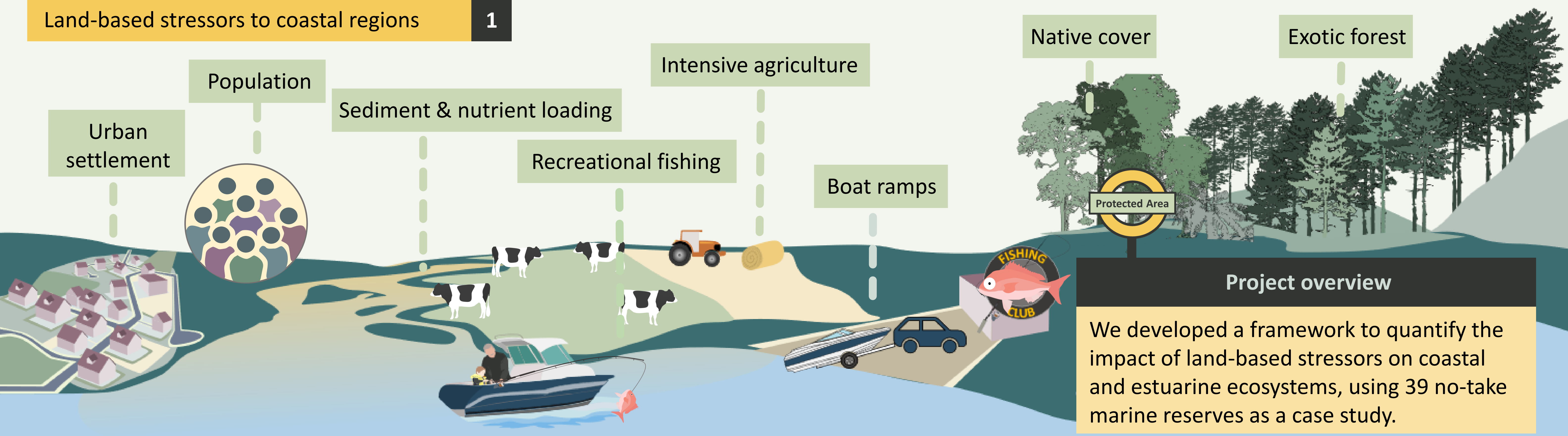


A Framework for Evaluating Cumulative Effects from Land-Based Sources on Coastal and Estuarine Ecosystems

