



NEW ZEALAND'S
BIOLOGICAL
HERITAGE

Ngā Koiora
Tuku Iho

National
SCIENCE
Challenges



New Zealand's Biological Heritage

Ngā koiora 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

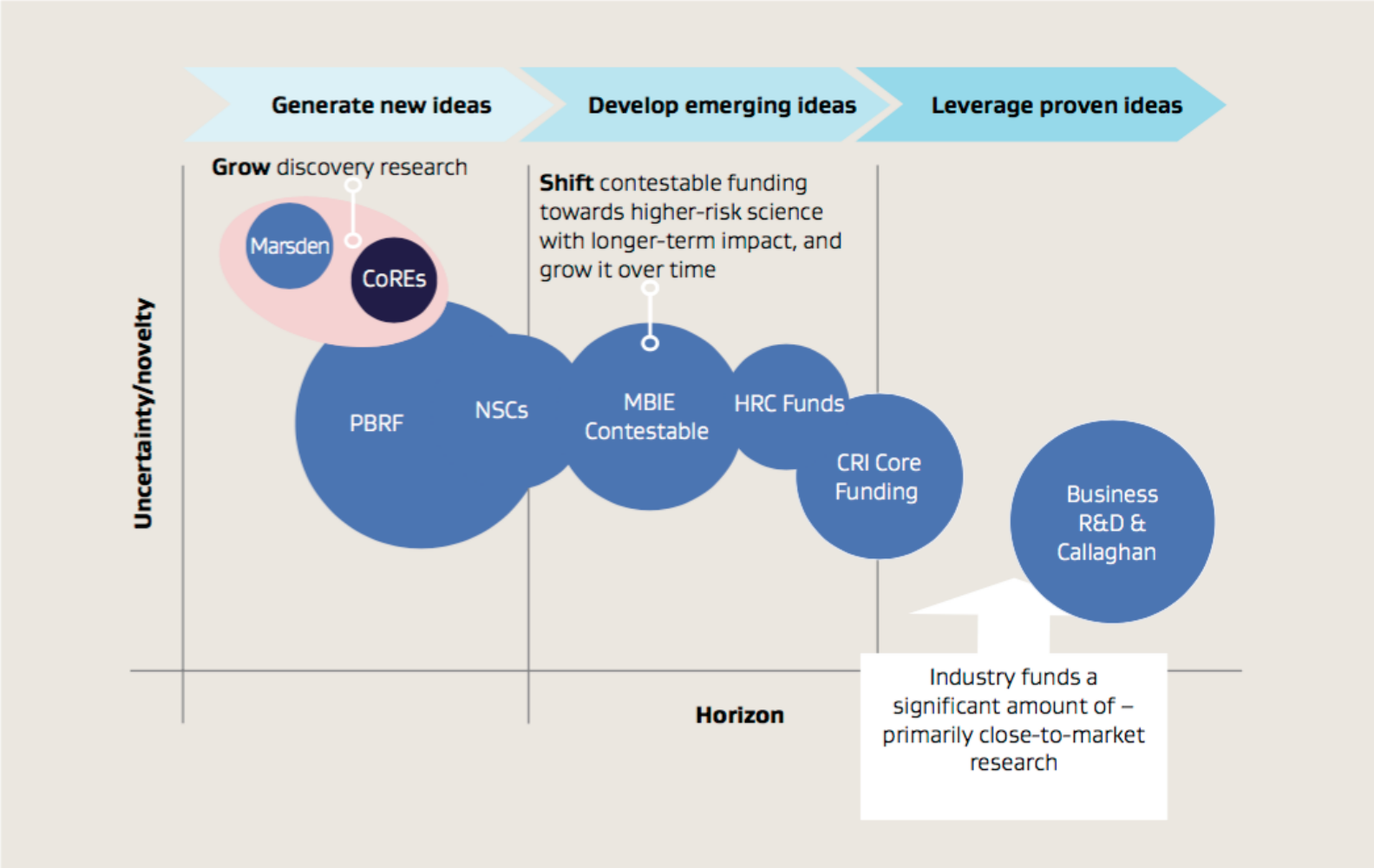
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National Statement of Science Investment

