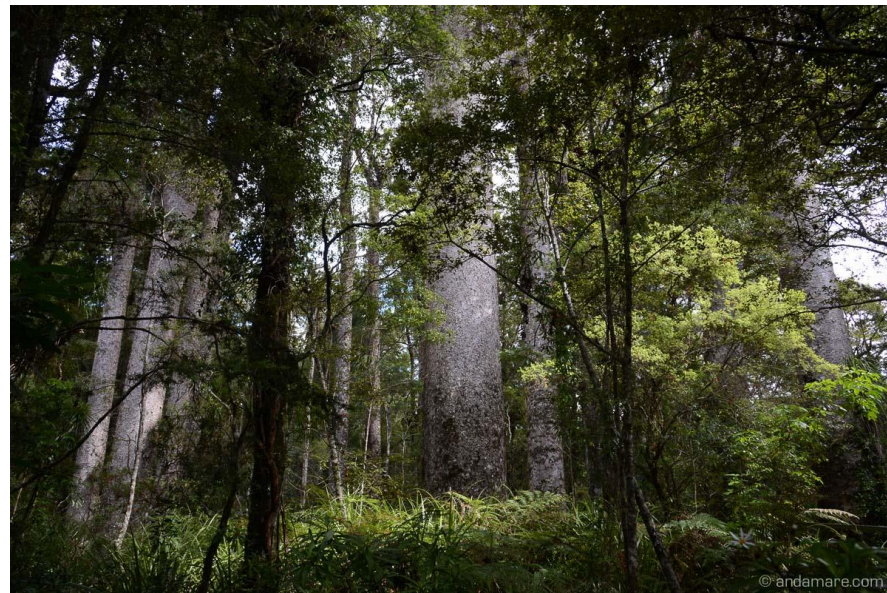


**Landcare Research**  
Manaaki Whenua



# Programme 2: Māori solutions to biosecurity threats and tāonga species

- Disease, dieback and decline of indigenous taonga species
  - Myrtle rust
- Freshwater mahinga kai
  - koura





# Project 3.2: Kia Mau Tonu Ki Ngā Tapu Taonga o Ngā Mātua Tūpuna: Customary approaches and practices for optimising ecosystem resilience

## Our vision is to:

- Determine how Māori customary approaches and practices contribute towards protecting and restoring ecosystem resilience, acknowledging the human-biodiversity relationship as fundamental
- Explore the legislative, cultural, ecological, economic, and social conditions that facilitate the application of customary approaches and practices
- Contribute towards reconnecting Māori communities with their natural environments and rebuilding whanau ora (family health and function)

## Project Overview

- Develop innovative legal guidelines and solutions that are more responsive to Māori kaitiakitanga aspirations
- Determine effect of kaitiakitanga interventions on population growth rates
- Determine how key indicators of ecosystem processes and functional diversity respond to kaitiakitanga interventions
- Investigate Māori and public attitudes towards the implementation of kaitiakitanga
- Estimate the 'value' and cost effectiveness of kaitiakitanga interventions

# Engagement with Māori

*Increasing level of Māori impact*

Whakamōhio Inform	Whakauiuia Consult	Whakaura Involve	Mahi Ngātahi Collaborate	Whakamanahia Empower
<b>MAORI PARTICIPATION GOAL</b>				
To provide Māori (whānau, hapū, iwi) with balanced and objective information to assist them in understanding the Challenge.	To obtain Māori (whānau, hapū, iwi) feedback on the Challenge and its research, direction etc.	To work directly with Māori (whānau, hapū, iwi) throughout the Challenge process to ensure that issues and concerns are consistently understood and considered.	To partner with Māori (hapū, iwi) in each aspect of the decision-making, development and implementation of the Challenge.	To place ultimate decision-making power in the hands of Māori (hapū, iwi).
<b>PROMISE TO MAORI</b>				
The Challenge will keep Māori (whānau, hapū, iwi) informed.	The Challenge will keep Māori (whānau, hapū, iwi) informed and will listen to and acknowledge concerns and, provide feedback on how Māori input has influenced the Challenge and its decisions.	The Challenge will work with Māori (whānau, hapū, iwi) to ensure that their concerns and aspirations are directly reflected in the Challenge and its research and provide feedback on how Māori input influenced the Challenges decisions.	The Challenge will look to Māori (hapū, iwi) for direct advice and innovation in formulating solutions and, incorporate their advice and recommendations into the decisions to the maximum extent possible.	The Challenge will implement what Māori (hapū, iwi) decide.
<b>EXAMPLE TOOLS</b>				
<ul style="list-style-type: none"> <li>Open days (via research programmes)</li> <li>Fact sheets</li> <li>Media releases</li> <li>Websites</li> <li>Hui</li> </ul>	<ul style="list-style-type: none"> <li>Focus groups</li> <li>Surveys / response requests</li> <li>Hui</li> </ul>	<ul style="list-style-type: none"> <li>Wānanga</li> <li>Workshops</li> <li>Kaihautu</li> <li>Kāhui Māori</li> </ul>	<ul style="list-style-type: none"> <li>Co-governance/Co-management</li> <li>Kāhui Māori</li> <li>Kaihautu</li> </ul>	<ul style="list-style-type: none"> <li>Treaty Settlement Legislation</li> <li>WAI 262</li> </ul>

# Vision Mātauranga

**New knowledge / Māori knowledge:** unique traditional & evolving knowledge base; tikanga Māori, discovery processes

**New science capability / Māori people:** skills, creativity, youthful growing population, indigeneity, access to communities, tikanga-led ways of engaging, social structures

**New ways of discovery / Māori resources:** access to significant resources, stewardship, models, investments in productivity and sustainable development

