



Multicore Conference

February 2024



NEW ZEALAND'S
BIOLOGICAL
HERITAGE

Ngā Koiora
Tuku Iho

National
SCIENCE
Challenges

Aim:
to protect and manage
Aotearoa New Zealand's
biodiversity, improve
our biosecurity and
enhance our resilience
to harmful organisms



Eco-index[®]

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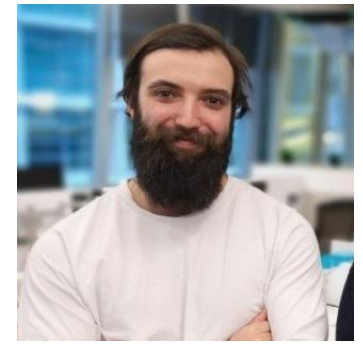
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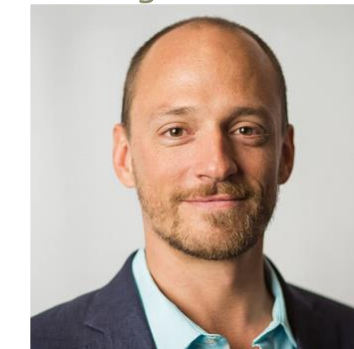
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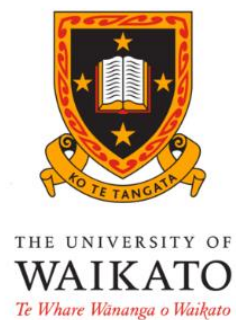
Eco-index

- We know that biodiversity in Aotearoa NZ (A-NZ), and globally, is in serious decline.
 - We have the measures and data and to tell us this and we know the trends.
- However, we don't have Biodiversity Information Systems (BIS) in place to guide decision makers (i.e., land managers, policy makers, industries, iwi, and governors) on how to address the problem.
- Eco-index team was formed to plan and build a terrestrial BIS in partnership with iwi, farmers, industry, and councils - with collaboration from Ministries.

Industry Partners and Co-funders



Host & key research institutions:



Data partners:



Proudly members of:



Proudly endorse:



The Eco-index BIS

THE MACRO SCALE - maintaining biodiversity is dependent on large healthy interconnected ecosystems across our landscapes. However, change on the ground is driven at a micro scale - among 1000s of landowners, individuals, and groups - **THE MICRO SCALE**

How do we coordinate action at the micro scale to generate big outcomes at a macro scale?

1. Develop a macro scale ecosystem restoration spatial planning tool to guide action and coordinate ecosystem restoration efforts at the local scale.
2. Develop an automated system for measuring ecosystem changes at micro scales to determine progress toward targets at a macro scale.
3. Develop automated systems for undertaking ecosystem economic valuations: cost of restoration and benefits of services generated

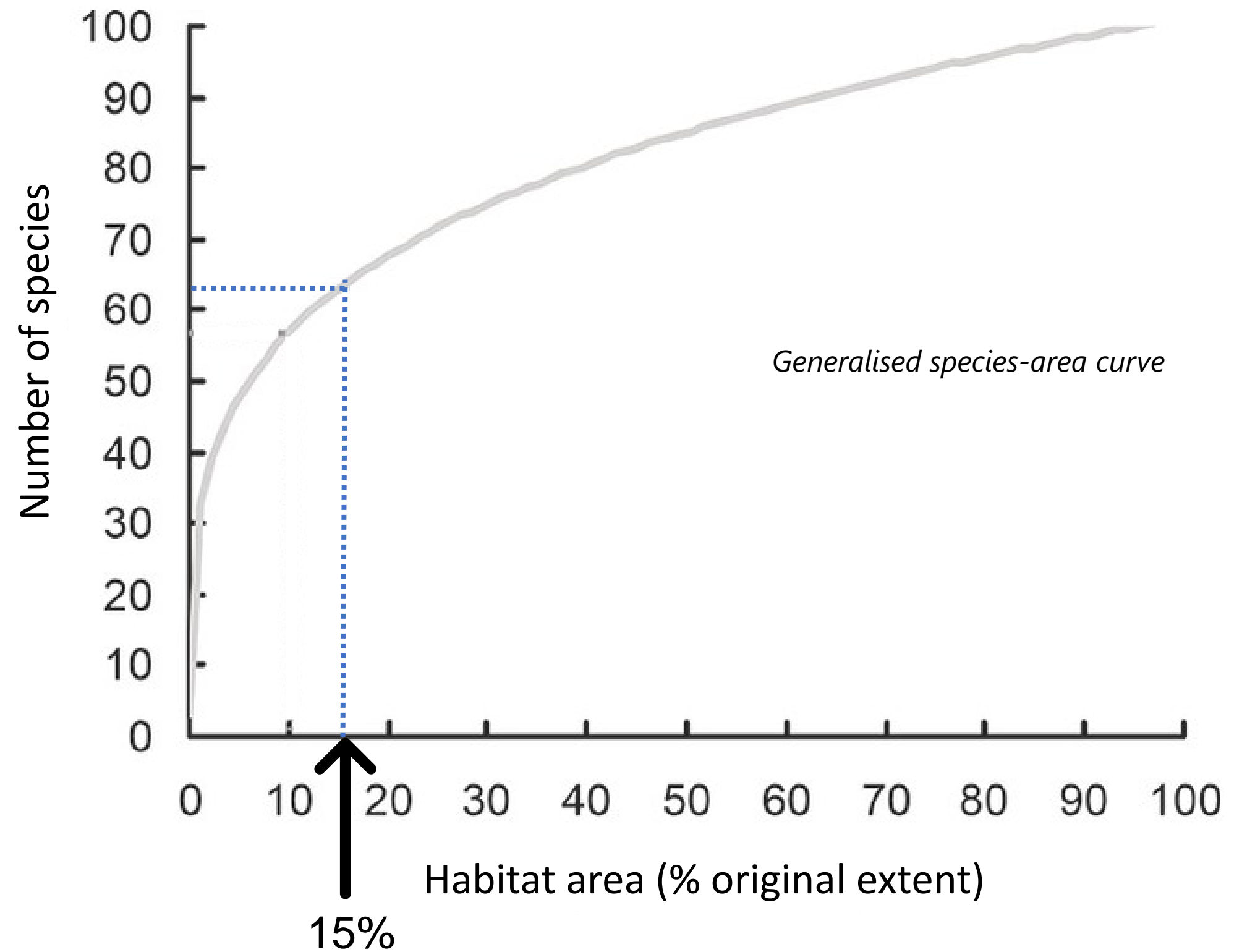
Biodiversity targets and heat maps



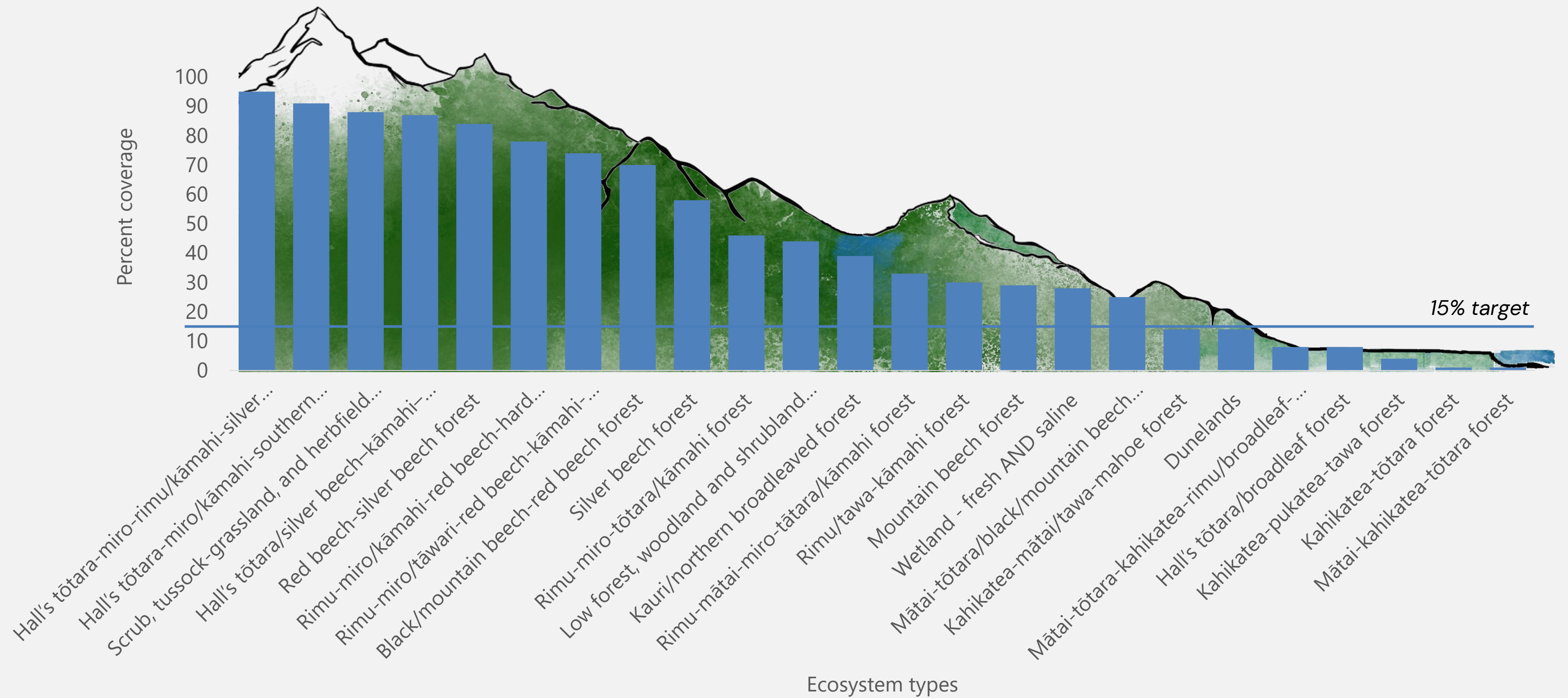
Biodiversity targets based on species-area relationship