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

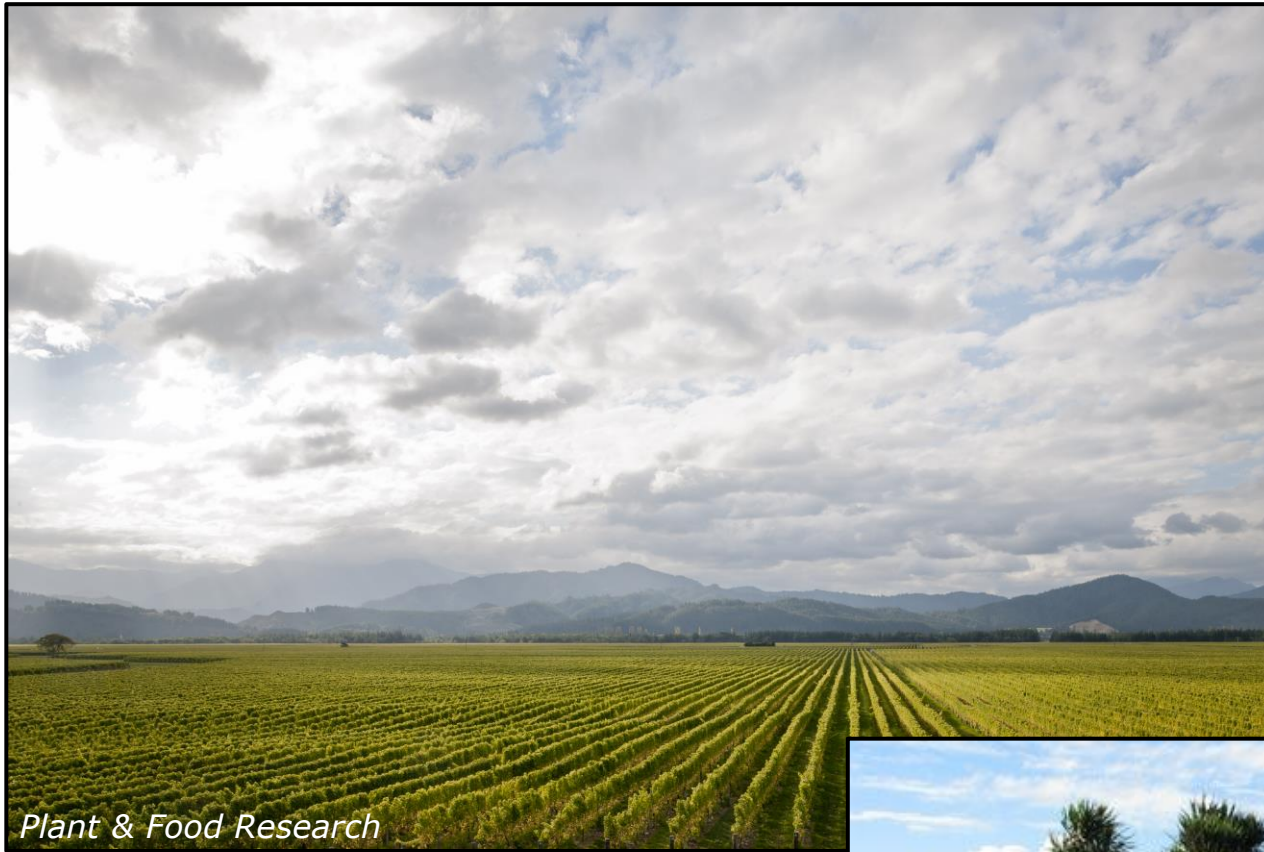
Production and conservation sectors



Terrestrial and freshwater ecosystems

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Research Programmes

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



Research Programmes

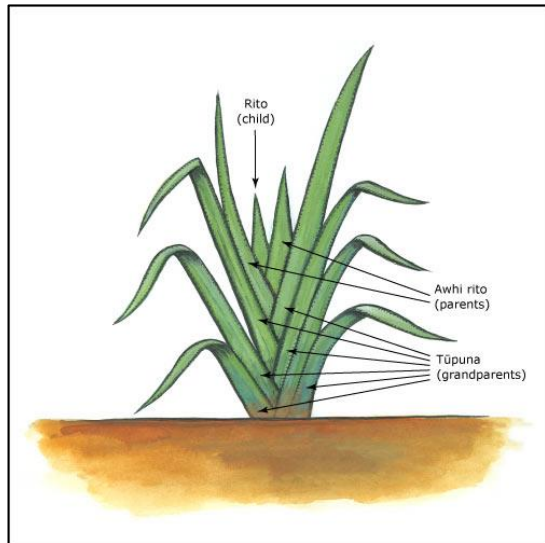
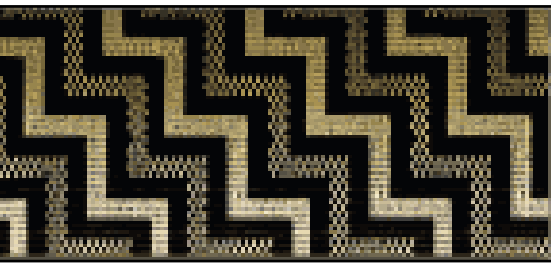
- **Programme 1:**
“What have we got”
- **Programme 2:**
*“Get rid of it
(or keep it out)”*
- **Programme 3:**
*“Take a whole-system
view”*