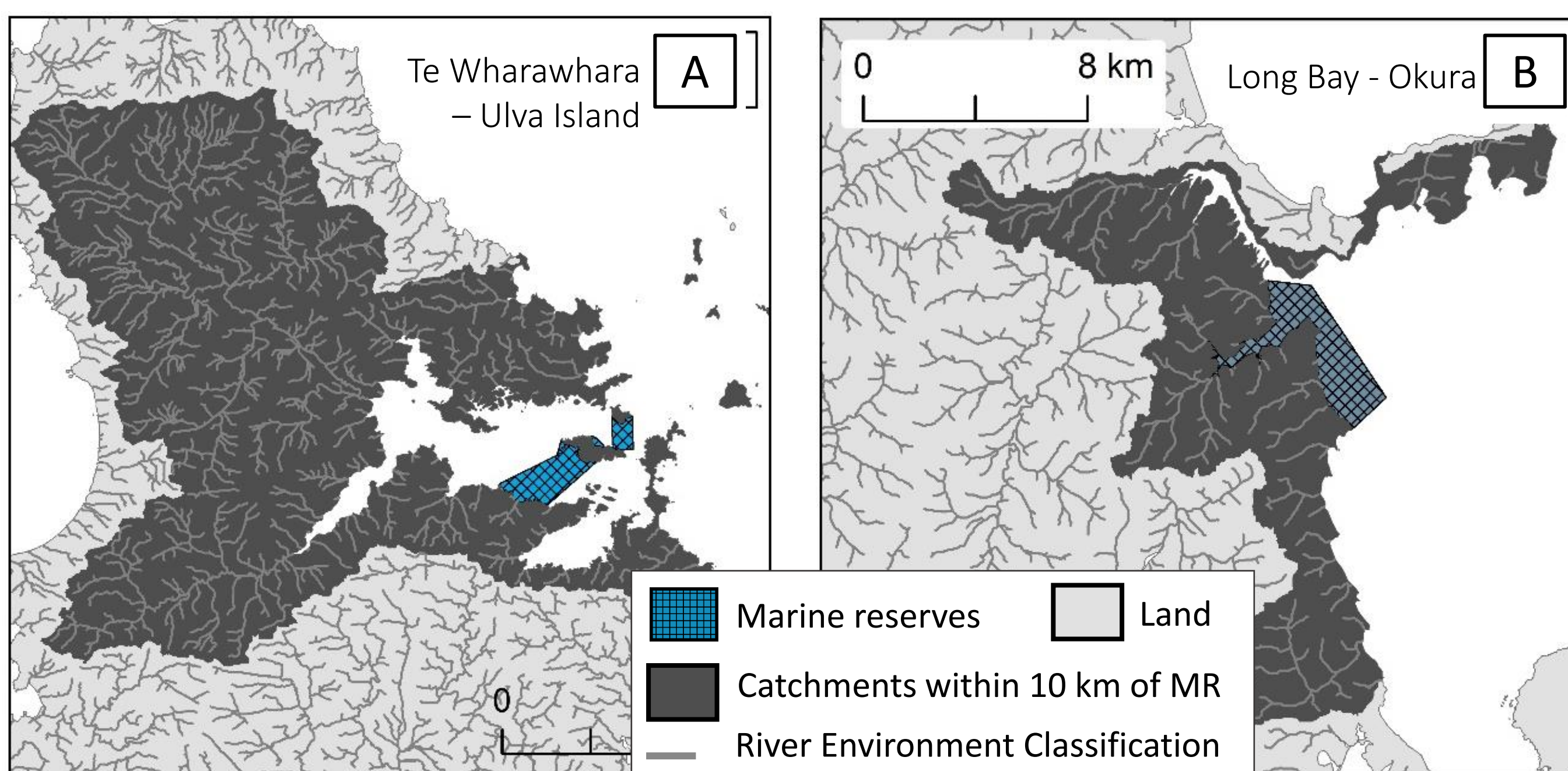
Katie M Cook¹, Elsa Roumégous¹, Shane Geange², Fabrice Stephenson¹, Carolyn J. Lundquist^{1,3}

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Land-based stressors to coastal regions 1



Location of Marine Reserves with associated freshwater catchments 2



Catchments within 10 km from MPA boundaries were identified using River Environments Classification (REC2) segments.

