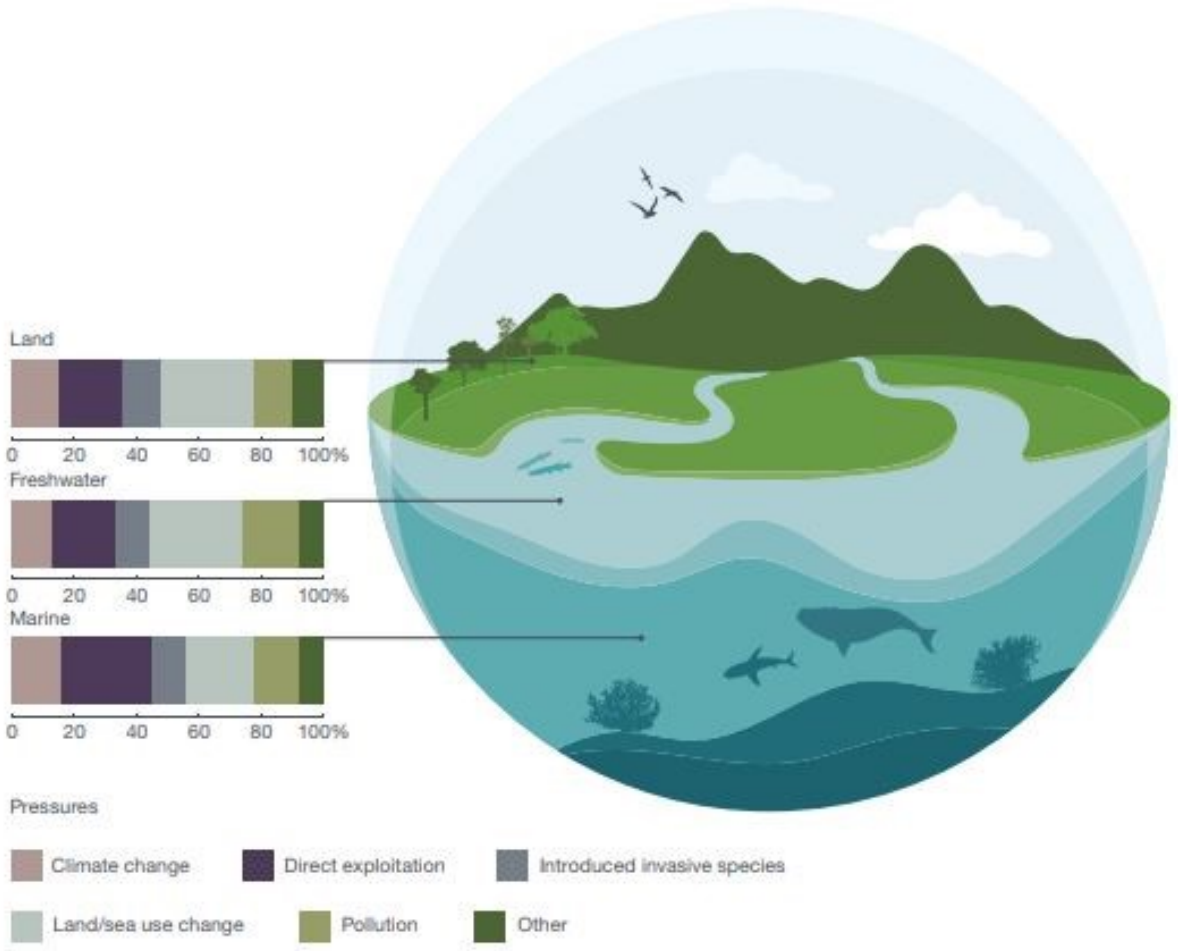
Climate change and Biodiversity

Connectivity for mitigation and offsets

Ian Boothroyd

Global Biodiversity Crisis



NZ Pressures

- Competition including by invasive alien species
- Predation by introduced predators
- Herbivory by introduced herbivores
- Habitat modification and land use change
- Other human activities
- Climate change