Programme 1

“What have we got”

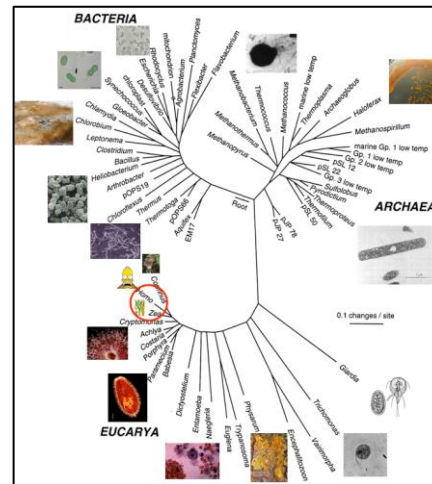
Mātauranga Māori
characterisation
of bioheritage



Genomics: risk-
based analysis
of pathogens



eDNA
monitoring
frameworks

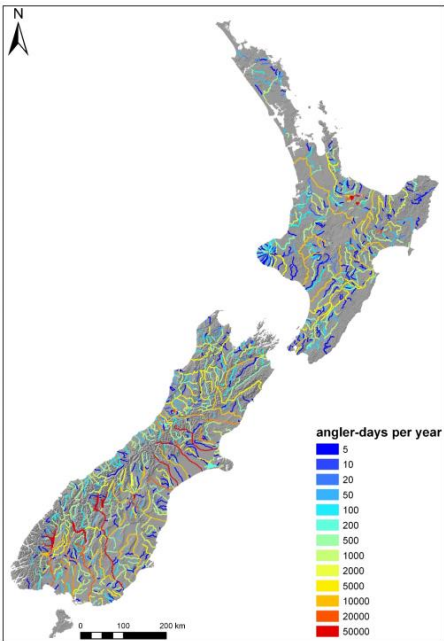


Conservation
genomics
for restoration



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

Biosecurity networks



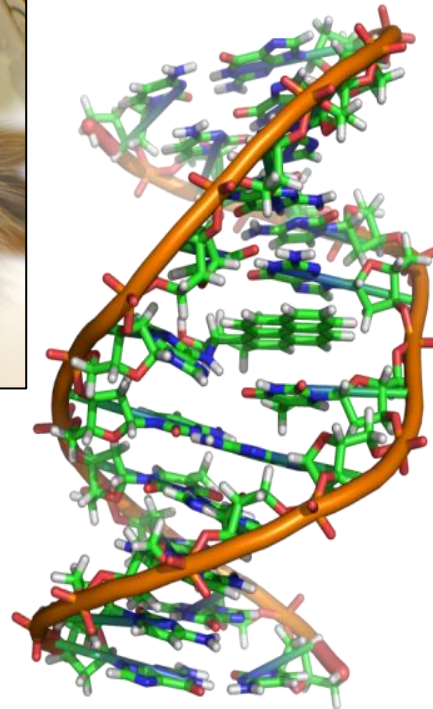
Novel technologies for wasp control



High-tech solutions small mammal predators



Māori biosecurity solutions



Programme 3

“Whole-of-system view”

