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

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# Location of Marine Reserves with associated freshwater catchments





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

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Stressor layers were sourced from a number of national databases.

LUCAS NZ land use	12 national land-use
(MFE)	classifications
<b>CLUES - Catchment Land</b>	Annual average nutrient
Use for Environmental	loads (Nitrogen and
Sustainability model	Phosphorus) for each REC2
(NIWA)	river segment
	Mean annual suspended
Sediment yield (MFE)	sediment loads for REC2
	river segments
<b>Electoral population</b>	Human population from
(Meshblock) (Stats NZ)	2018 Census data
<b>National Property Land</b>	DOC and LINZ
Information System	administered protected
(NaPALIS) (LINZ)	areas
Land covenants (Queen	Covenants to protect
Elizabeth II Trust)	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
<b>Urban Accessibility</b>	Degree of urban influence
	1. 1

estimate risks to ecological, socio-cultural, and economic benefits of MPAs.

# **Bioregions Map**

Motu Manawa – Pollen Island – Marine Reserve

Cape Rodney – Okakari Point Marine Reserve Long Bay – Okura Marine Reserve

Waiau Glacier Coast Marine Reserve

Te Awaatu Channel

Hikurangi Marine Reserve

### Cumulative stressor risks to marine reserves Land-use stressors Population Land-use Nutrient loading Road lengths Boat ramps Fishing clubs Distance to urban areas Long Bay - Okura

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

Indicator 2022 (Stats NZ) on surrounding rural areas

# Interactive Online Tool

 $\checkmark$ 



Marine Reserve e Wharawhara – Ulva Island Marine Reserve

North Eastern East Coast North Island West Coast North Island 0.5<sup>°</sup> North Cook Strait South Cook Strait East Coast South Island West Coast South Island Fiordland Southern South Island Marine Reserves (39)

patterns in stressors Intensive land-use are evident, e.g., Fiordland reserves associated with native forest cover; Native  $\diamond$ North-eastern forest Urban population accessibility reserves associated Land-based run-off with population -1.0 -1.0 -0.5 1.0 1.5 0.5 accessibility. PC1 (57%)

 $\checkmark$  $\checkmark$ 

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** 







Ko ngā moana whakauka

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