KEY: LAND ECOSYSTEMS

1.	D'urville	Coastal ultramafic dominated
2.	Bryant	Inland ultramafic
3.	Cook Strait	Exposed, maritime
4.	Bulwer	Sounds, dry, non foliated to weakly foliated
5.	Arapawa	Sounds, dry, weakly foliated
6.	Portage	Sounds, dry, strongly foliated
7.	Stokes	Sounds, wet, weakly to strongly foliated
8.	Nydia	Sounds, wet, non foliated to weakly foliated
9.	Pelorus	Inland western, wet, non foliated to weakly foliated
10.	Kaituna	Inland eastern, wet, strongly foliated
11.	Robertson	Moist, non foliated to weakly foliated

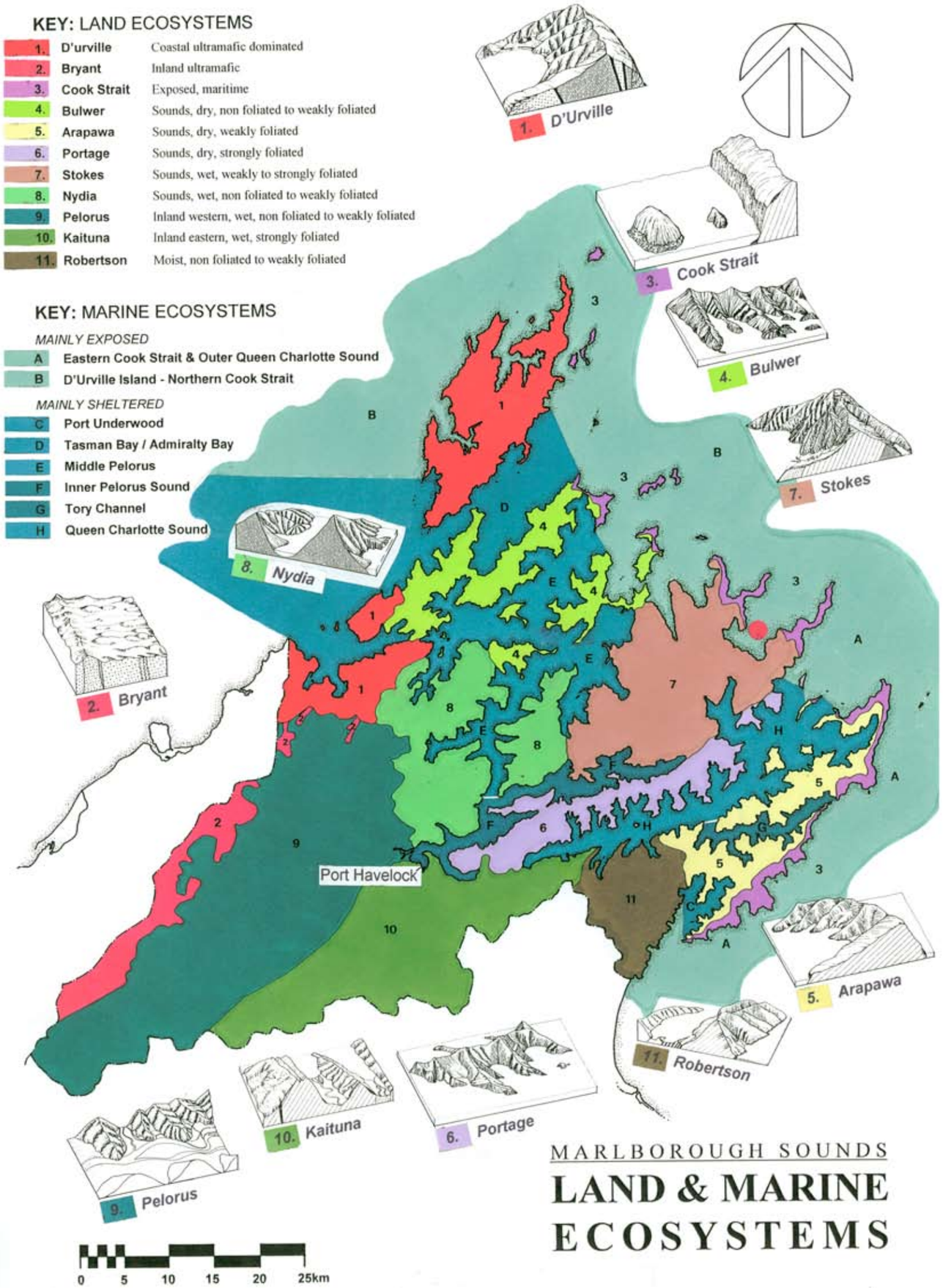
KEY: MARINE ECOSYSTEMS

MAINLY EXPOSED

- A Eastern Cook Strait & Outer Queen Charlotte Sound
- B D'Urville Island - Northern Cook Strait