Tipping points



Customary use



Ecosystem
connectivity



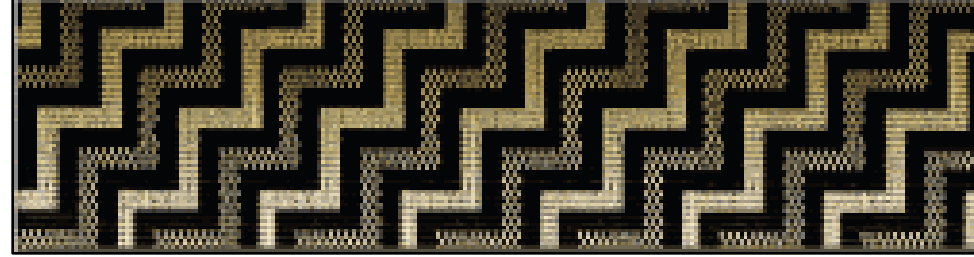
Partnership with Māori



To support industry



To build capability

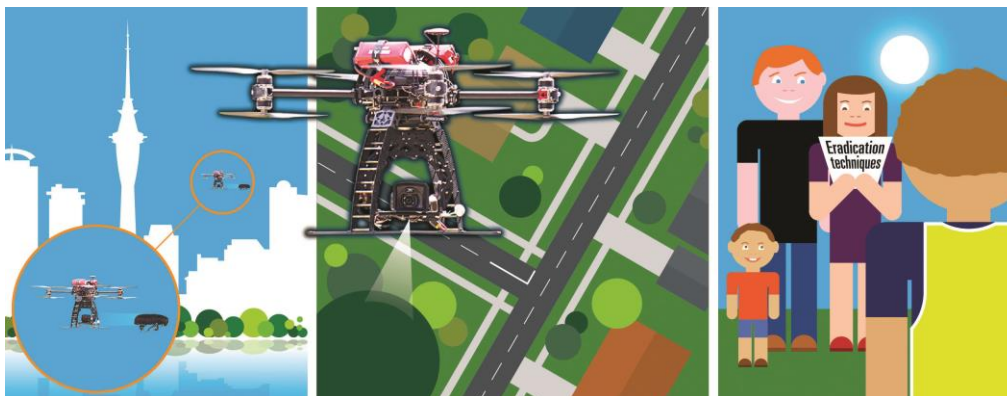


To protect tāonga species

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*



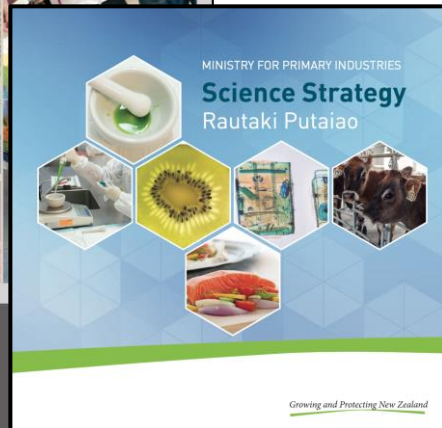
SCION 
forests · products · innovation

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Strategic alignment



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Real-time biological heritage assessment

Thomas Buckley
Programme 1 Leader

Programme 1: Real-time biological heritage assessment

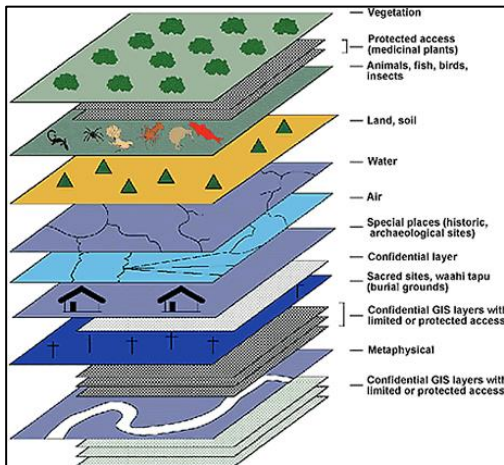
- What is biological heritage assessment?
- Broader science & technology context
- What will the Programme deliver?
- Overarching science questions
- Specific projects



What is biological heritage assessment?

