



A Conservation Decision Support Tool for Freshwater Ecosystems of New Zealand (**FENZ**)

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The scope...

- New Zealand and its freshwaters
- The policy background
- Building a prioritisation tool
- End-user delivery



Россия
Russia

中国
China

Canada

United States

India

Australia

Brasil

Southern Ocean

Southern Ocean





For those not familiar with New Zealand...



The policy background...

- Part of a whole of government initiative
 - Different departments looked at various aspects
 - To identify nationally important water bodies
- DOC asked to identify nationally important rivers, lakes and wetlands
 - Assembled national freshwater datasets
 - Developed prioritisation tools for rivers, etc.

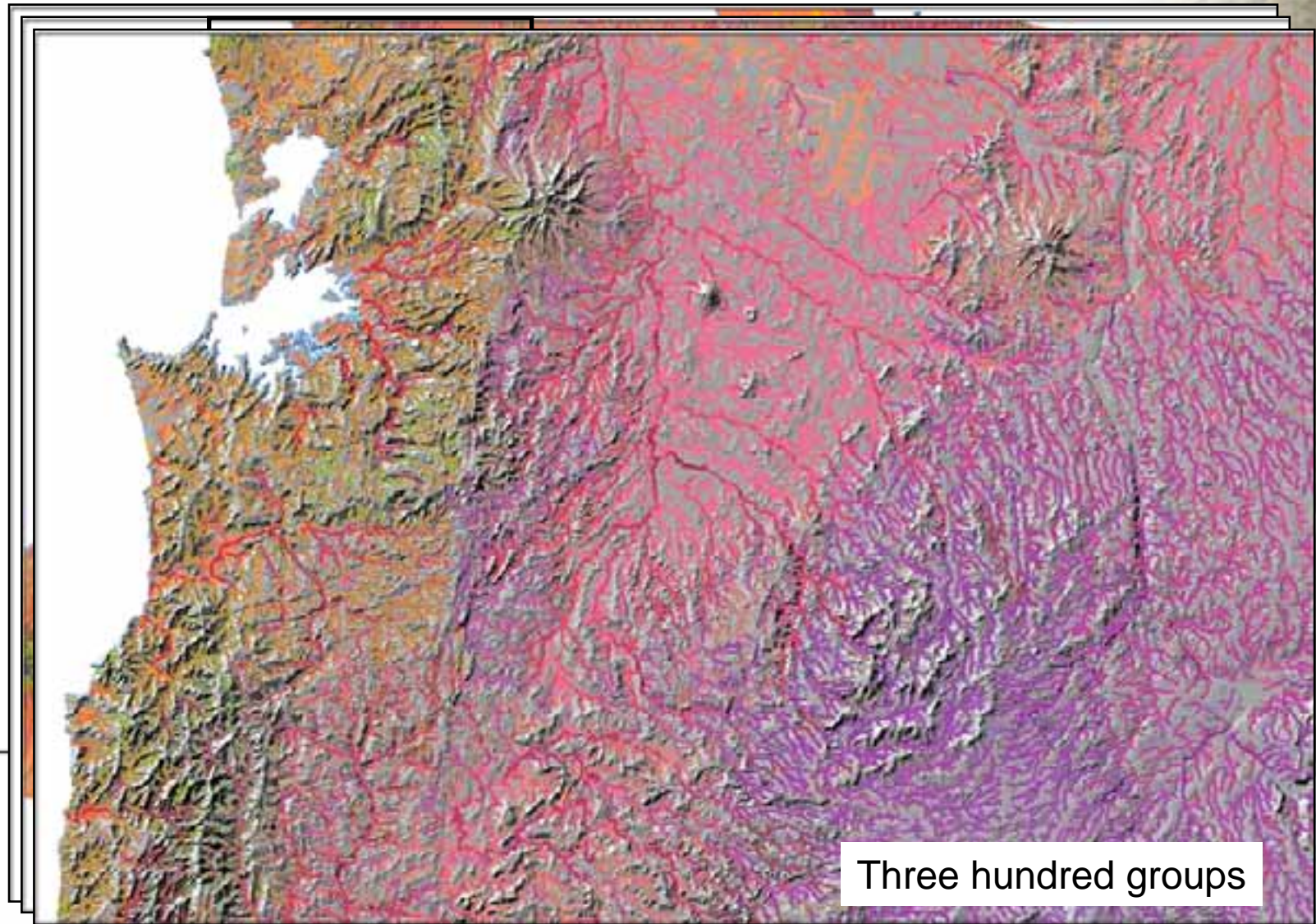
Building the rivers component

- GIS river network
 - 567,000 individual segments
 - Range of environmental/biological attributes
- A river environmental classification
 - Spatial surrogate for biodiversity patterns
- Estimation of human impacts on biodiversity
 - To allow consideration of current condition
- Methods for identifying efficient sets of sites
 - Complementarity-based selection

The river classification...

- Built using biological sample data for
 - Native fish – 13 363 sites
 - Macro-invertebrates – 2677 sites
- Environmentally based then tuned to maximise its biological discrimination
- Used Generalised Dissimilarity Modelling to identify the main environmental correlates of species turnover
 - Hierarchical classification – 20, 100, 200 and 300 groups

Typical data ...