Restore native ecosystems in every catchment to a minimum of 15% of original ecosystem land cover

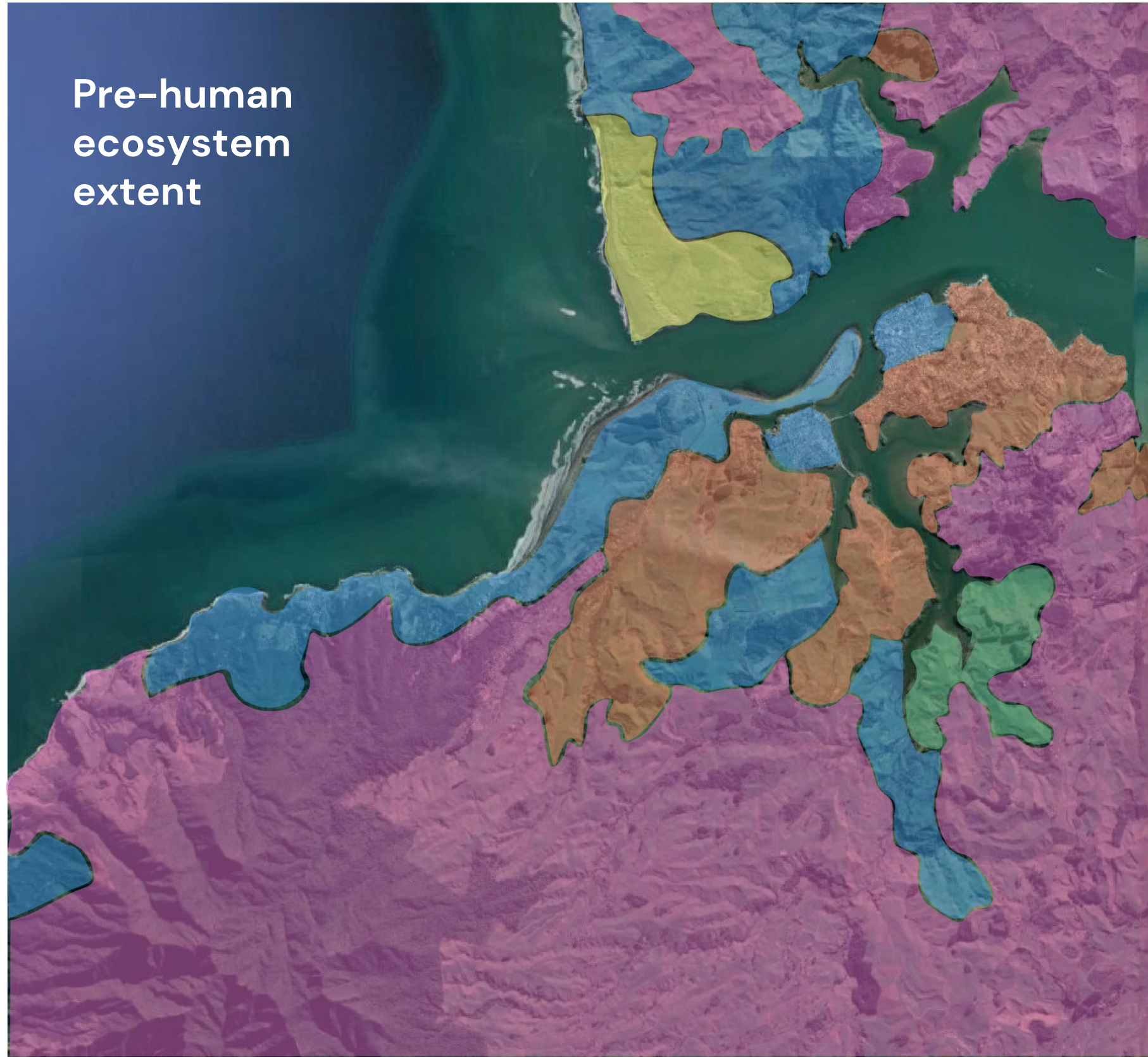
Kia whakahoki te mauri o te Taiao ki te taumata e hiahia ana e tātau
To restore the mauri of the ecosystem to the standard we want