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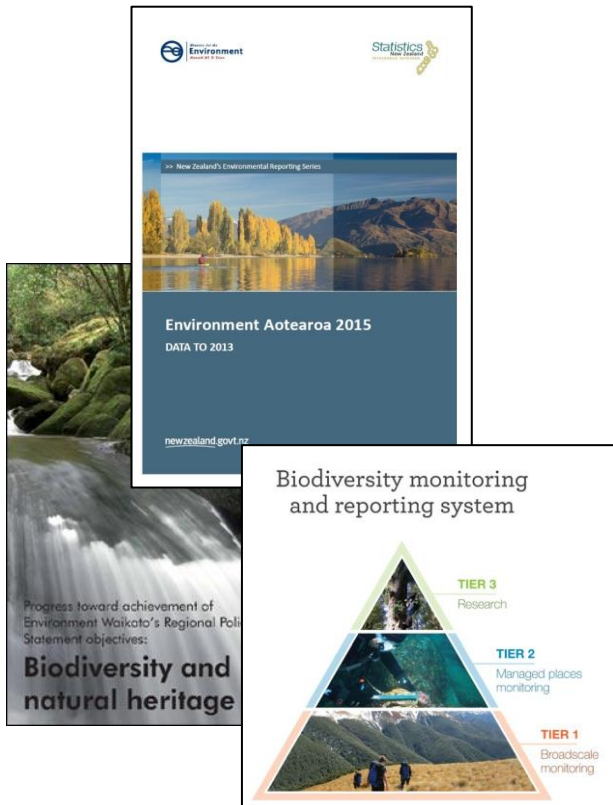


Images: LCR, edX, MfE, Landcare Trust, coldhollowtocanada

Biological heritage assessment: applications

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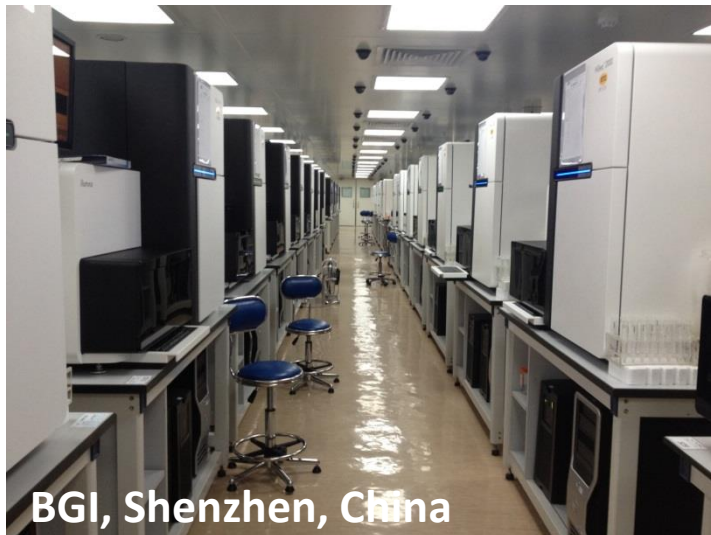
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Technological drivers

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

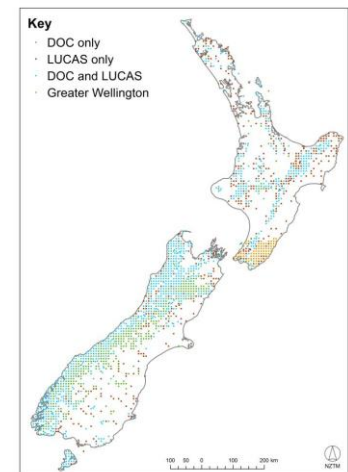
What science is required?