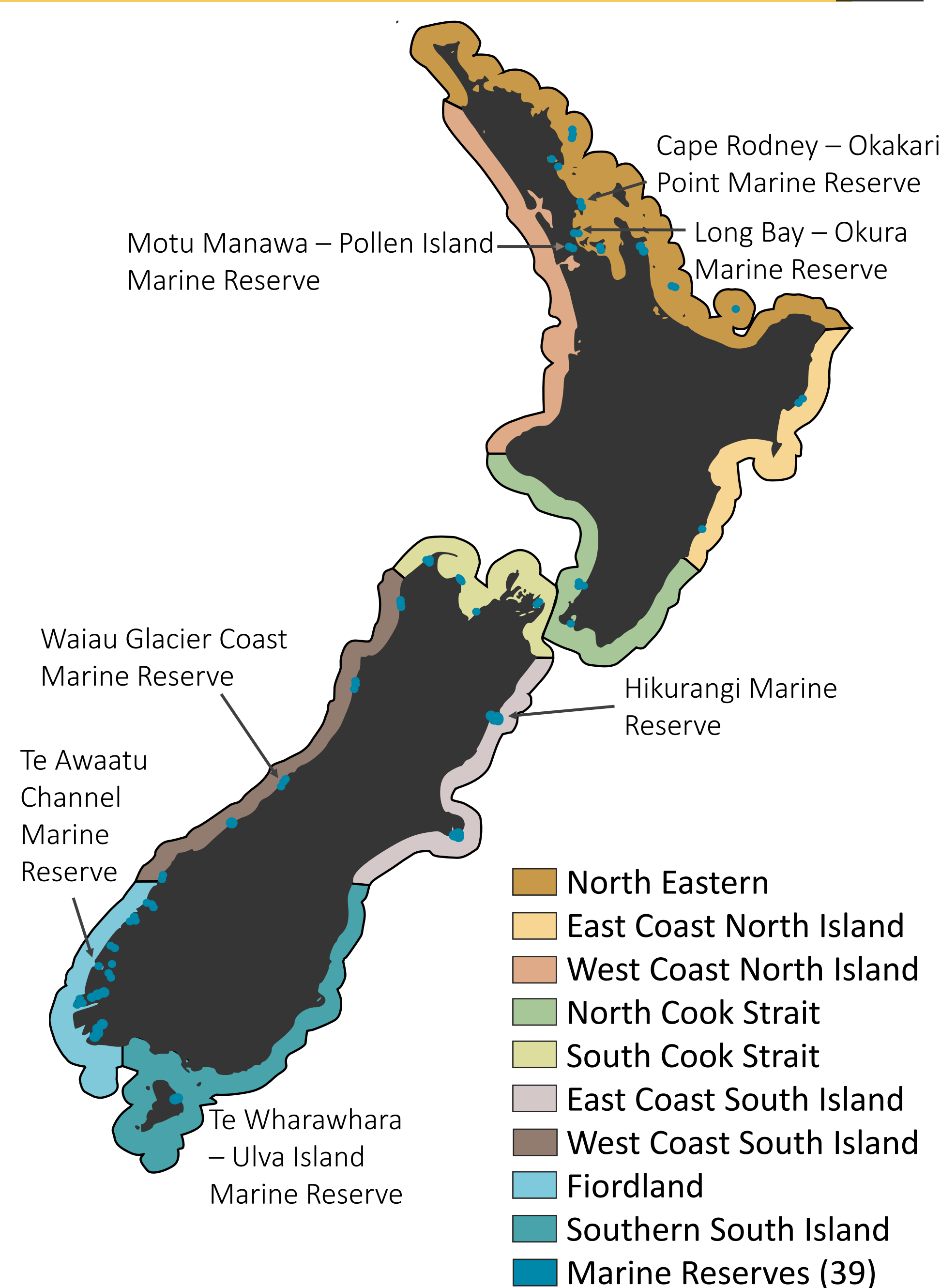
Stressors related to natural and anthropogenic land-uses within catchments were quantified to estimate risks to ecological, socio-cultural, and economic benefits of MPAs.