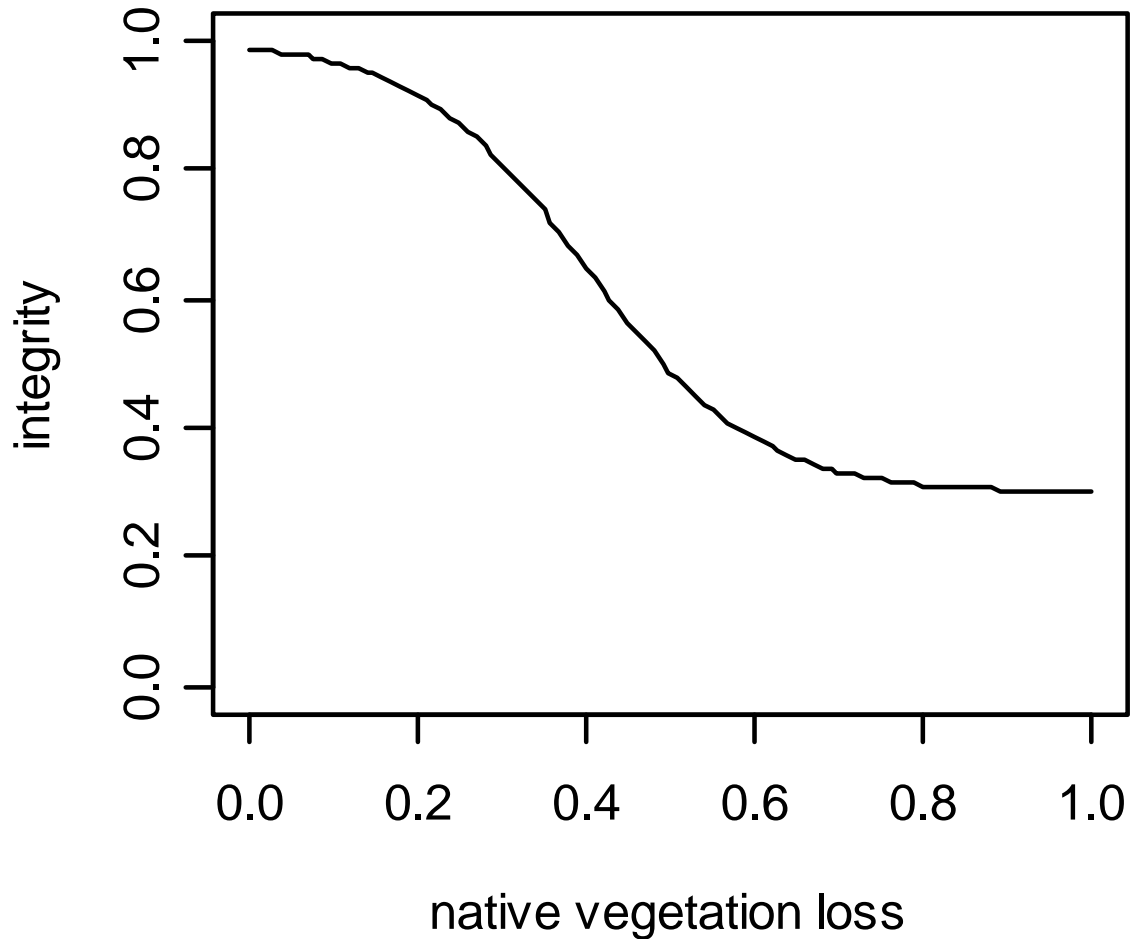
M Glacial rivers

Estimation of human impacts...

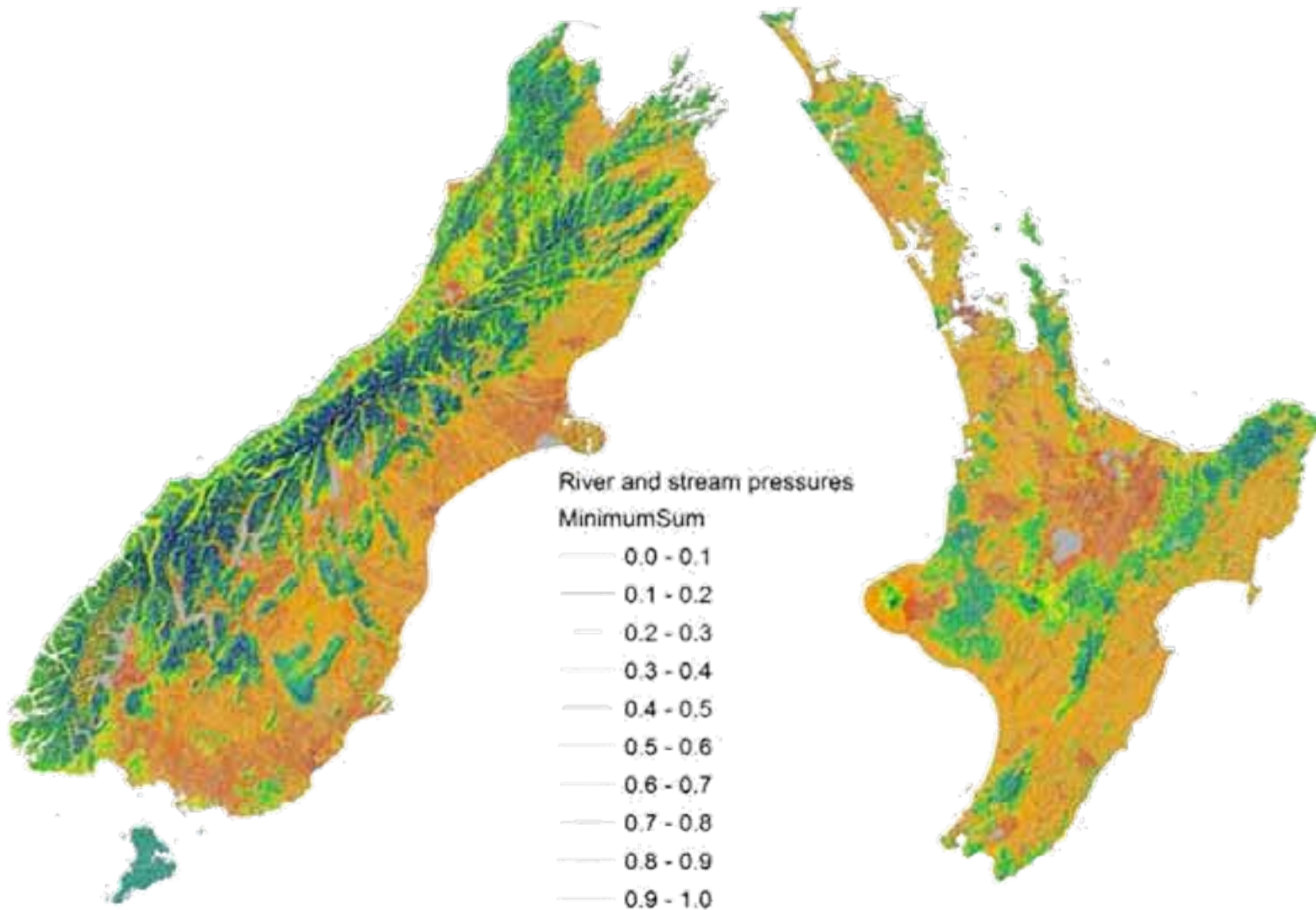
- Complicated by having multiple pressures
 - Most occur together
 - Strong lowland bias in their effects
 - Lack both quantitative data & reference sites
- Estimated impacts using expert opinion
 - A curve for each pressure describing
 - Threshold or buffering effects
 - The maximum impact and when it occurs
- Estimates combined to give overall condition