NZ Biodiversity Crisis

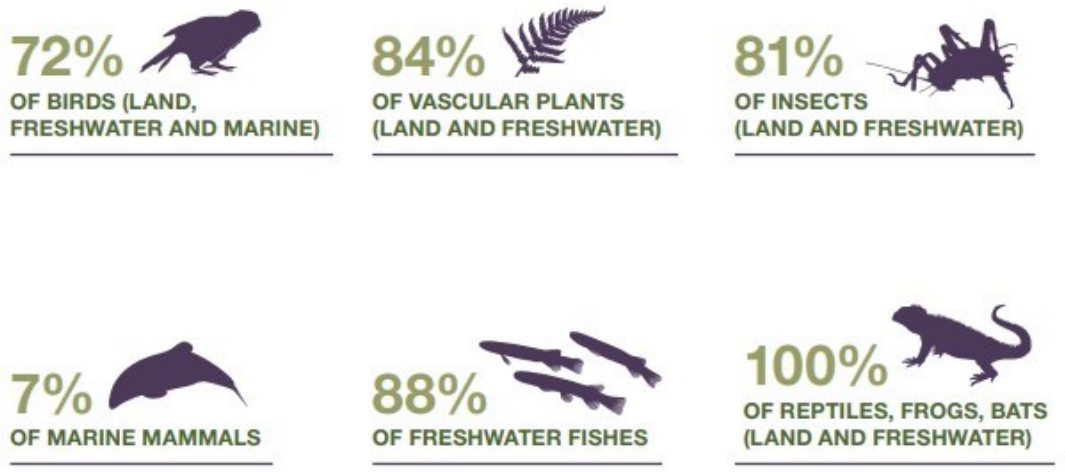


Figure 3. Proportion of New Zealand's indigenous species found nowhere else on Earth. Data does not include extinct species. Sources: Macfarlane et al. (2010); Gordon (2013); NZTCS (2019).

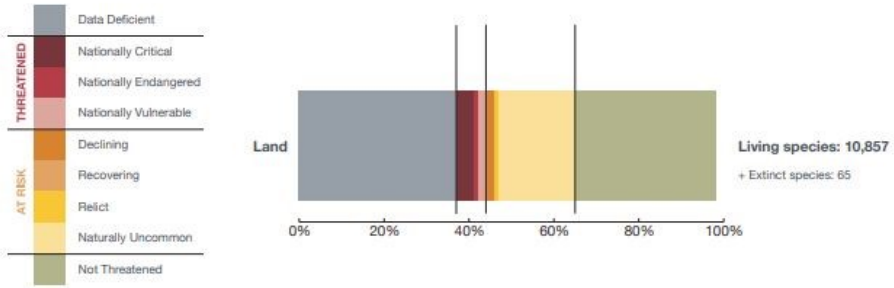


Figure 10. Conservation status (NZTCS) of resident native land species assessed under the NZTCS. Data source: NZTCS (2019).

About 43% of NZ land area in native cover

Marine birds:	28 (31%) Threatened 53 (60%) At Risk
Freshwater fish:	22 (43%) Threatened 17 (33%) At Risk
Land reptiles:	37 (35%) Threatened 52 (50%) At Risk

Naturally uncommon ecosystems (< 0.5% of NZ pre-human):
Now 72 of these – 45 (63%) are threatened

Climate Change and Biodiversity

- Do we include sufficient climate change attributes in (biodiversity) effects management considerations
- Do biodiversity offsets provide for future climate change scenarios?
- Should they?
- Is the status quo acceptable?
- Do biodiversity offsets provide sufficient buffer against future threats?
- Can we better manage biodiversity offsetting

NPS-Indigenous Biodiversity

Part 2: Objectives and Policies

2.1 Objective

(1) The objective of this National Policy Statement is:

(a) **to maintain indigenous biodiversity across Aotearoa New Zealand** so that there is at least no overall loss in indigenous biodiversity after the commencement date; and

(b) to achieve this:

(i) through recognising the mana of tangata whenua as kaitiaki of indigenous biodiversity; and

(ii) by recognising people and communities, including landowners, as stewards of indigenous biodiversity; and

(iii) by protecting and restoring indigenous biodiversity as necessary to achieve the overall maintenance of indigenous biodiversity; and

(iv) while providing for the social, economic, and cultural wellbeing of people and communities now and in the future.

2.2 Policies

17 policies including for: precautionary approach, resilience to climate change, consistency and integration, SNAs.

All resource consent applications must be assessed against this Objective and 17 Policies (as relevant) now.

Except Renewable electricity generation activities and electricity transmission network assets and activities.