Spatial analysis 3

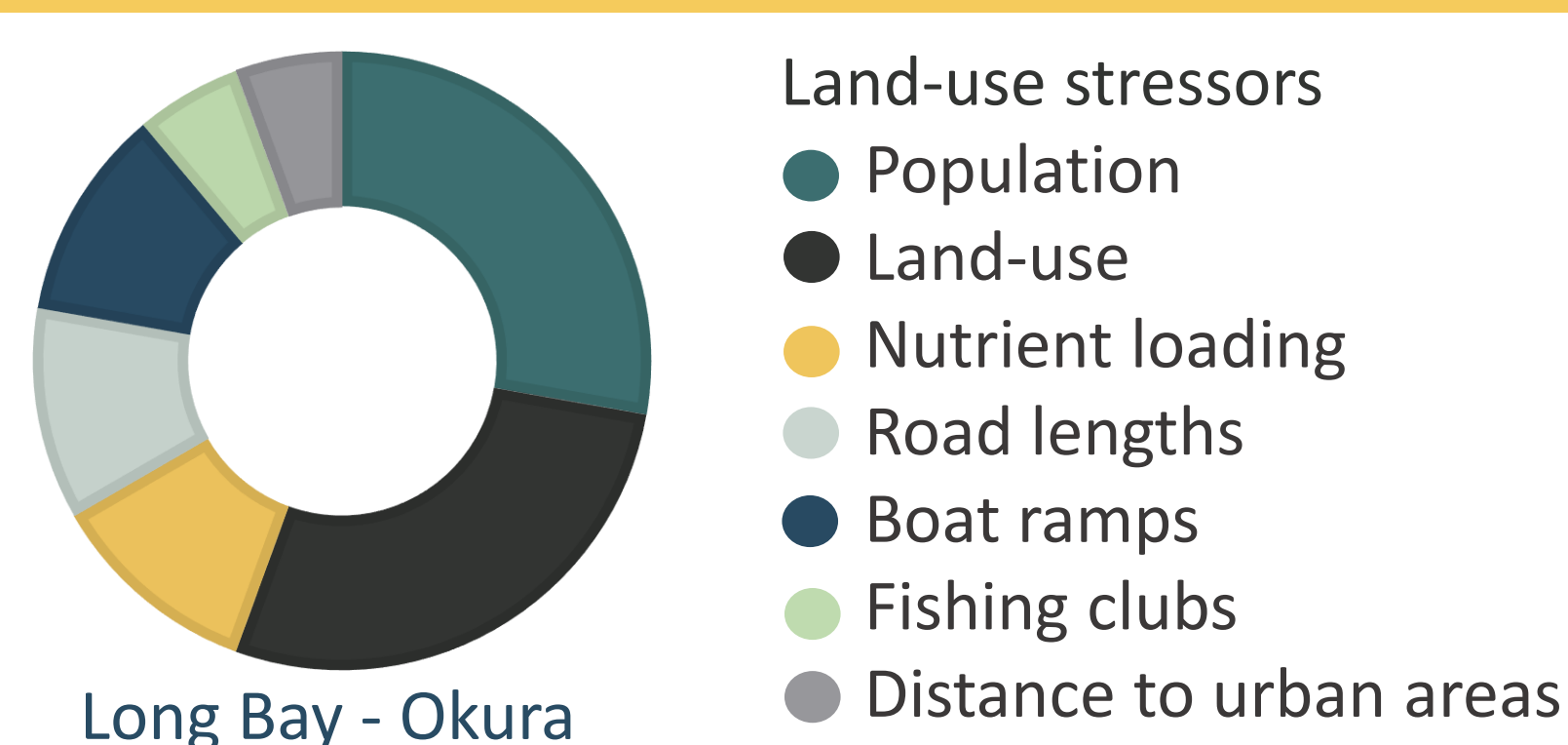
Stressor layers were sourced from a number of national databases.

LUCAS NZ land use (MFE)	12 national land-use classifications
CLUES - Catchment Land Use for Environmental Sustainability model (NIWA)	Annual average nutrient loads (Nitrogen and Phosphorus) for each REC2 river segment
Sediment yield (MFE)	Mean annual suspended sediment loads for REC2 river segments
Electoral population (Meshblock) (Stats NZ)	Human population from 2018 Census data
National Property Land Information System (NaPALIS) (LINZ)	DOC and LINZ administered protected areas
Land covenants (Queen Elizabeth II Trust)	Covenants to protect private land
NZ Roads (LINZ)	Database of national roads
Recreational use database (DOC)	Coastal recreational use and value data, e.g., boat ramps, and fishing clubs
Urban Accessibility Indicator 2022 (Stats NZ)	Degree of urban influence on surrounding rural areas