MAINLY SHELTERED

- C Port Underwood
- D Tasman Bay / Admiralty Bay
- E Middle Pelorus
- F Inner Pelorus Sound
- G Tory Channel
- H Queen Charlotte Sound



MARLBOROUGH SOUNDS

LAND & MARINE ECOSYSTEMS

LAND ECOSYSTEM SUMMARY

1. D'URVILLE

Hard Beech, Manuka, Weka, Bellbird, Coastal Ultramafic-Dominated ecosystem

Steep hills and mountains typify this land ecosystem with bluffy sea cliffs and headlands in places. At sea level lie large drowned river valley harbours featuring along their land-sea margins a varied array of coastal landforms such as inlets, spits, estuaries, beaches, lagoons and minor fans. Elevation is moderately low but rainfall moderately high in places as the landmass is being constantly buffeted on all fronts by the sea, has a strong maritime influence and is subject to frequent sea storms. Base rocks eventuate from deep within the earth's mantle, often erupting through the surface as dykes and sills. Some of the soils lack many essential nutrients and have toxic concentrations of trace elements creating generally inhospitable conditions resulting in unusual vegetation, Many streams , some quite large, and extensive tracts of native vegetation.

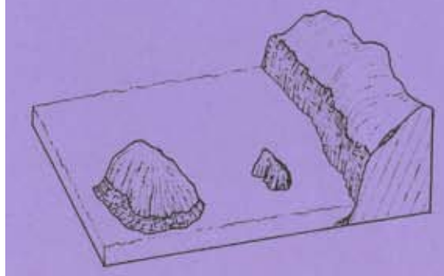
2. BRYANT

Pahautea, Southern Rata, Mountain Beech, Rifleman, Tit, Inland Ultramafic Ecosystem

Only the mountain summit crestline and eastern slopes of this range plus a few isolated chunks of faulted blocks of nutrient-poor, mineral-rich, mantle rocks nearby make up this system. On the mid to upper slopes, an uneven hummocky character caused by mass earthflows is prominent with numerous rocky outcrops as the bones of the earth poke through. Elevation is high and the climate wet with no maritime influence but exposed conditions on the tops. The poor-nutrient soils with high concentrations of trace elements has allowed unique stunted vegetation to evolve; still mostly intact in its natural state.

3. COOK STRAIT

Taupata, Ngaio, Rengarenga, Tuatara, Diving Petrel, Exposed, Dry, Maritime Ecosystem



Highly exposed maritime land ecosystem. High coherence of cliff face landforms with a collection of jagged stacks and harsh rocky islands. Steep, exposed and daunting sea cliffs, peninsulas and headlands. Wild & scenic sea coast Dry climate coupled with small catchment areas and few streams. Elevation is low and rocks are predominantly a range of schists and sedimentary strata. Exposure and maritime influence is extreme. Brutal exposure to the elements has shaped a unique Cook Strait vegetation. The sheer nature and the topography and inaccessibility has left some areas, especially islands, predominantly in a natural state. High aesthetic coherence of pastoral landcover. A number of island sanctuaries (Stephens, Chetwodes, Titi & Brothers Islands). Stephens Island tuatara. King Shag stack roosts. Many rare species.

4. BULWER

Kohekohe, Whararikí, Blue Penguin, Western Sounds, Dry, Non To Weakly Schistose Ecosystem

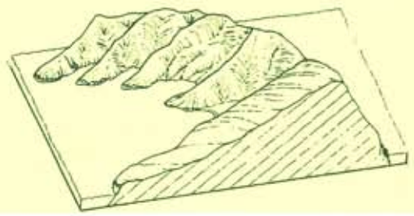
Steepish dissected, climatically dry coastal hill slopes stretch fingers at random into the sea, forming many bays and coves, the landmass itself being the most submerged of the Marlborough land ecosystems. Inside these splayed fingers the sea abuts the land abruptly, with few beaches. Rocks are sedimentary and weakly developed schist. Maritime influence and exposure is high, elevation generally low. Fragmented vegetation patterns, with much scrubland.