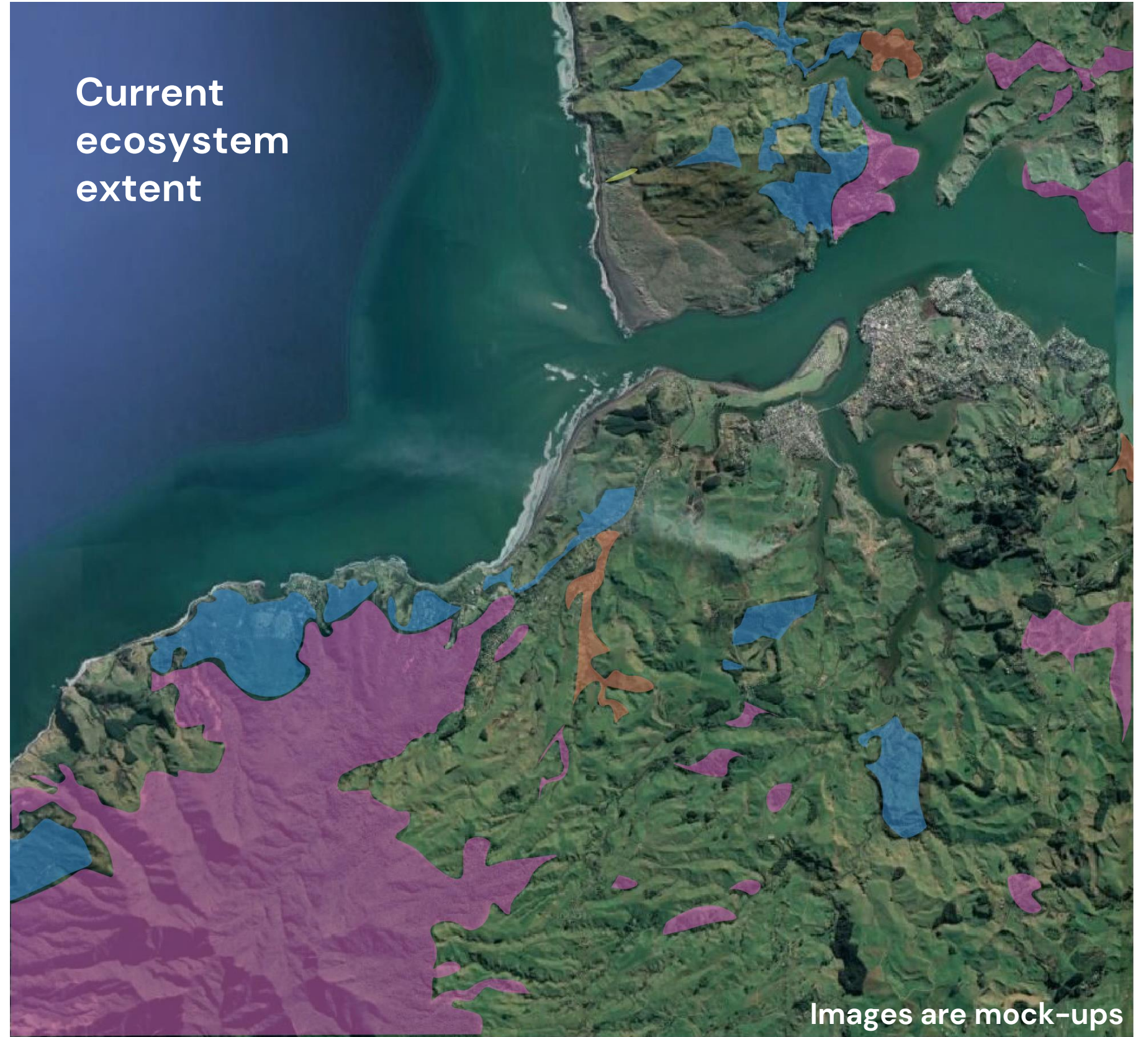
15% goal for ecological representation



Pre-human ecosystem extent



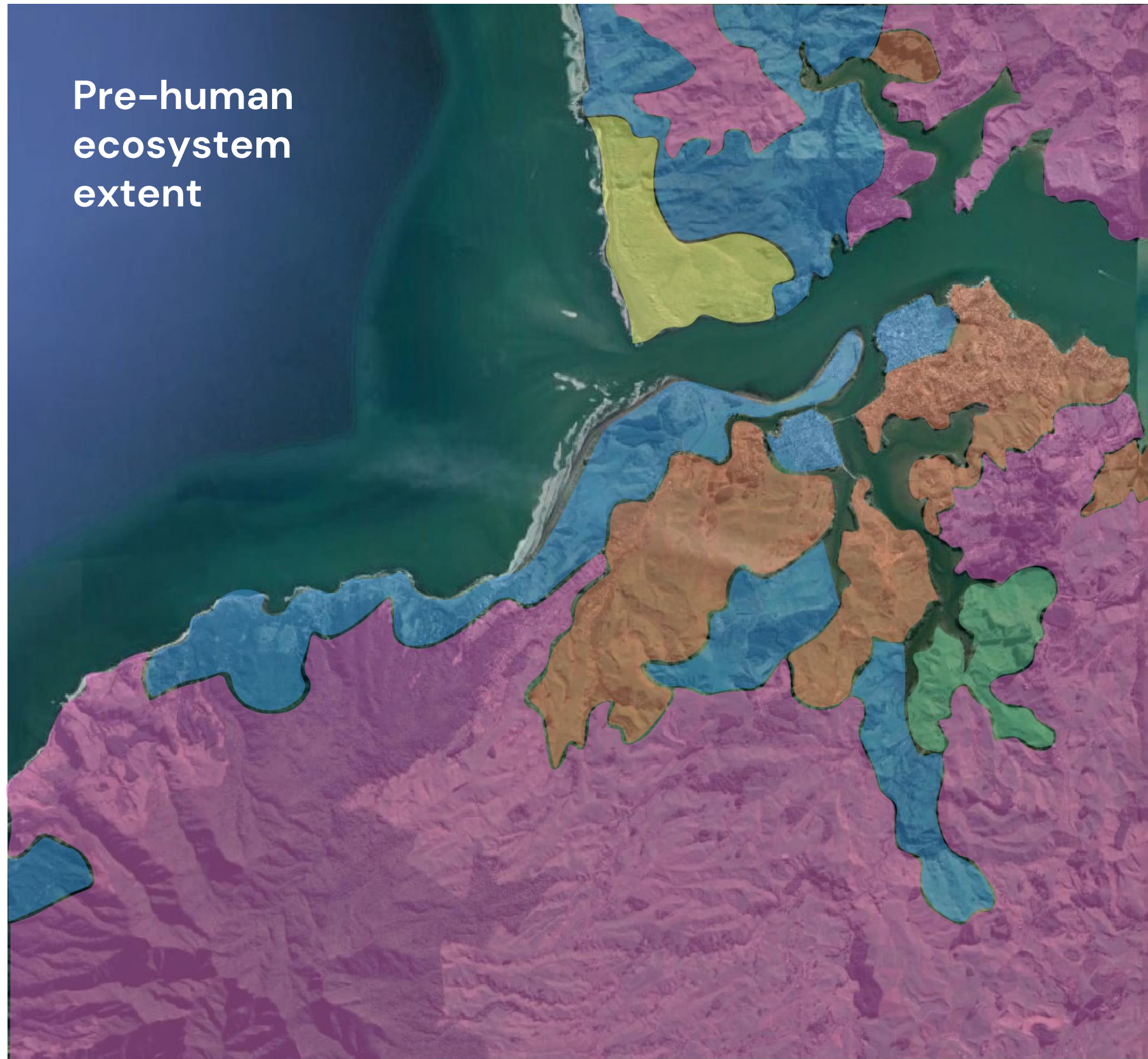
Current ecosystem extent



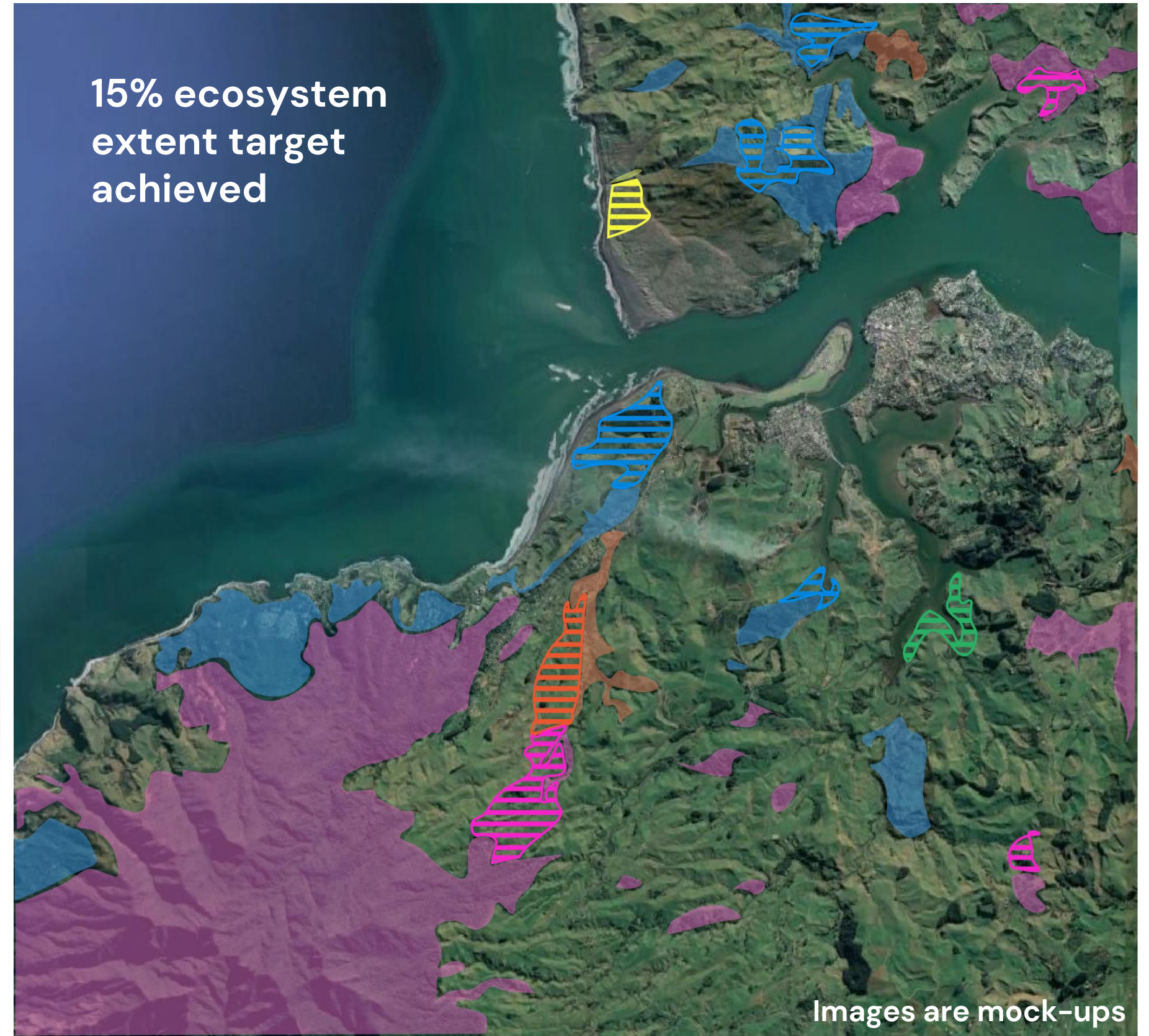
Images are mock-ups

-  Rimu/tawa-kāmahi forest
-  Kahikatea-pukatea-tawa forest
-  Kauri/taraire-kohekohe-tawa forest
-  Dunelands
-  Wetland

Pre-human ecosystem extent



15% ecosystem extent target achieved



Images are mock-ups

Existing ecosystem type:



Rimu/tawa-kāmahi forest



Kahikatea-pukatea-tawa forest



Kauri/taraire-kohekohe-tawa forest



Dunelands



Wetland

Re-created ecosystem:



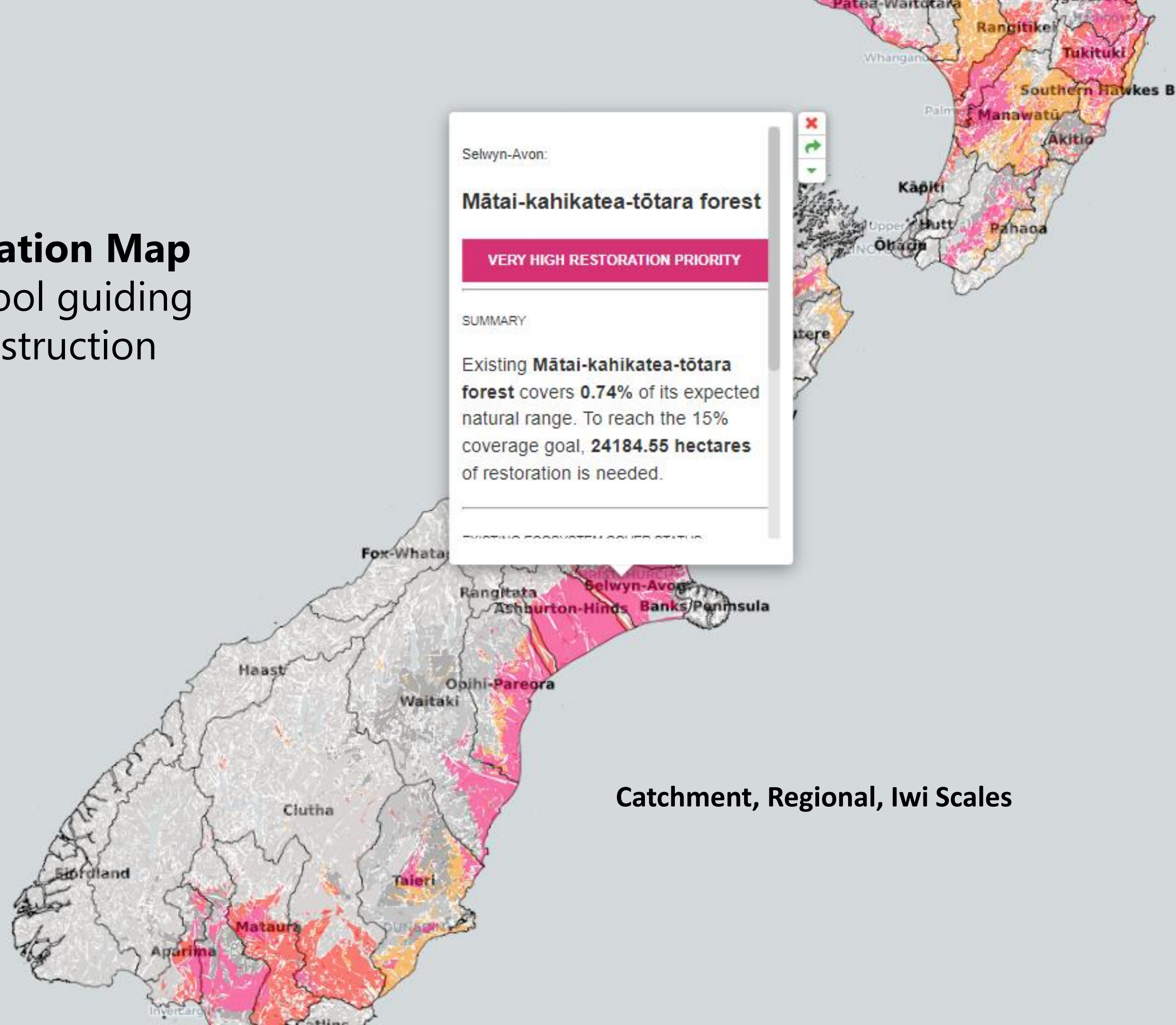
Eco-index Ecosystem Restoration Map

Open access national digital tool guiding ecological restoration/reconstruction

RESTORATION PRIORITY LEVELS ➡ - ✖

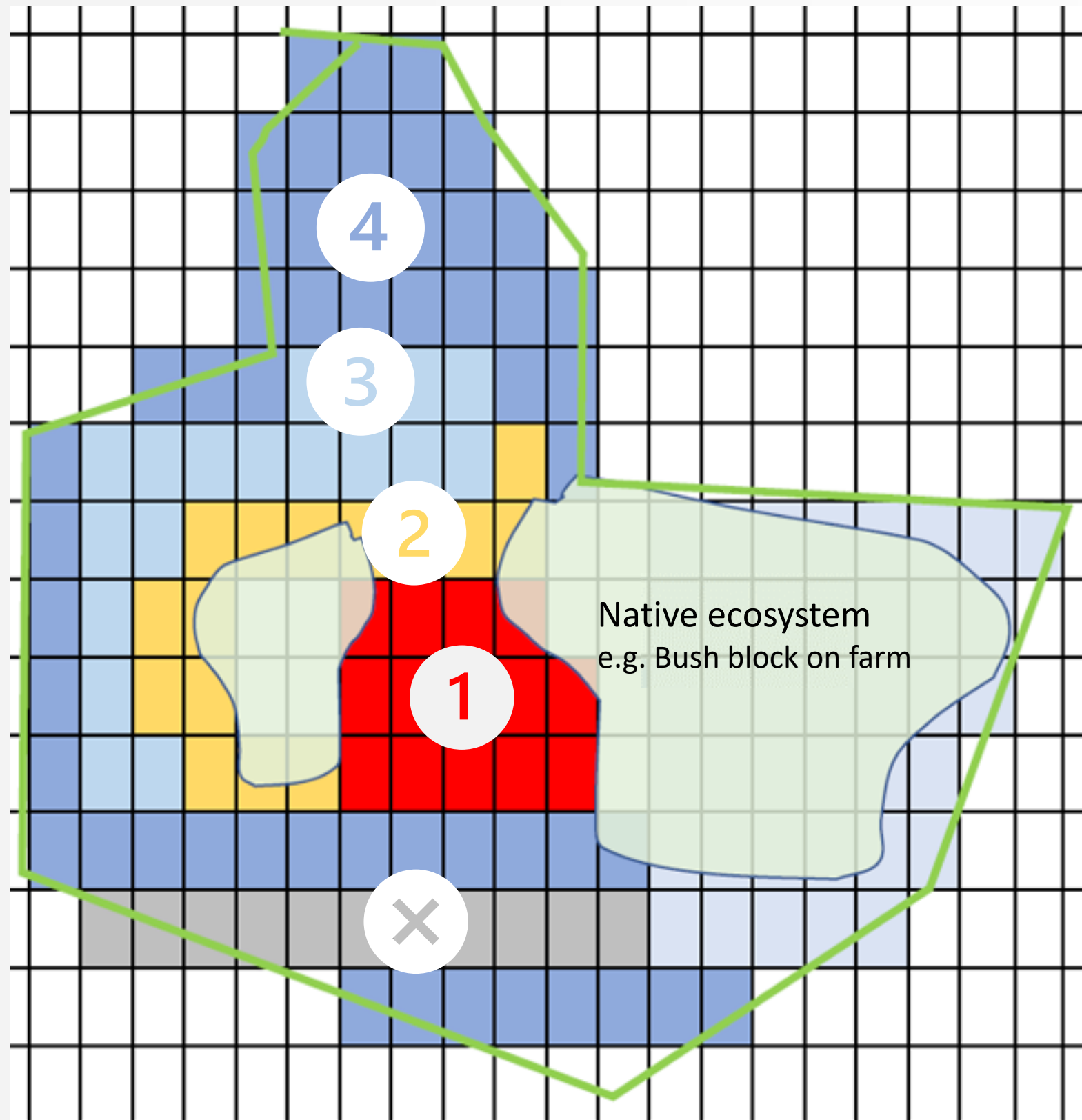
	VERY HIGH / ecosystem cover below 5%
	HIGH / ecosystem cover 5% - 10%
	MODERATE / ecosystem cover 10% - 15%
	LOW / ecosystem cover 15% - 25%
	VERY LOW / ecosystem cover 25% - 35%
	MINIMAL / ecosystem cover above 35%

*Ecosystem cover = The percentage of the expected natural range of an ecosystem type that the ecosystem type currently covers.



Catchment, Regional, Iwi Scales

Restoration Heat Maps provides location options



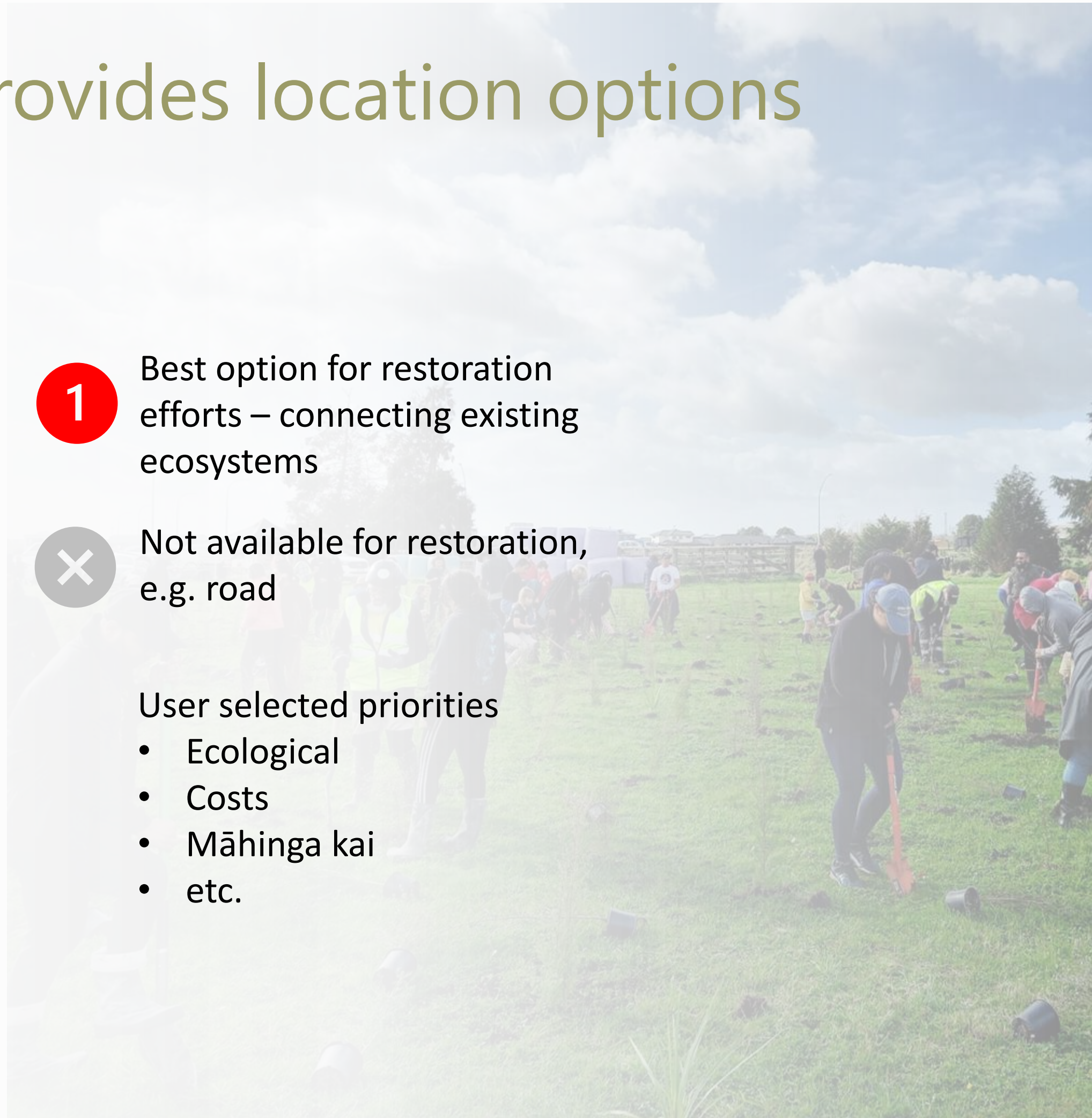
Best option for restoration efforts – connecting existing ecosystems