Example pressure/integrity relationship...

a) native vegetation loss



Cumulative river pressures...



Site prioritisation...

- Spatial prioritization software – Zonation
- Input data
 - One grid layer per river ecosystem type
 - 200 classification groups
 - 100 m spatial resolution
 - Grids modified to indicate inter-group similarities
- Zonation uses a backwards removal routine
 - 3rd order sub-catchment planning units
 - Stepwise removal of planning units contributing the least to conservation outcomes

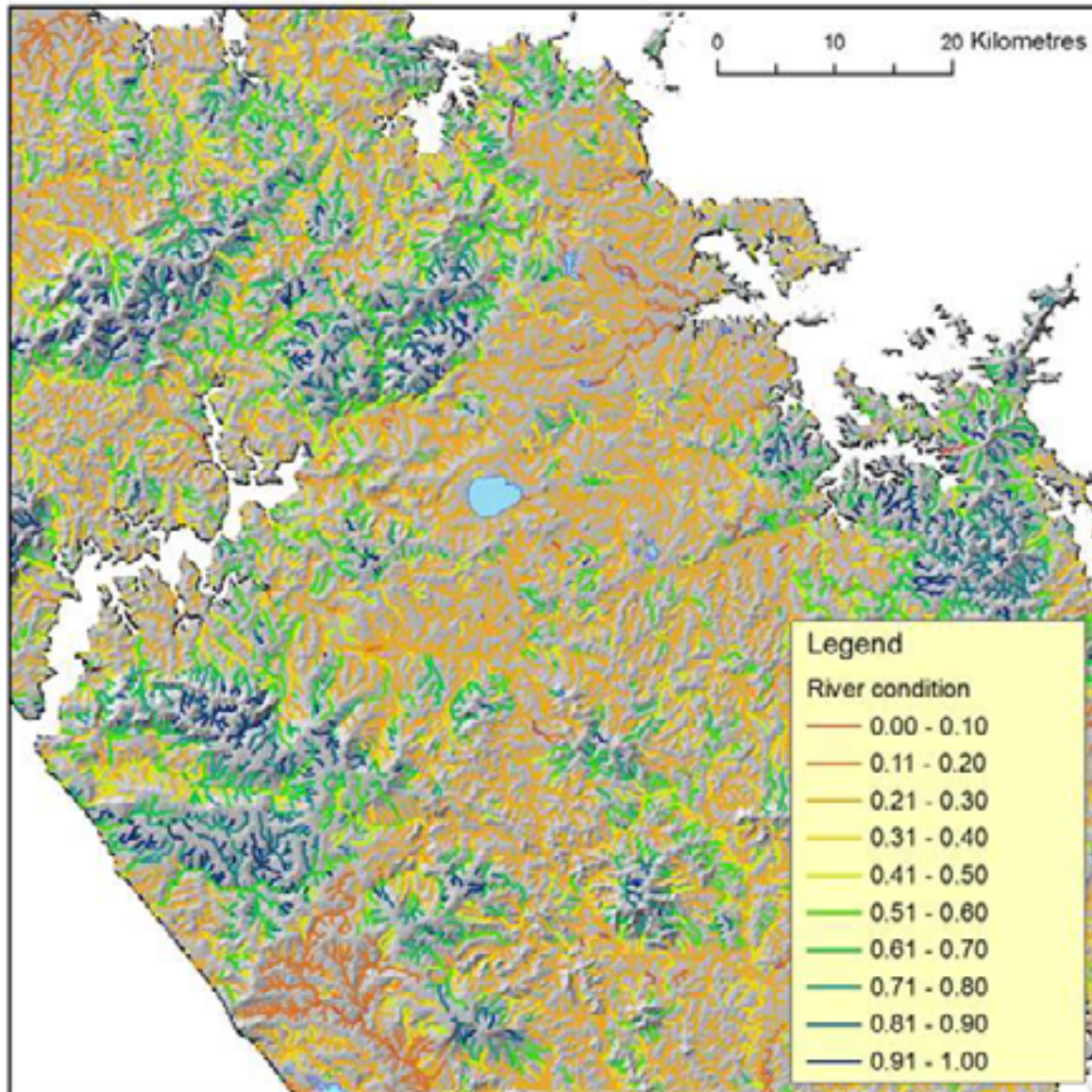
Three ranking analyses...