Marlborough Sounds Land Types

Marlborough Region & District

5. ARAPAWA

Tauhinu, Black Beech, Fluttering Shearwater, *Powelliphanta 'bicolor'*, Eastern Sounds, Dry, Weakly Schistose Ecosystem



Steep to moderately steep dry dissected coastal hill slopes are a feature of this land ecosystem with several islands, a highly indented coast, and confined coastal inlets, beaches and undulating to rolling prograding inlet heads and minor fans filling the valley floors. Baserock is weakly developed schist with minor sedimentary layers, with a valley overlay of alluvium in places. Exposure and maritime influence is generally high due to the landmass being surrounded by sea, the elevation low. Fragmented vegetation patterns, with much scrubland.

6. PORTAGE

Kanuka, Rewarewa, Pipipi, Sounds, Dry, Strongly Schistose Ecosystem

A strongly dissected long low ridge with many bays forming a gnarled finger separates two water bodies. Rocks are strongly schistose and slopes steep. Both maritime influence and rainfall are moderated. Due to the excessively drowned nature and low relief of the landmass, flats and gentle slopes are common. Slopes generally merge into the sea sometimes terminating in steep rocky shorelines but not usually with tall cliffs.

7. STOKES

Silver Beech, Stoppy-Stop, *Celmisia macmahonii*, Mohua, Sounds, Wet, Weakly To Strongly Schistose Ecosystem

Very steep to moderately steep, evenly contoured coastal hills and mountain slopes with steep and rolling upper ridge crests and summits feature here and together form the substantial Stokes massif. The coastline is characterised by several large, deeply incised inlets and prominent headlands. At the land-sea interface, confined coastal inlets and undulating to rolling prograding inlet heads are evident with alluvial flats, fans and dunes present. Foliation of schist baserock into layers ranges from weak to strong. There is a great range in height and rainfall gradient from sea level to mountain tops, which are fierce, highly exposed and sometimes covered in snow. Overall, the influence of the sea is generally high as it surrounds the landmass.

8. NYDIA

Red Beech, Supplejack, Filmy Ferns, Kakariki, Inner Sounds, Wet, Non To Weakly Schistose Ecosystem

Steep to moderately steep terrain is typical of this system with slopes plunging at similar angles into the sea. Small inlets and bays nestle within a range of fine fingers and broad headlands. Within these sheltered valleys lie fans and wetlands accumulating on the alluvium washed down from the non-schistose sedimentary strata and weakly developed schists. Elevation here is moderately high with high rainfall at the tops. Being Inner Sounds, it is relatively sheltered and enjoys a moderate maritime influence. Original forest covers much of the northern part of the ecosystem.

9. PELORUS

Kahikatea, Rimu, Beeches, Alpine Tussocks, Kaka, Robin, Inland Western, Wet, Non To Weakly Schistose Ecosystem

A collection of massive mountains, very steep dissected hills and large valley systems are the predominant feature of this land ecosystem. Sedimentary strata and weakly developed schists make up the very steep to moderately steep inland hills and mountains with substantial amounts of colluvium and alluvium coating the lower slopes and valley floors. The narrow floodplains between the ranges having had a constant progression of river courses snaking across the surface have built up a series of sinuous undulating terraces with layers of fans building up on the surface, themselves being cut into by subsequent rivers and streams. Towards the sea, narrow tidal flats mix the fresh and saline waters, deltas trying to constantly claim land back from the sea. Elevation is generally high and rainfall very high with snow on the tops in winter and the valley floors exhibiting extreme bitter frosts; there is very little maritime influence. Extensive forest tracts.

10. KAITUNA

Papauma, Kamahi, Karearea, Inland Eastern Moist to Wet, Strongly Schistose Ecosystem.

Immense, broad, steep to moderately steep mountainous schist slabs with even contours and regular, minimally dissected structure are a dominant feature of this system. The grain of the land is moderately to strongly schistose with material being transported downwards as colluvium and alluvium, in some areas building up an ever-coalescing series of fans between the spurs. Elevation is high with an associated high rainfall. As the landmass only just touches the sea, the moderating effect of the sea on climate is minor. Snow is often found on these ranges and there are inhospitable frosts in the main valleys during winter. At the point where the land briefly merges with the warm waters, tidal flats and deltas provide a tentative interface and further up the valleys series of terraces remain as a legacy from the meandering rivers. Forests clothing upper slopes and ridges.