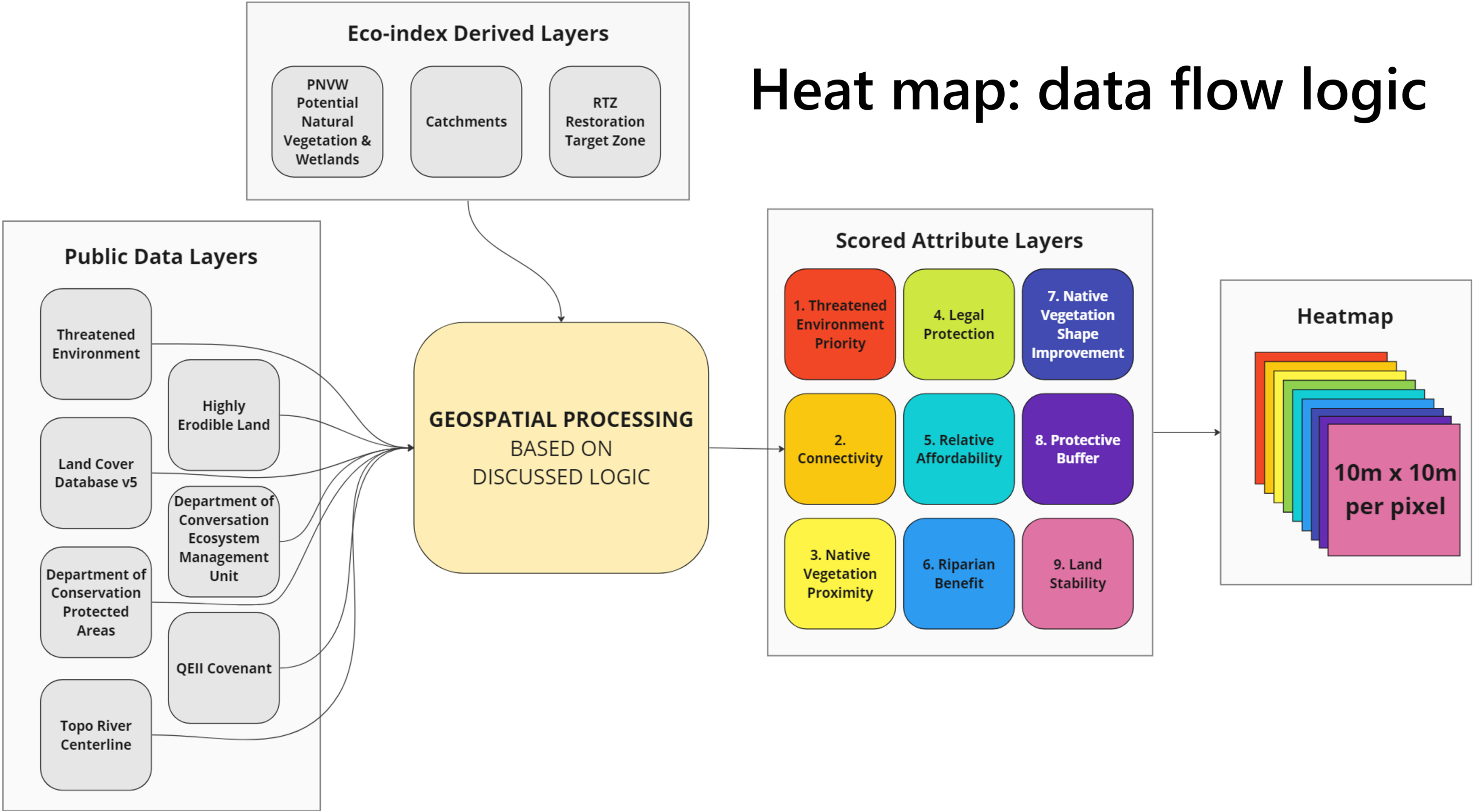
Not available for restoration, e.g. road

User selected priorities

- Ecological
- Costs
- Māhinga kai
- etc.



Heat map: data flow logic



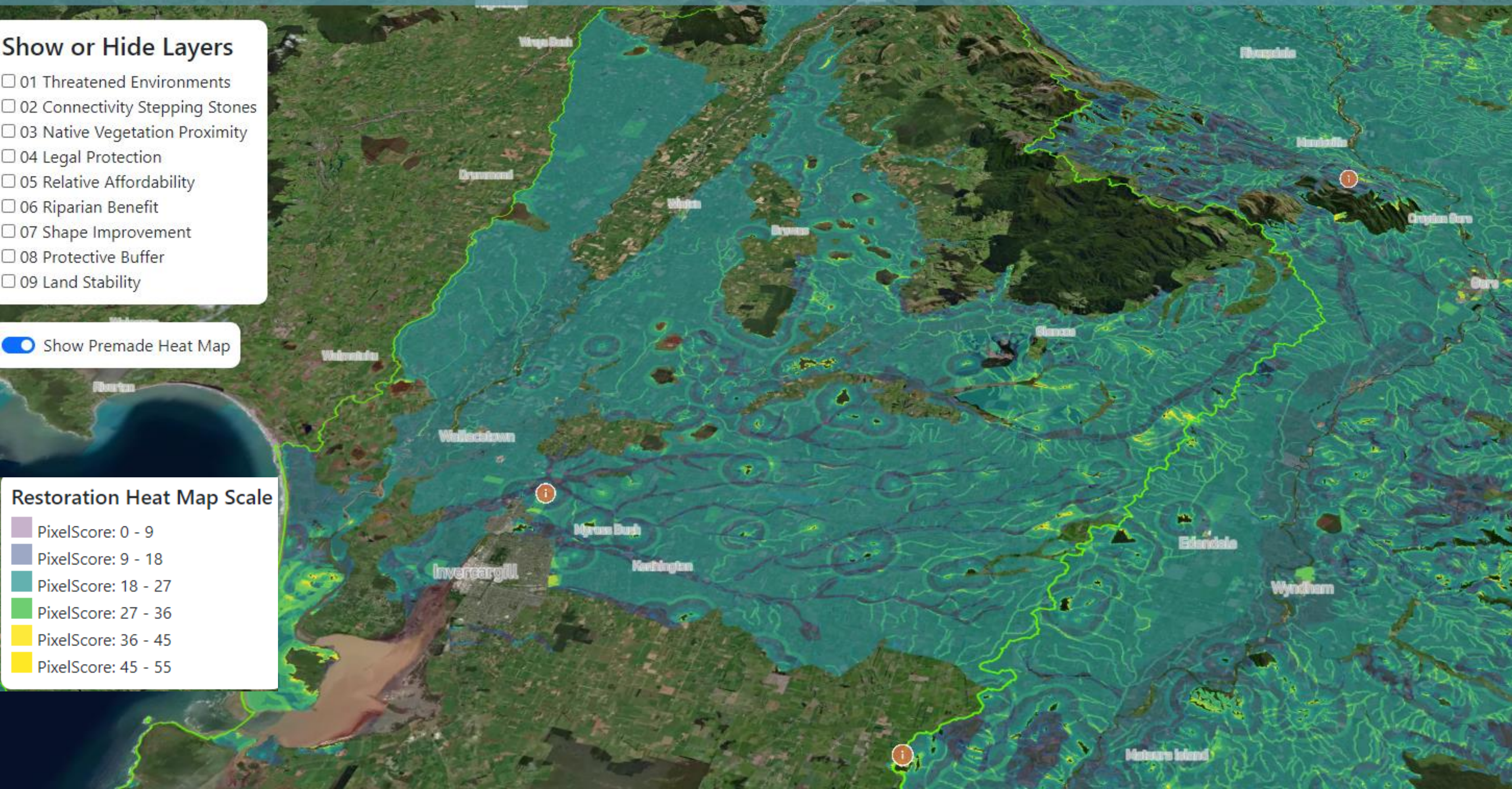
Show or Hide Layers

- 01 Threatened Environments
- 02 Connectivity Stepping Stones
- 03 Native Vegetation Proximity
- 04 Legal Protection
- 05 Relative Affordability
- 06 Riparian Benefit
- 07 Shape Improvement
- 08 Protective Buffer
- 09 Land Stability