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

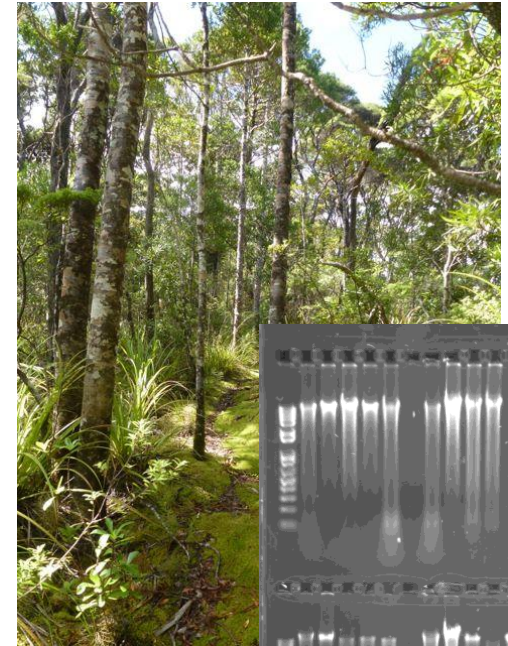
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Robert Holdaway (LCR)

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

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A conservation genomics approach for building resilience in threatened taonga species

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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

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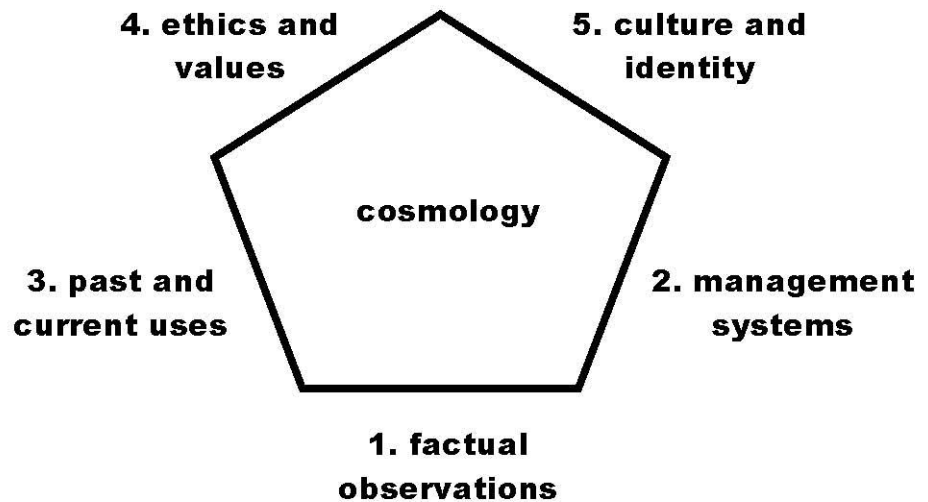
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Project Leaders: Melanie Mark-
Shadbolt & Simon Lambert (LU)