- ‘National rankings’
 - Used estimates of current condition
 - Applied connectivity constraints
 - Planning unit values decline as upstream or downstream planning units are removed
- ‘Gap analysis rankings’
 - Planning units with >80% formal protection retained until all other units removed
 - Separate rankings outside and within reserves
- ‘Regional rankings’
 - Within 29 regional biogeographic units

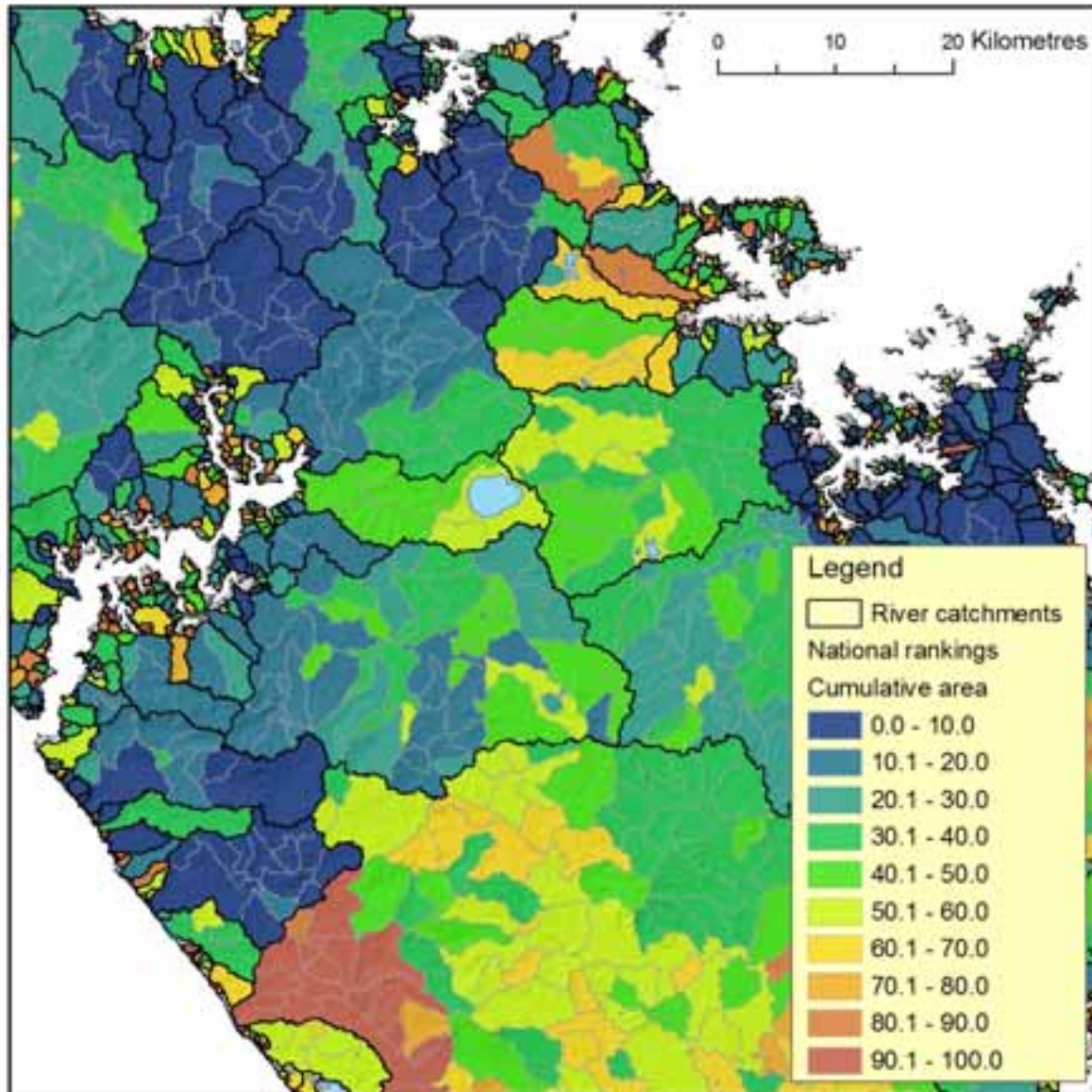
Planning units and reach classification



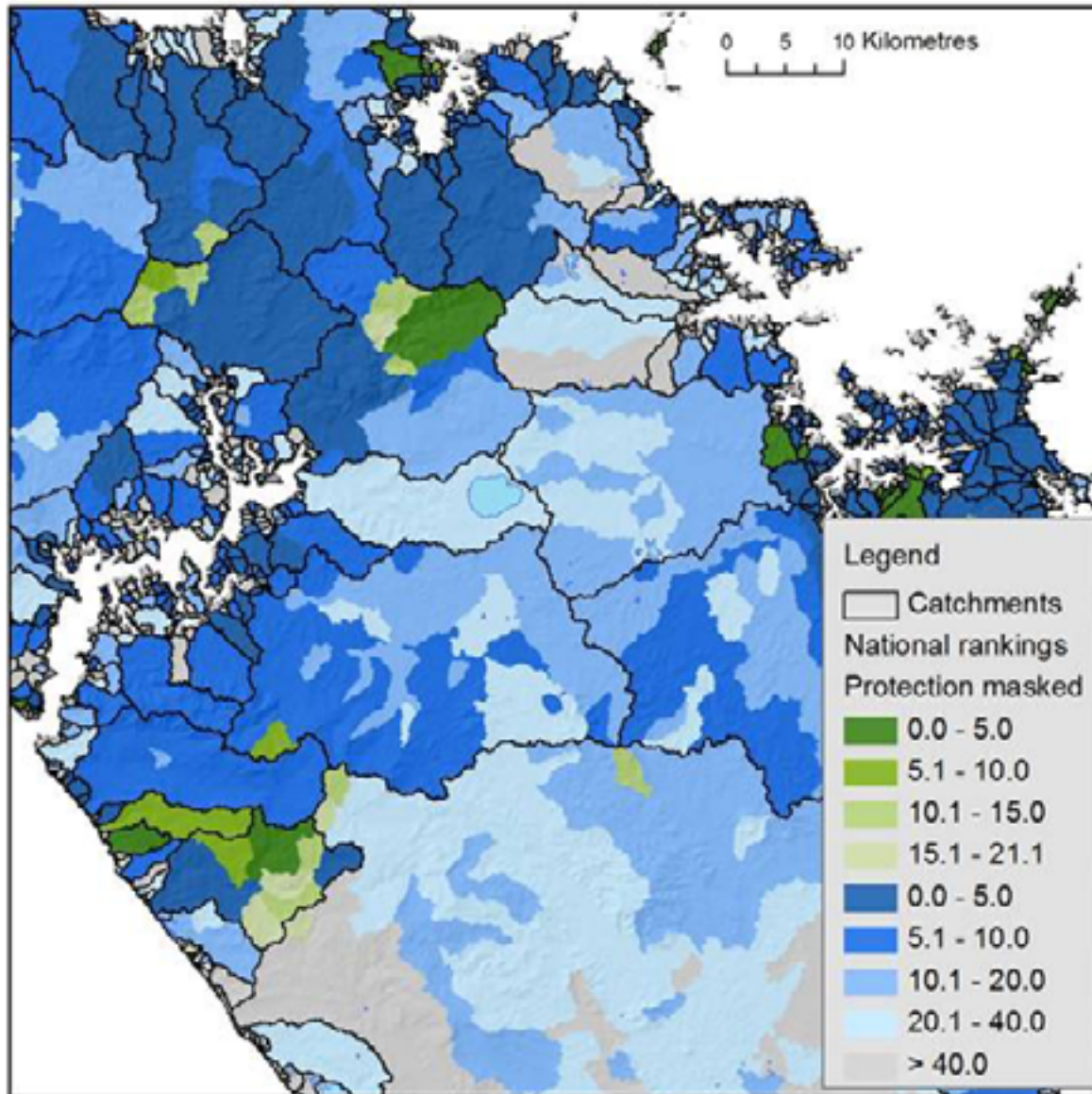
Reach condition



Catchment rankings...



Catchment gap rankings...