Maintaining Indigenous Biodiversity

1.7 Maintaining indigenous biodiversity

(1) Maintaining indigenous biodiversity requires:

(a) the maintenance and at least no overall reduction of all the following:

(i) the size of populations of indigenous species:

(ii) indigenous species occupancy across their natural range:

(iii) the properties and function of ecosystems and habitats used or occupied by indigenous biodiversity:

(iv) the full range and extent of ecosystems and habitats used or occupied by indigenous biodiversity:

(v) connectivity between, and buffering around, ecosystems used or occupied by indigenous biodiversity:

(vi) the resilience and adaptability of ecosystems; and

(b) where necessary, the restoration and enhancement of ecosystems and habitats.

Effects management hierarchy

- **effects management hierarchy** means an approach to managing the adverse effects of an activity on indigenous biodiversity that requires that:

  a) adverse effects are **avoided** where practicable; then
  b) where adverse effects cannot be avoided, they are **minimised** where practicable; then
  c) where adverse effects cannot be minimised, they are **remedied** where practicable; then
  d) where more than minor residual adverse effects cannot be avoided, minimised, or remedied, **biodiversity offsetting** is provided where possible; then
  e) Where biodiversity offsetting of more than minor residual adverse effects is not possible, **biodiversity compensation** is provided; then
  f) if biodiversity compensation is not appropriate, **the activity itself is avoided**.

Biodiversity Offsets

- No net loss
- Net gain
- Like for like
- Close to loss location
- Account for lag time
- Additionality

Principles for offsetting

- Enhancement planting to existing
- Add area to existing
- Weed management
- Pest management
- Extent?

MAD

MAD

Move, Adapt or DIE

Climate change strategies

Move – range expansion, dispersal,	Adapt – genetic plasticity,
Evolve over time	Take refuge & hold on

Suitable habitat area will decrease, and fragmentation will increase

Range expansion (dispersal) limited by land use, natural and built impediments

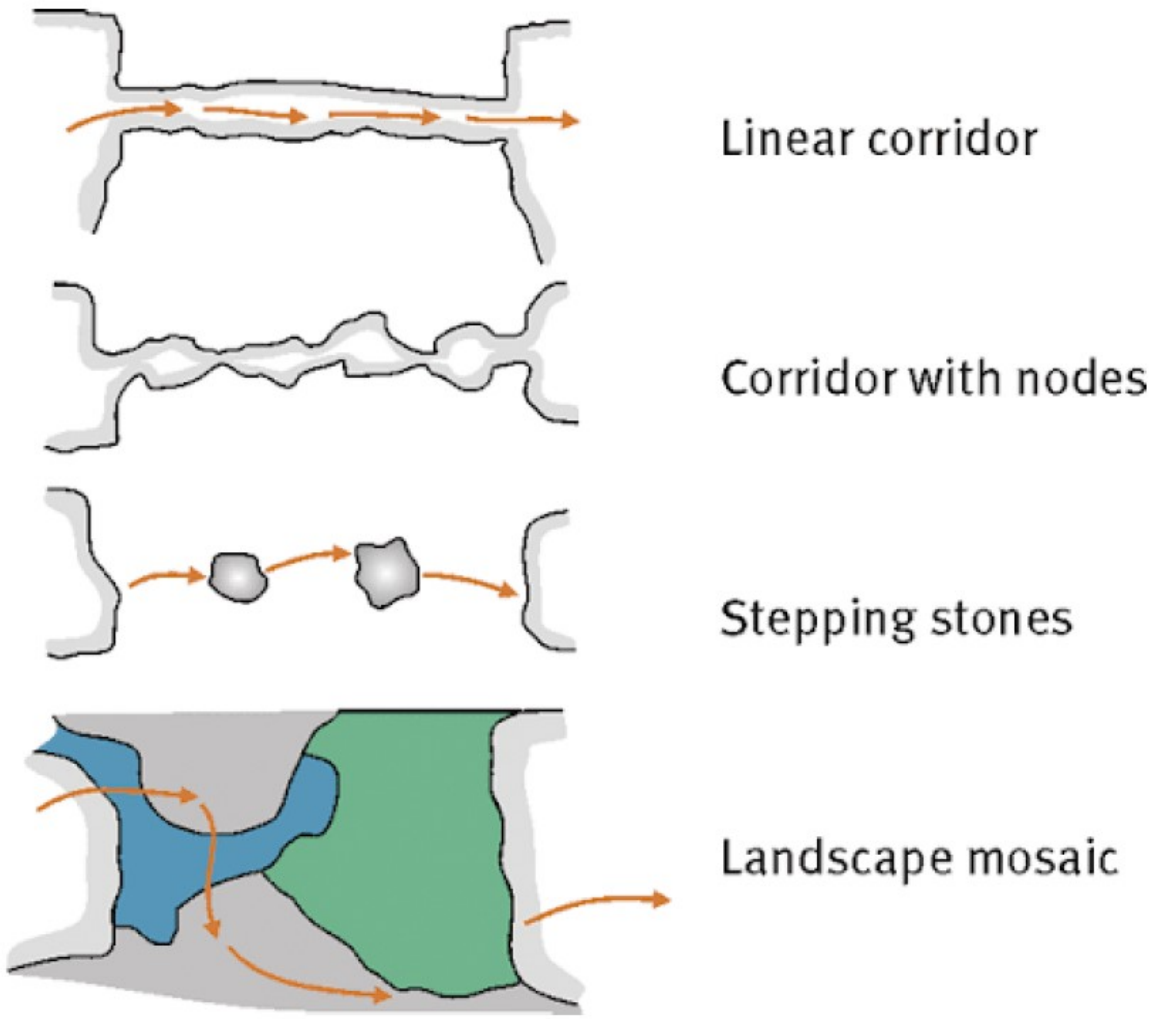
Spatial arrangement and planning by retaining/enhancing habitat patches and adding patches