Show Premade Heat Map

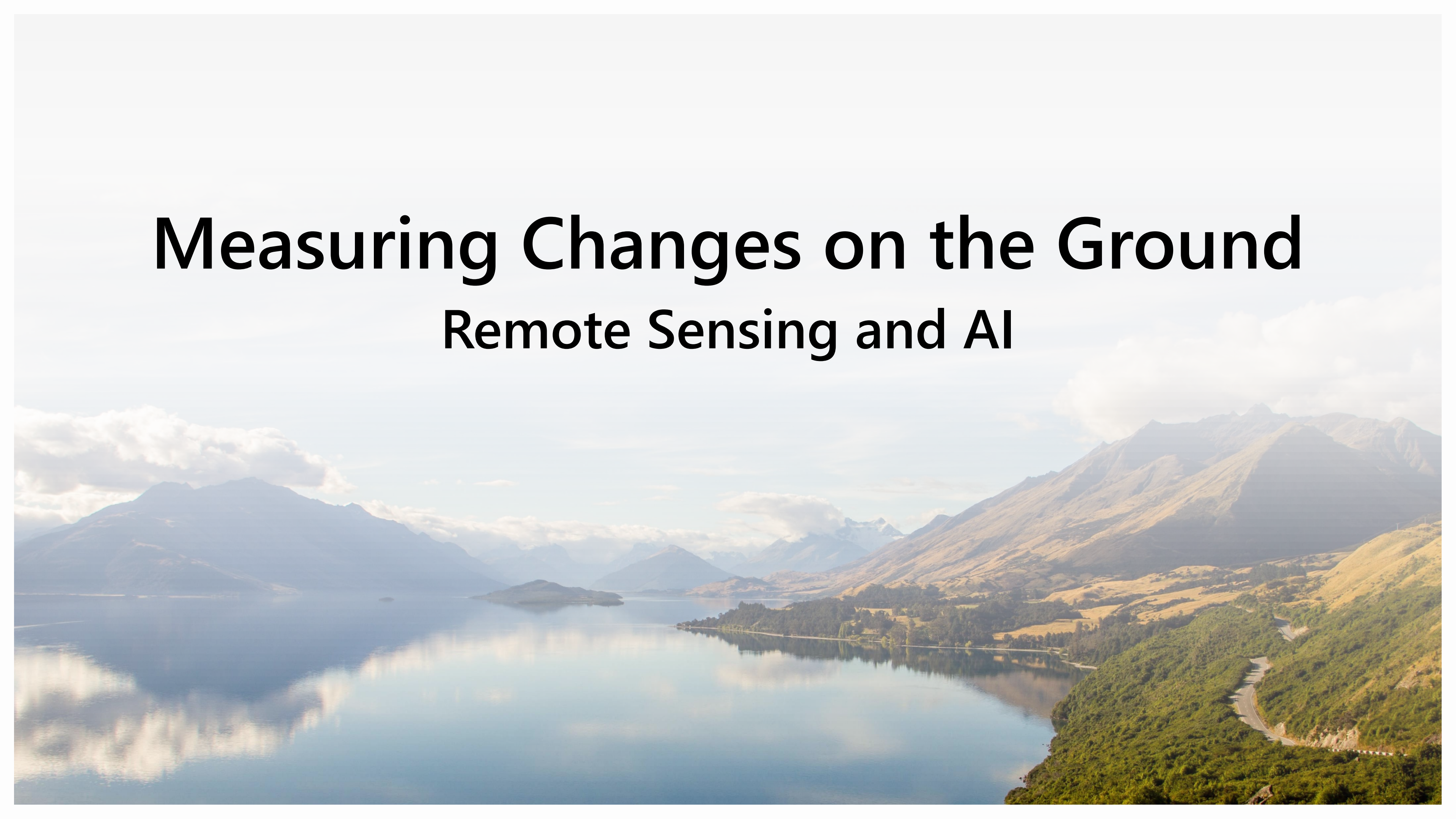
Restoration Heat Map Scale

- PixelScore: 0 - 9
- PixelScore: 9 - 18
- PixelScore: 18 - 27
- PixelScore: 27 - 36
- PixelScore: 36 - 45
- PixelScore: 45 - 55