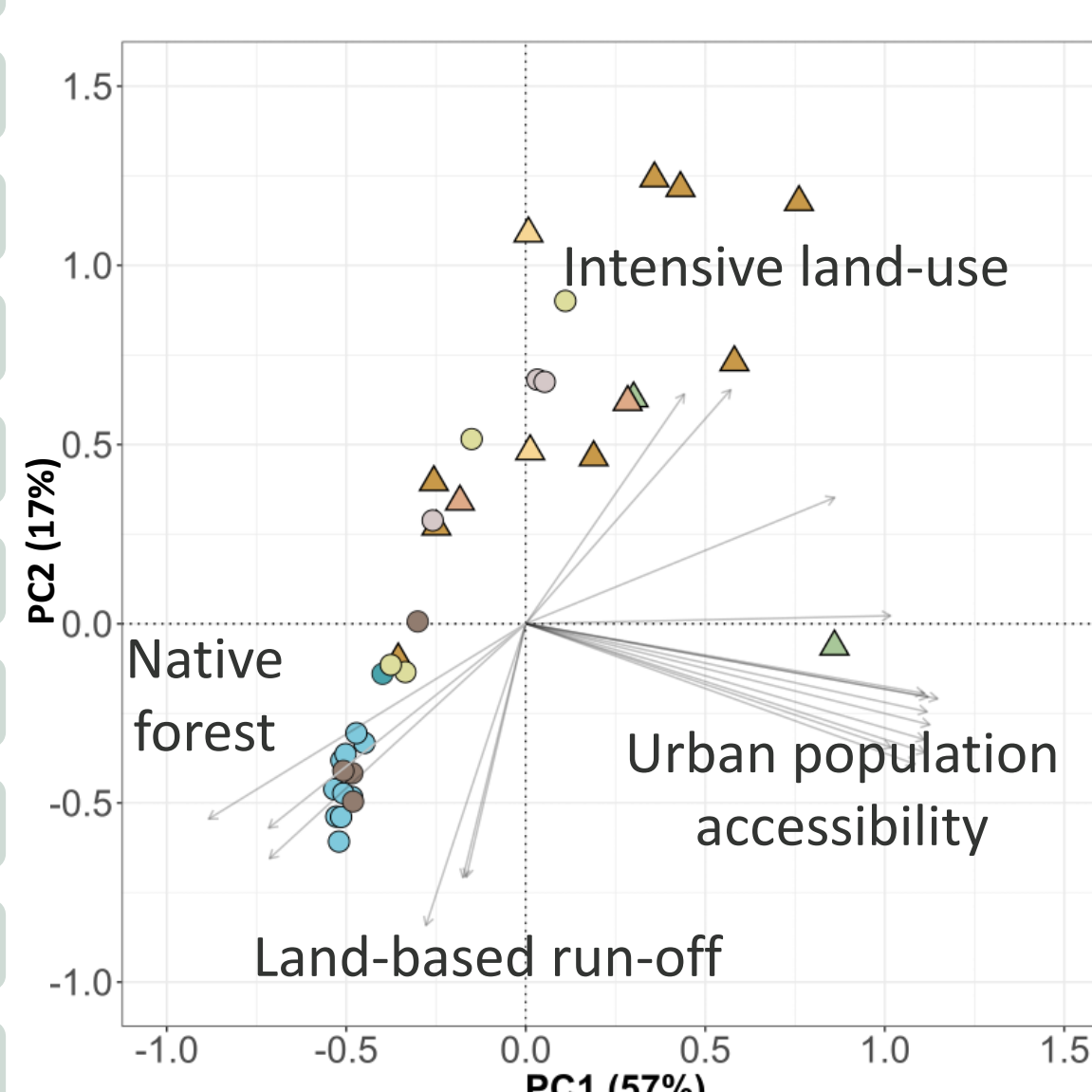
Bioregions Map



Cumulative stressor risks to marine reserves 4

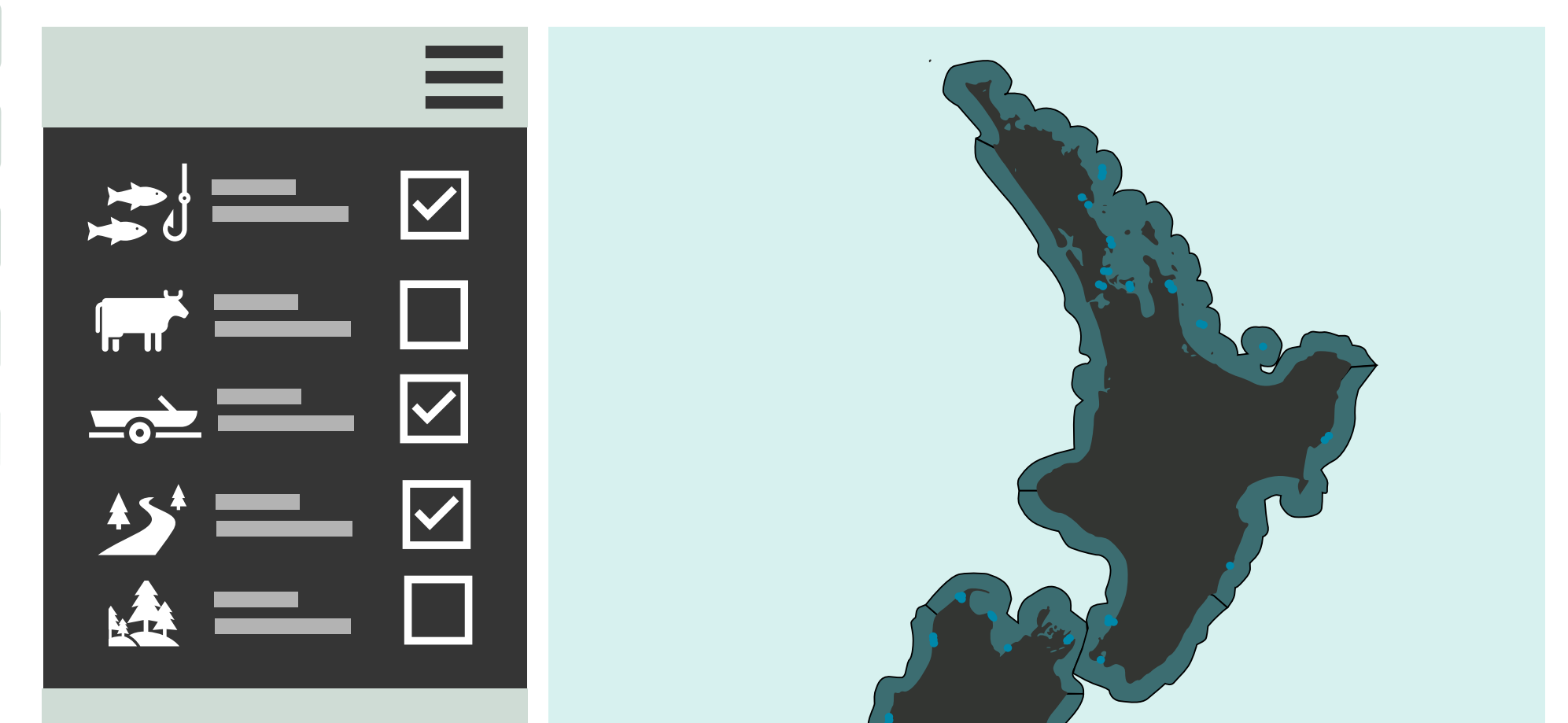


Stressor scores can be used to identify key categories of impacts for each MPA. Three groups of stressors were identified: stressors associated with urban populations, stressors associated with agriculture and forestry, and stressors from sediment and nutrient loading.



Biogeographic patterns in stressors are evident, e.g., Fiordland reserves associated with native forest cover; North-eastern reserves associated with population accessibility.

Interactive Online Tool 5



Interactive online tool for resource managers, marine spatial planners, iwi/hapū and general public to visualise stressor impact on coastal areas and guide management responses.

Project 1.2: Spatially-explicit cumulative effects tools