11. ROBERTSON

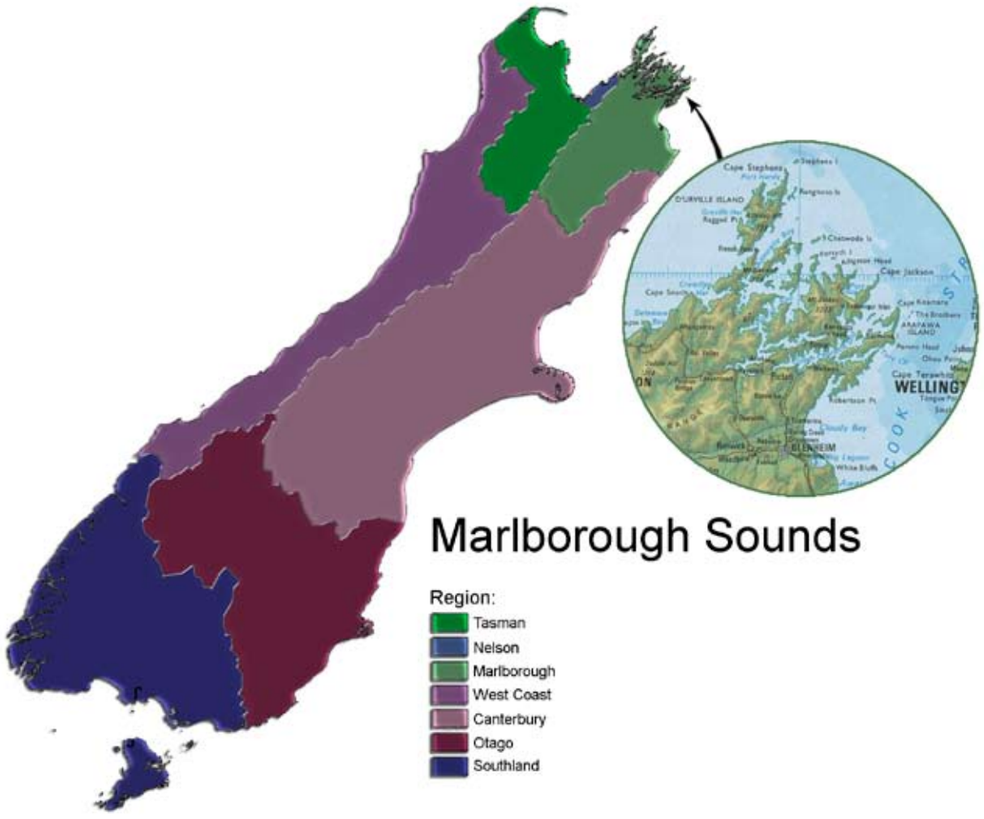
Mamaku, Horopito, Ruru, Moist, Non to Weakly Schistose Ecosystem

Very steep to moderately steep schist lumps, with a minor sedimentary contribution to the layering, comprise the hill and mountain building blocks of this land ecosystem. The rock structure is either non or only weakly schistose with colluvium and alluvium merging on the lower slopes and valley floors. Between the broad shoulders of the land lie a series of coastline fans and inlet heads particularly indented. Elevation is fairly high with a moderate rainfall and overall, only a moderate maritime influence. High exposure and infrequent snow fall around the tops. Large forest tracts on mountain flanks.