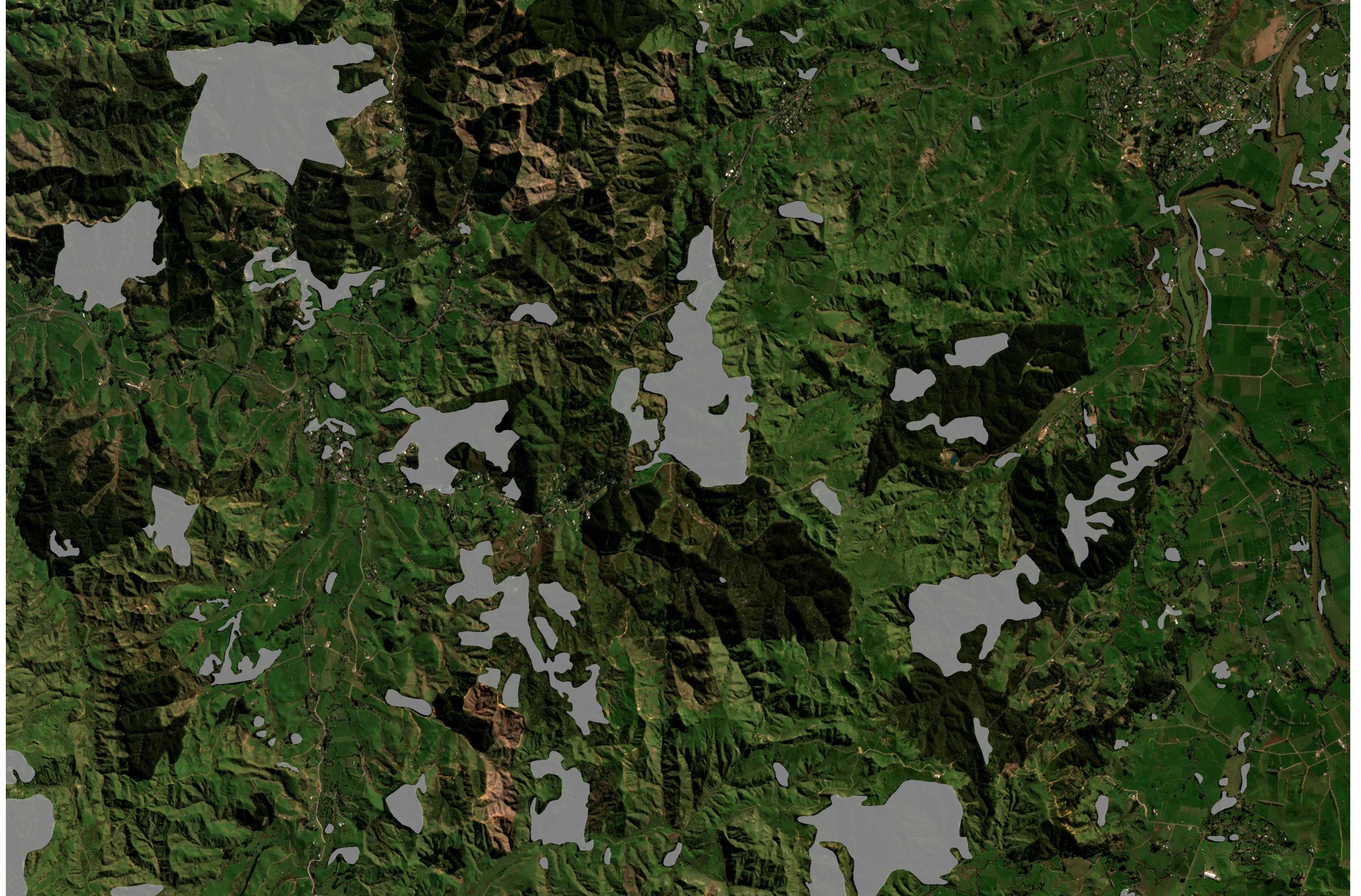


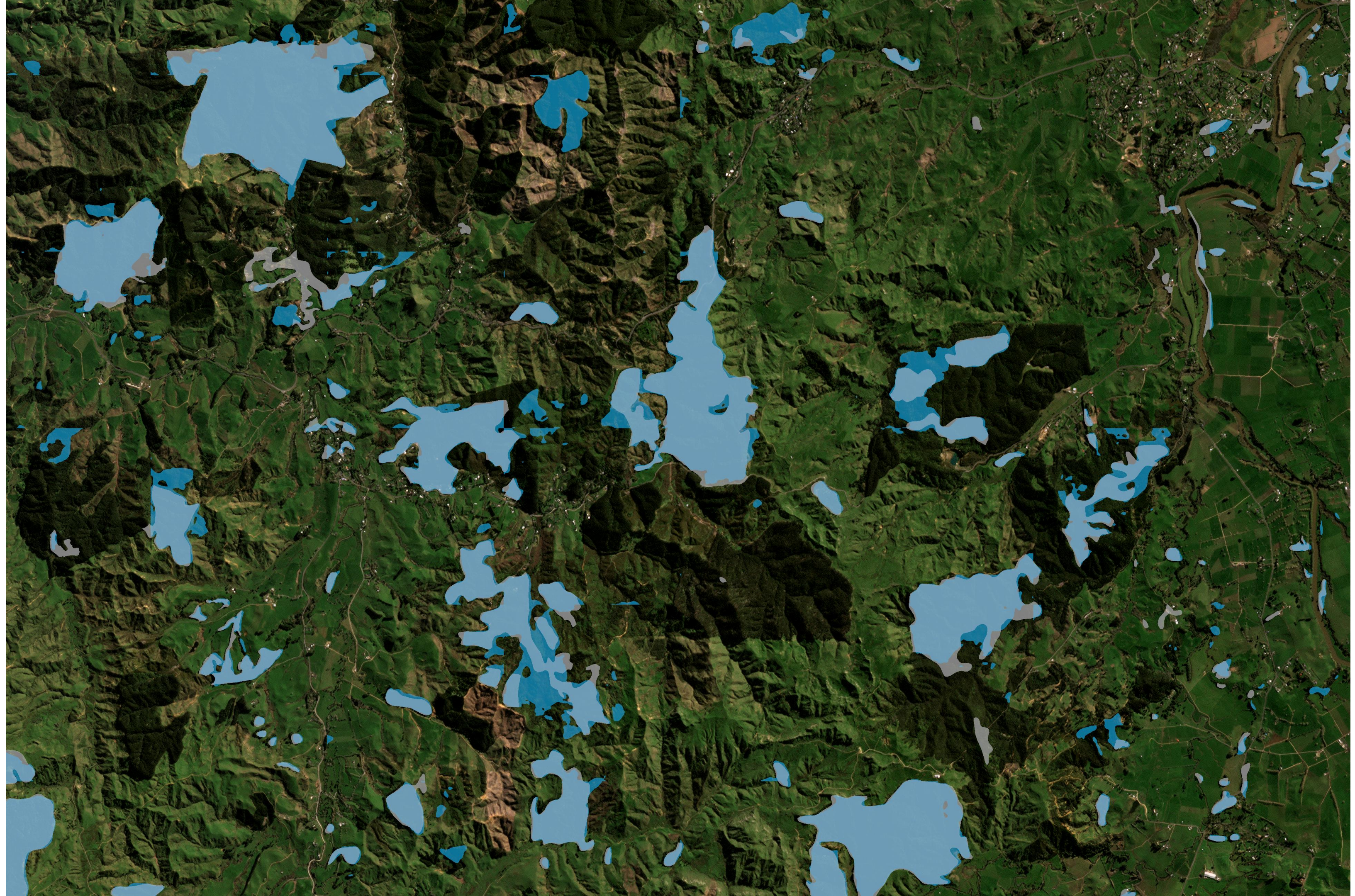
Measuring Changes on the Ground

Remote Sensing and AI

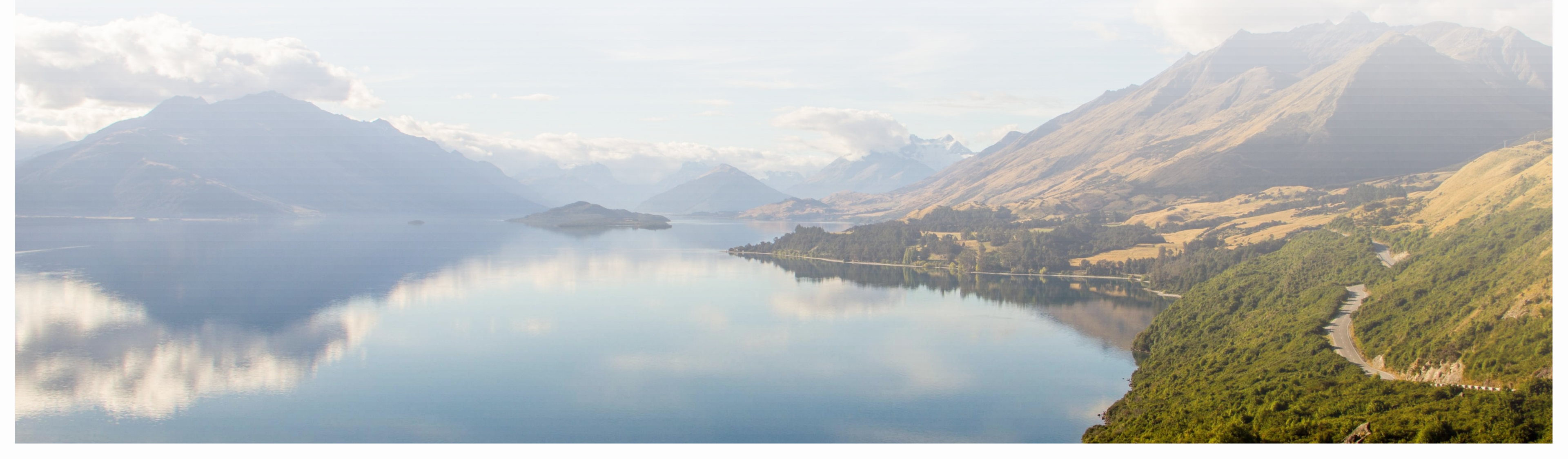




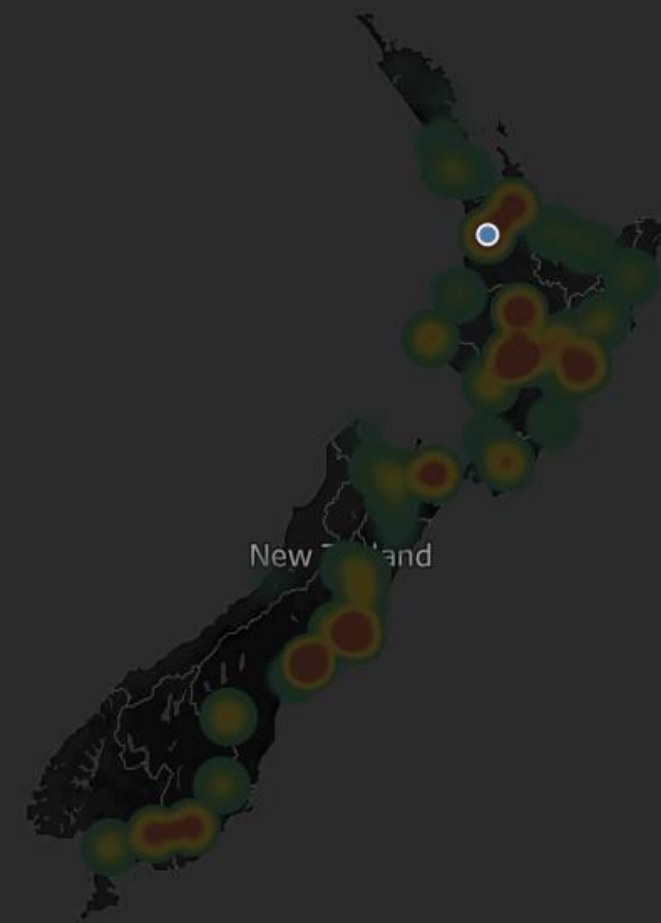




Automating the valuation of ecosystem restoration and services



Ecosystem Valuations



© 2024 Mapbox © OpenStreetMap

Hectares to Restore

30,927 ha.

Total Establishment Costs

\$426M

Total Annual Maintenance Costs

\$4M

Ecosystem Service Benefits

\$1,190M

Ecosystem Service Benefits

Biological Control	\$18,256,819
Climate Regulation	\$11,012,682
Cultural	\$17,145,533
Disturbance Regulation	\$48,580,962
Erosion Control	\$39,229,670
Food Production	\$22,908,519
Gas Regulation	\$3,560,713
Genetic Resources	\$2,183,501
Habitat/Refugia	\$131,675,733
Nutrient Cycling	\$18,904,077
Raw Materials	\$13,955,460
Recreation	\$70,966,427
Soil Formation	\$594,145
Waste Treatment	\$726,226,209
Water Regulation	\$48,136,713
Water Supply	\$16,944,573

Establishment Costs

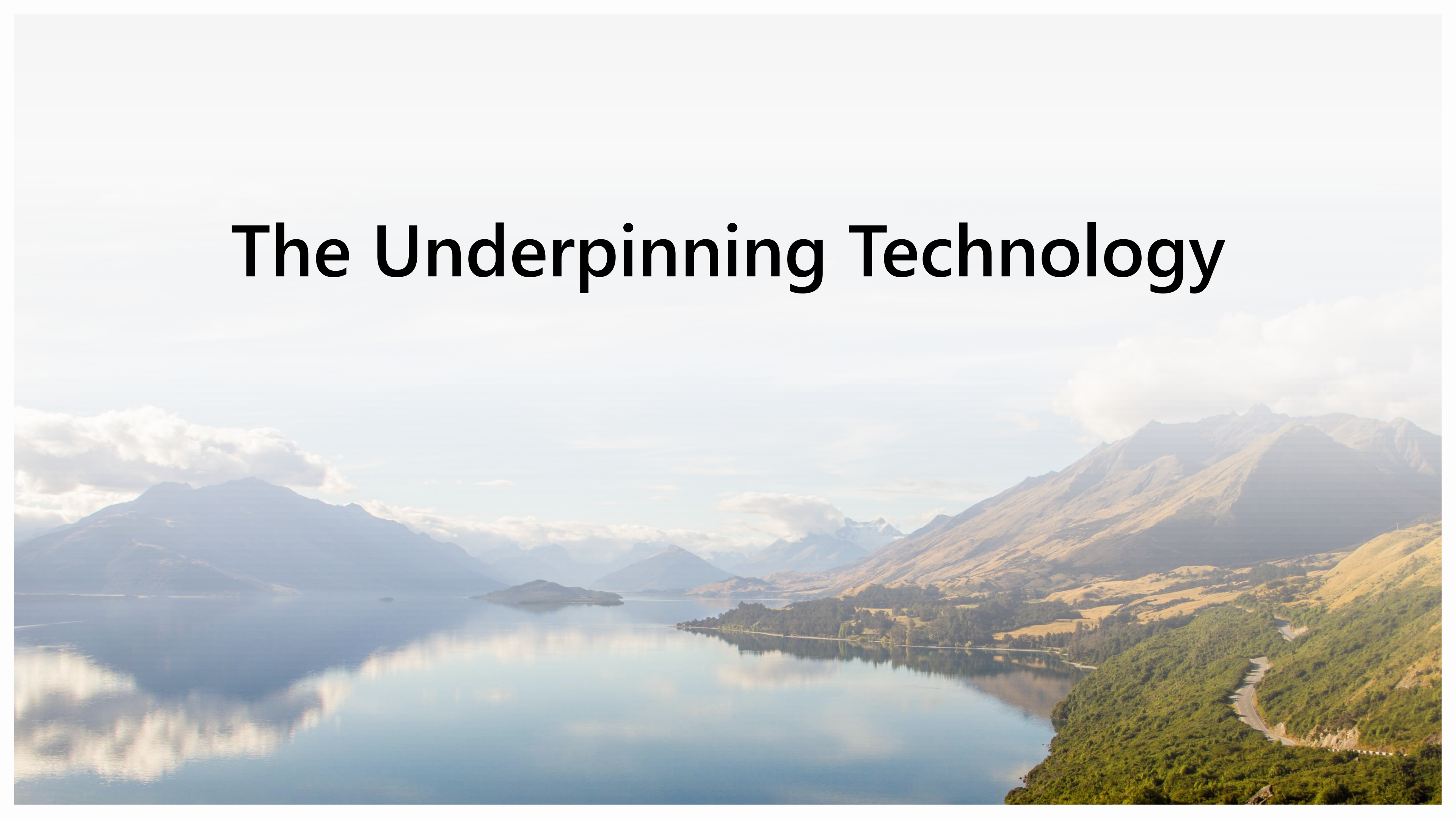
Fence Cost	\$81,598,276
Plant maintenance ..	\$175,838,881
Planting Costs	\$169,027,531