Manage/control abiotic features (e.g., wetland hydrology)

Regions with minor difference between current and future connectivity could facilitate outcome

Climate change and Biodiversity: Connectivity

Category	Feature	Modeling approach: *Traditional*	Modeling approach: *Climate-driven*
Primary conservation objective	Maintain or restore movement among fragmented habitats	✔	
	Promote climate-driven shifts in species' ranges		✔
Potential model focus or what is being connected	Protected areas	✔	
	Natural landscapes	✔	
	Geophysically diverse areas	✔	✔
	Current ranges or habitat	✔	✔
	Future ranges		✔
	Current and future climate conditions		✔
	Climate gradients (eg warm to cool)		✔
Potential model inputs	Land cover or landscape resistance	✔	✔
	Geophysical features	✔	✔
	Habitat suitability models	✔	✔
	Current climate	✔	✔
	Future climate		✔
	Species distribution models		✔

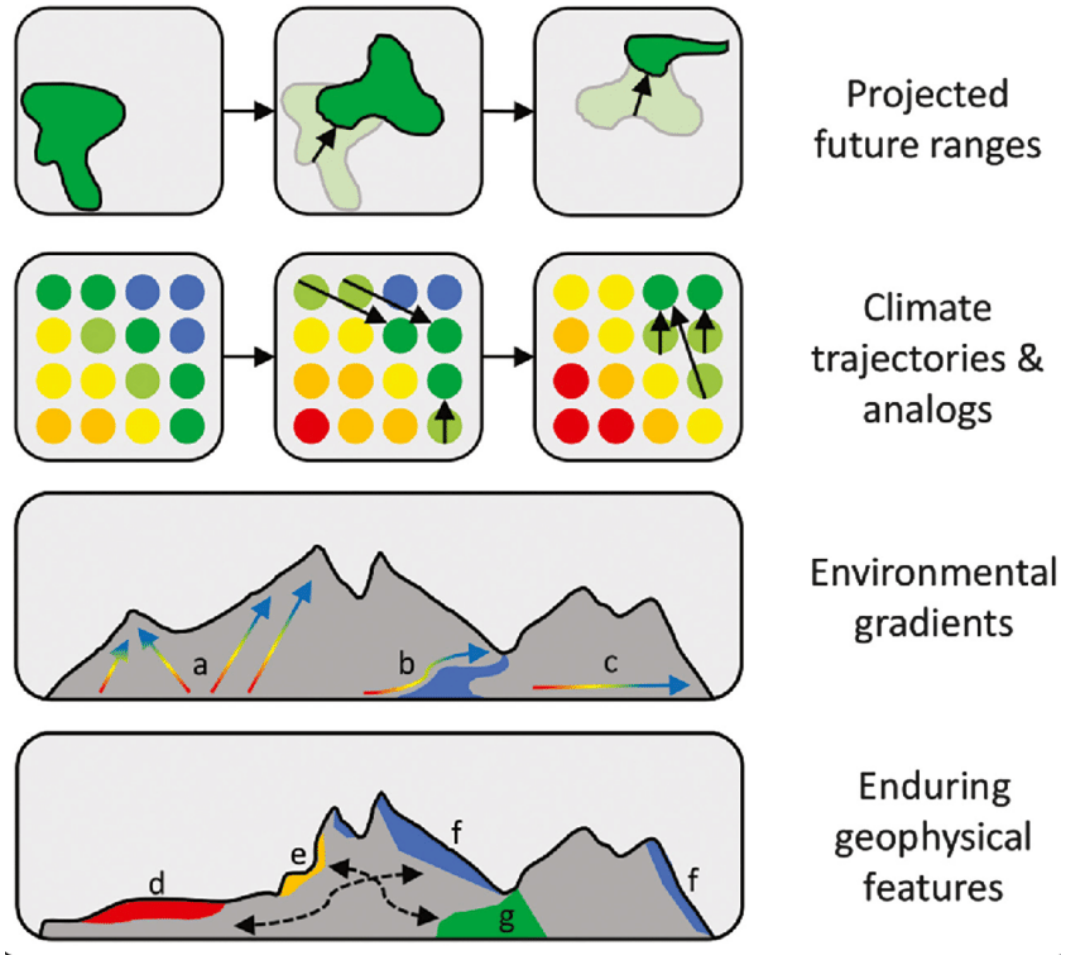


From: Littlefield et al. 2019. Connectivity for species on the move: supporting climate-driven range shifts

Climate change and Biodiversity: Connectivity

- Focal-species based connectivity
  - climate-stable corridors
  - current to future habitats
  - temporal corridors

- Structural connectivity
  - environmental gradients (a)
  - riparian corridors (b)