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

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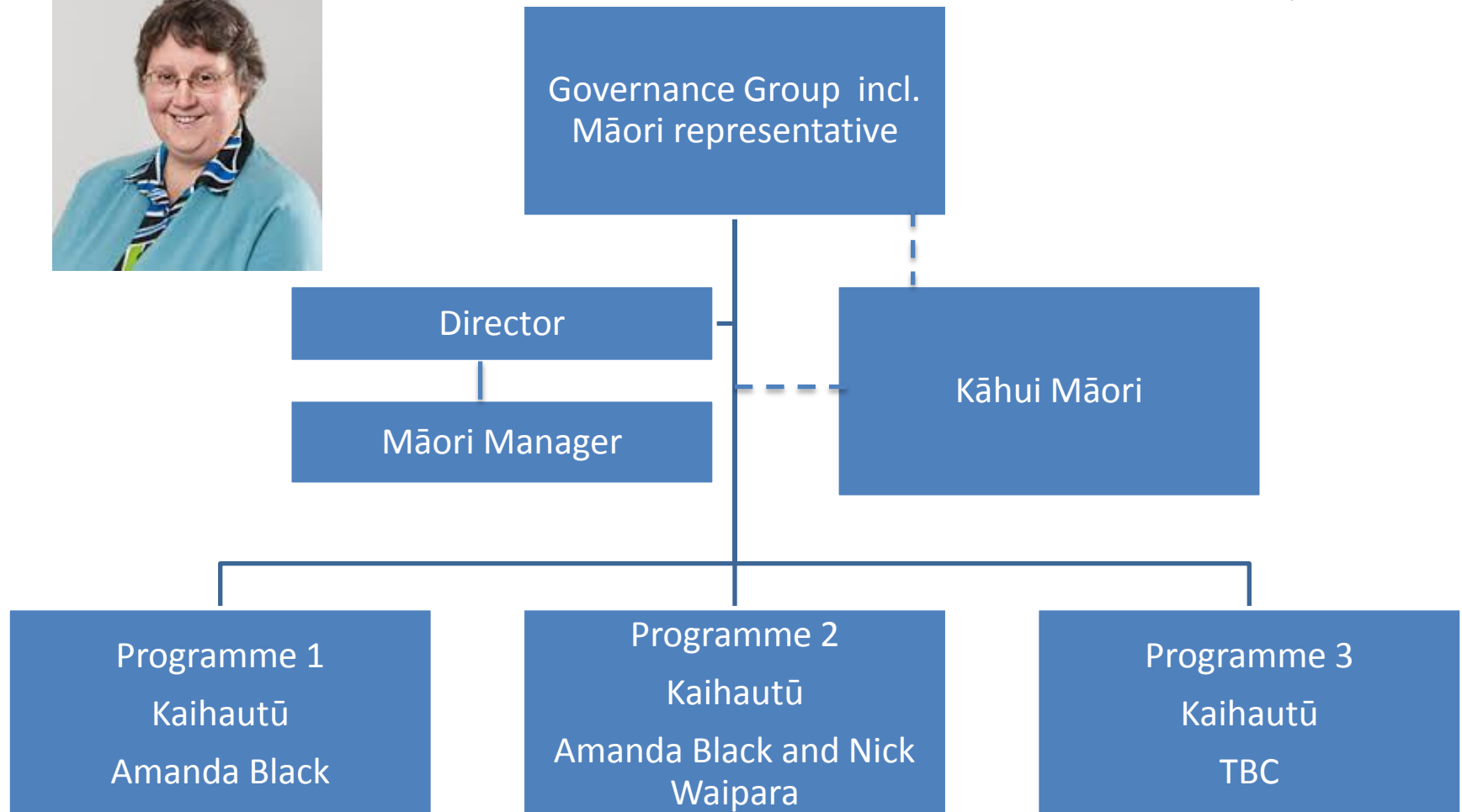
- Will need to address Māori expectations
 - Reconnect indigenous knowledge and peoples with indigenous species
 - Partnership and co-governance
 - Research does not exacerbate existing grievances
- Data access an issue
 - Tapu nature of Mātauranga Māori
 - Importance of DNA sequence information (whakapapa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

Pools of knowledge & experience
 Creativity
 Aspirations
 Worldviews
 Priorities
 Social infrastructure
 Access to communities & significant resources
 Unique brand value
 Indigenous networks
 Māori frameworks, processes, practices
 Capital
 Environmental practices
 Guardianship role & practices
 Indigeneity
Māori bring distinctive contributions
 Te Reo Māori
 Conceptual Knowledge
 Processes
 Whanau, hapu, iwi experiences
 Proven collaborations
 Knowledge of materials

New product development
 New market development
 Relevant environmental research
 Stronger economies
 Indigenous best practice
Māori require distinctive outcomes
 Relevant technology
 Relevant approaches to sustainability
 Specific health & social solutions – healthy whanau, prosperous communities
 Protection of taonga
 Better integrated research process approaches
 Tikanga & Te Reo flourishing

How to connect with the Challenge

www.biologicalheritage.nz

@BioHeritage_NZ



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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 | Whakauia Consult | Whakauru Involve | Mahi Ngātahi Collaborate | Whakamanahia Empower |
|---|---|--|---|--|
| MAORI PARTICIPATION GOAL | | | | |
| 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). |
| PROMISE TO MAORI | | | | |
| 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. |
| EXAMPLE TOOLS | | | | |
| <ul style="list-style-type: none"> Open days (via research programmes) Fact sheets Media releases Websites Hui | <ul style="list-style-type: none"> Focus groups Surveys / response requests Hui | <ul style="list-style-type: none"> Wānanga Workshops Kaihautu Kāhui Māori | <ul style="list-style-type: none"> Co-governance/Co-management Kāhui Māori Kaihautu | <ul style="list-style-type: none"> Treaty Settlement Legislation WAI 262 |

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