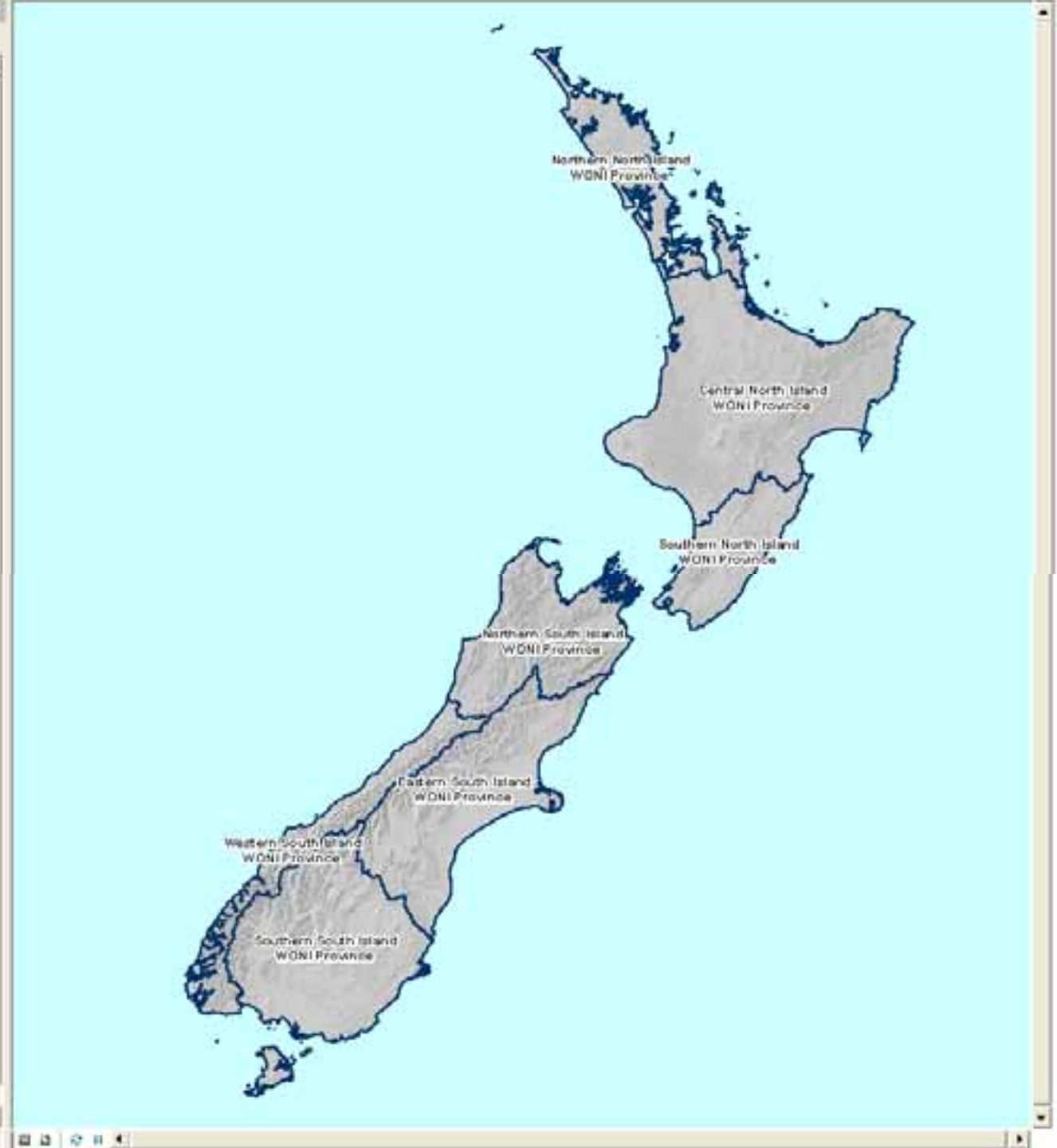


End-user delivery

- Layers for rivers, lakes & wetlands
 - Environmental attributes
 - Biological values
 - Estimated human impacts
 - Classifications
 - Rankings
 - Background features
- Documentation
 - As metadata, user manual, and associated publications



- Freshwater Ecosystems of New Zealand
- Rivers
 - River Prediction
 - River - Environment Predictors
 - River - Fish Predictions
 - Exotic fish
 - Native fish
 - River predicted - Diadromous fish communities
 - A. Banded kokopu - longfin eel - (shortfin)
 - B. Longfin eel - redfin bully - banded kokopu
 - C. Banded kokopu
 - D. Longfin eel - shortfin eel - inanga - con
 - E. Longfin eel - redfin bully - torrentfish
 - F. Longfin eel - common bully - (smelt)
 - G. Shortfin eel
 - H. Longfin eel
 - I. Koaro
 - J. Common bully
 - Diadromous largely lacking
 - River predicted - Galaxias spp
 - River predicted - Gobiomorphus spp
 - River predicted - Other native spp
 - River - Macro-invertebrate Predictions
 - River Classification
 - River and stream classification level 1 (20 groups)
 - River and stream classification level 2 (100 groups)
 - River and stream classification level 3 (200 groups)
 - River and stream classification level 4 (300 groups)
 - River Condition & Pressures
 - River and stream pressures - SumMinimum
 - River and stream pressures - natural cover
 - River Ranking
 - River rankings - regional ranks
 - River rankings - regional accumulation
 - River rankings - national ranks
 - River rankings - national accumulation
 - River rankings (protect needed) - national accum
 - River PLU geographic protection
 - River PLU ecosystem protection
 - River PLU average condition
 - River Catchments
 - River planning units - 3rd order
 - River planning units - 4th order
 - River planning units - 5th order
 - River catchments
 - Lakes
 - Wetlands
 - Boundaries
 - Background



Progressive release...

- Starting with development partners
 - Training sessions for end-users
 - A paradigm shift for non-GIS users!
- Subsequent release to other central and regional government agencies
- Now beginning to work more widely
 - Forestry companies, agricultural, hydro generation, conservation groups etc.

Acknowledgements...

- Innumerable colleagues...
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Any questions?