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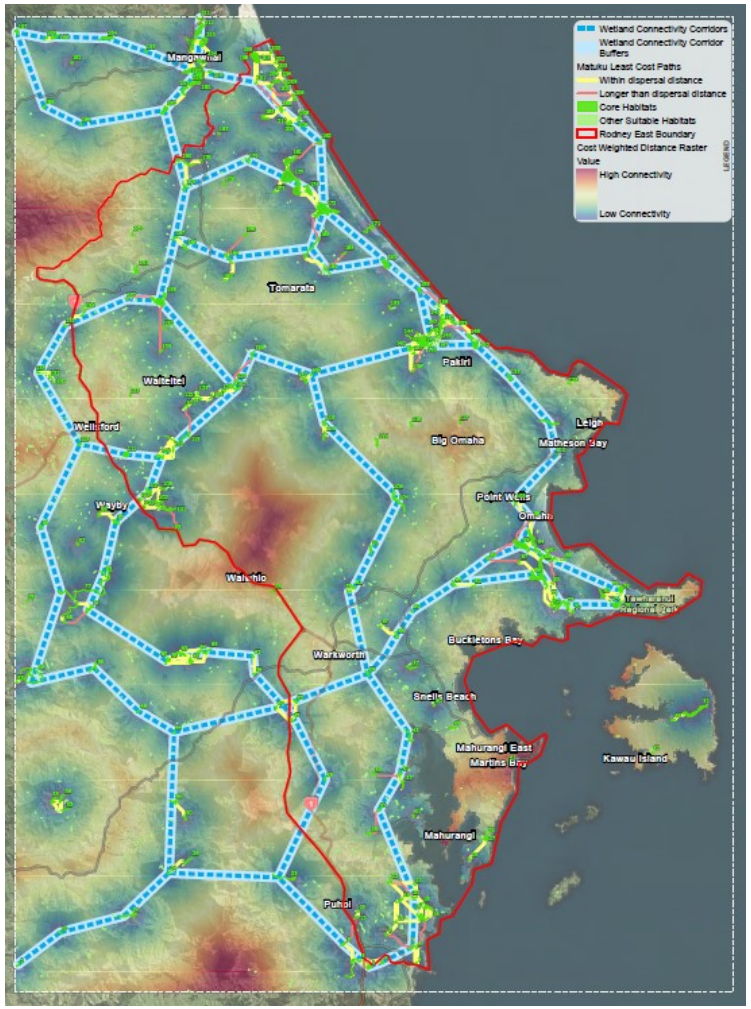