Annual Maintenance Costs

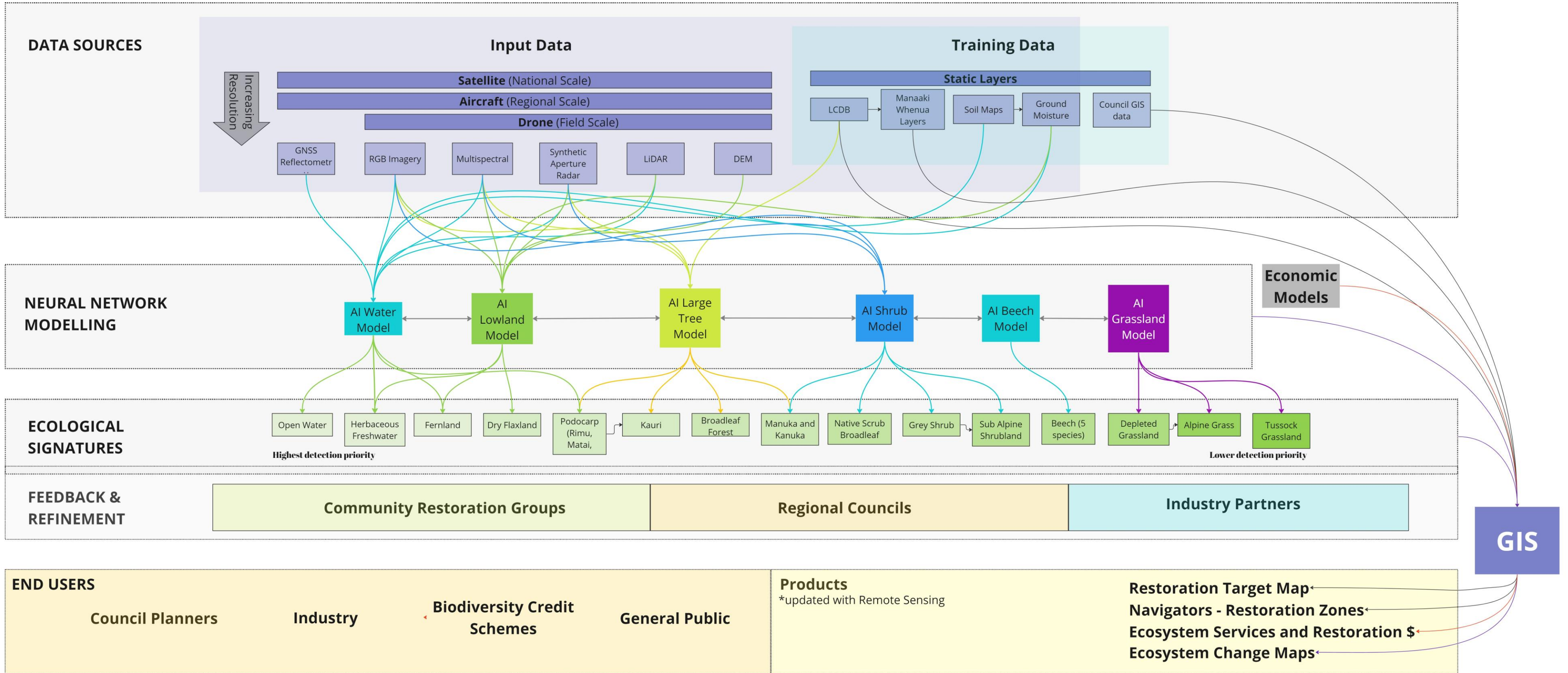
Fence maintance cost	\$841,324
Pest Management	\$781,549
Weed Management	\$2,460,716



The Underpinning Technology



Eco-index BIS



Automating Biodiversity Reporting for Investors, Primary Industry, and Land Managers



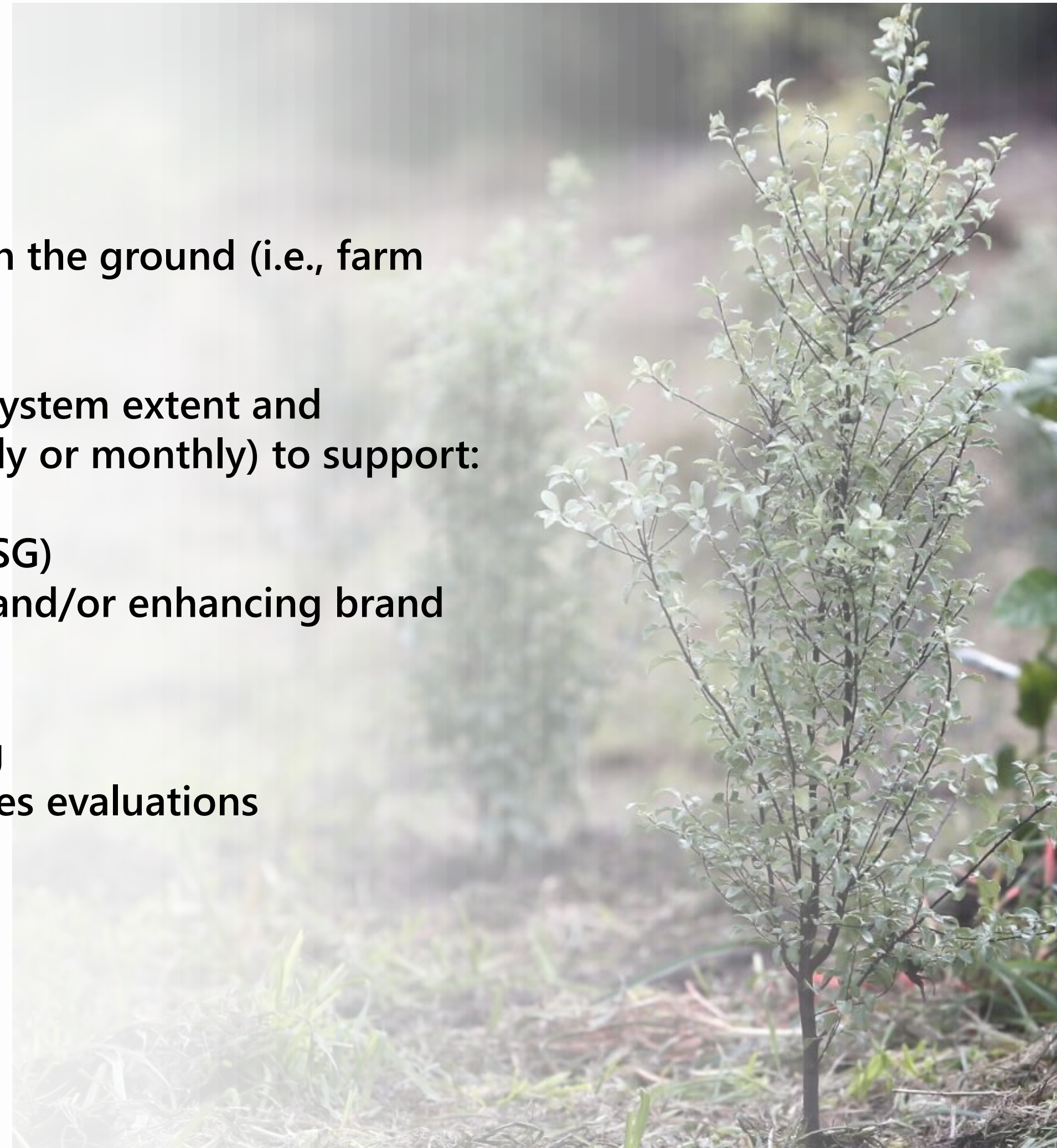
International and Nation Trends

- **Compulsory Biodiversity Reporting: Signatories to the Montreal-Kunming Global Biodiversity Framework are required to put in place legal, administrative, or policy measures to ensure that businesses and financial institutions regularly monitor, assess, and transparently disclose their risks, dependencies, and impacts on biodiversity**
 - NZ businesses (including land-based enterprises and industries) and financial institutions will need to know and disclose their biodiversity footprint by 2030
 - Farming industry - Farm Environment Plans (FEPs) require in many circumstances biodiversity reporting
- **Efforts are underway internationally to establish the regulatory structures and policy environment for the development of Biodiversity Credit Systems.**
 - Internationally: Biodiversity Credit Alliance and UNDP Working Group
 - Domestically: MfE
- **Efforts to put in place market mechanisms**
 - A-NZ – Toha and Ekos
- **CHALLENGE – Access to verification tools**



Eco-index Products

- The capacity to measure biodiversity changes on the ground (i.e., farm scale) in reference to macro targets
- Developing capability to detect changes in ecosystem extent and ecosystem health on a frequent basis (i.e., weekly or monthly) to support:
 - Environment Social Governance reporting (ESG)
 - Verifying environmental claims – protecting and/or enhancing brand value
 - Verifying biodiversity credits
 - Automated Farm Environment Plan reporting
 - Automated ecosystem restoration and services evaluations



Questions

Ngā mihi nui

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Eco-index
Guiding Biodiversity Investment

www.eco-index.nz