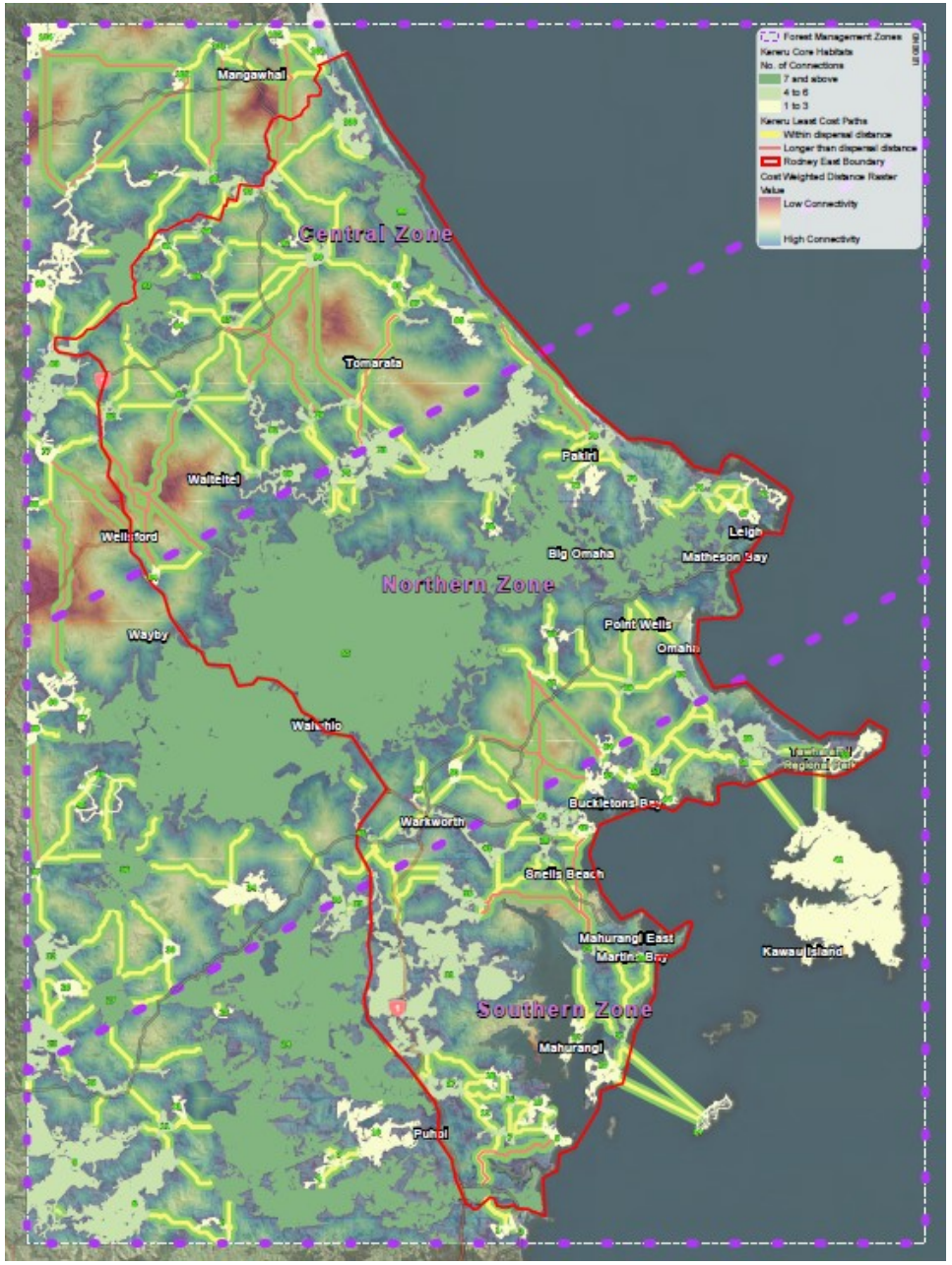
Connectivity Linkages



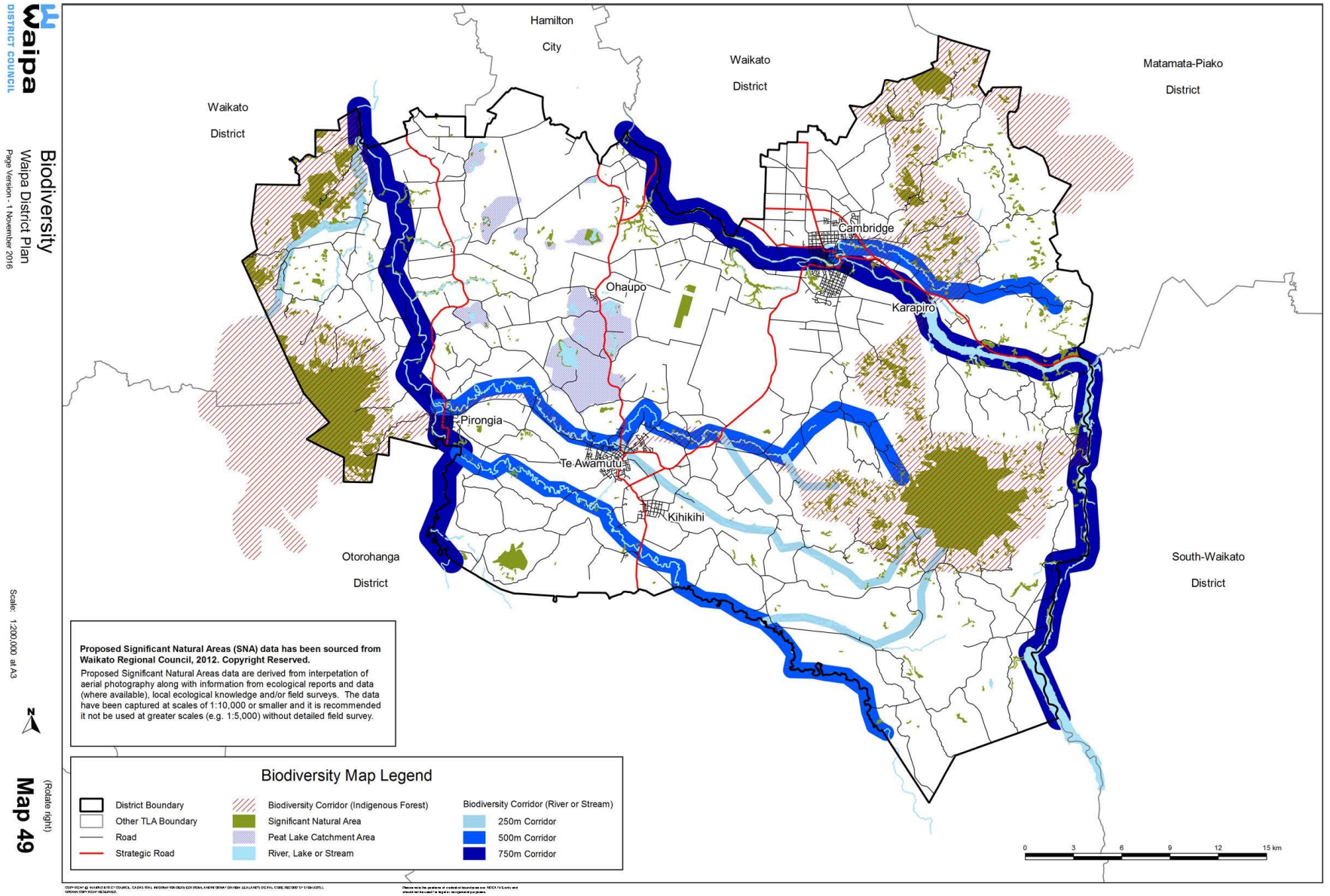
kereru

matuku-hūrepo



Biodiversity Spatial Strategy

Waipa District



Biodiversity Spatial Strategy

North-West Wildlink

The North-West Wildlink provides a wildlife corridor from the Waitākere Ranges to the Hauraki Gulf.

Final thoughts

- Spatial strategy for biodiversity offsets reflecting climate change predictions
- National/inter-regional approach
- Current to future habitats
- Biodiversity credits
- Evolutionary resilience