Marlborough Sounds Land Types

Marlborough Region & District

Cook Strait



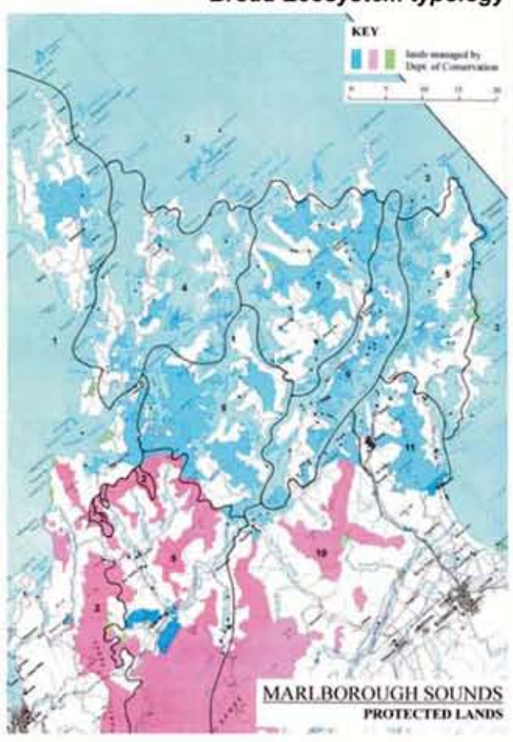
Cook Strait Land Type

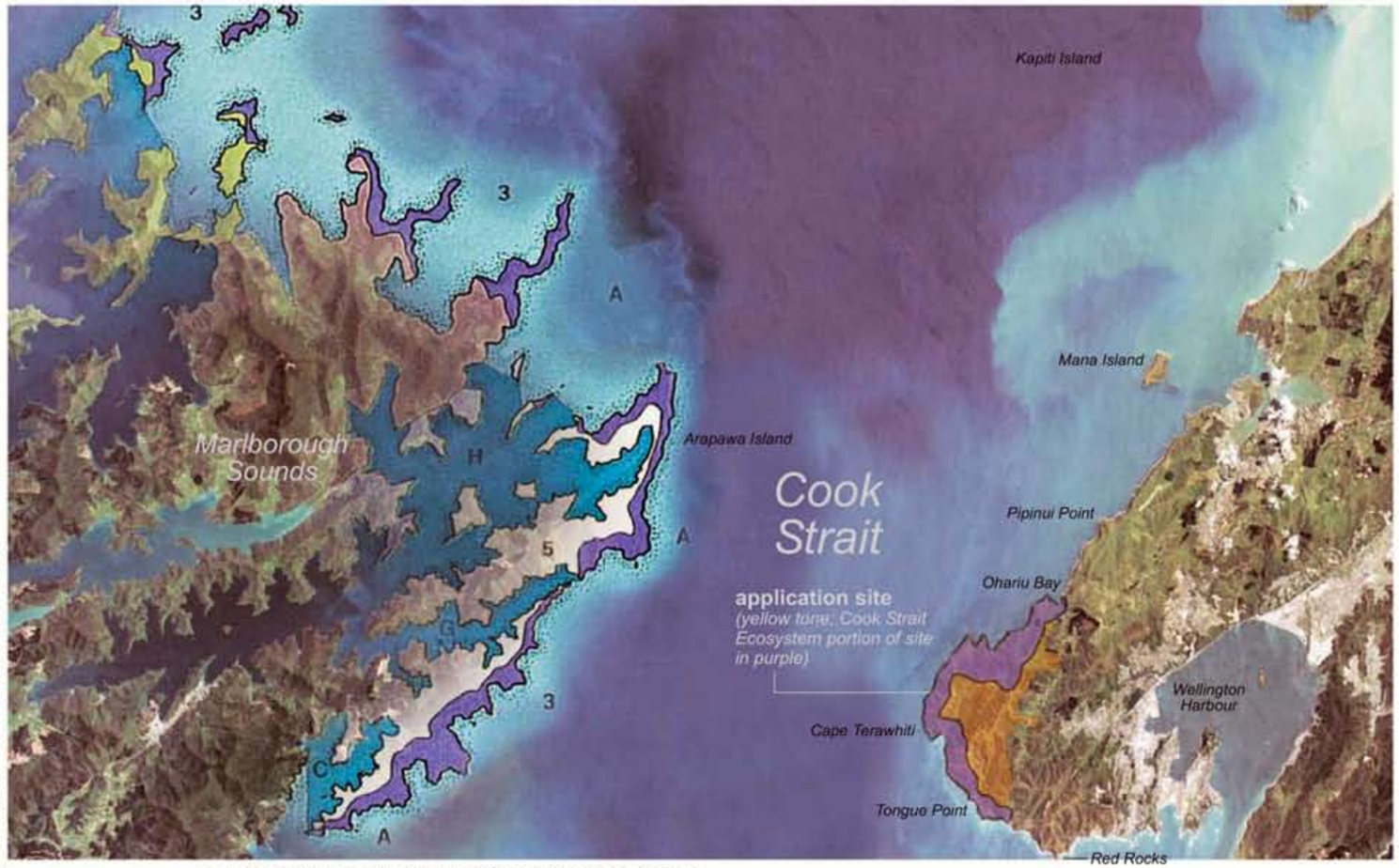
Looking toward Port Gore Stokes Land Type right and Queen Charlotte Sound (Totaranui) Portage Land Type left

from The Natural Character of the Marlborough Sounds: land and marine ecosystems
for the Department of Conservation and the Marlborough District Council, 1997.

A Natural Character Framework for the Marlborough Sounds. Department of Conservation 2004

Broad Ecosystem typology



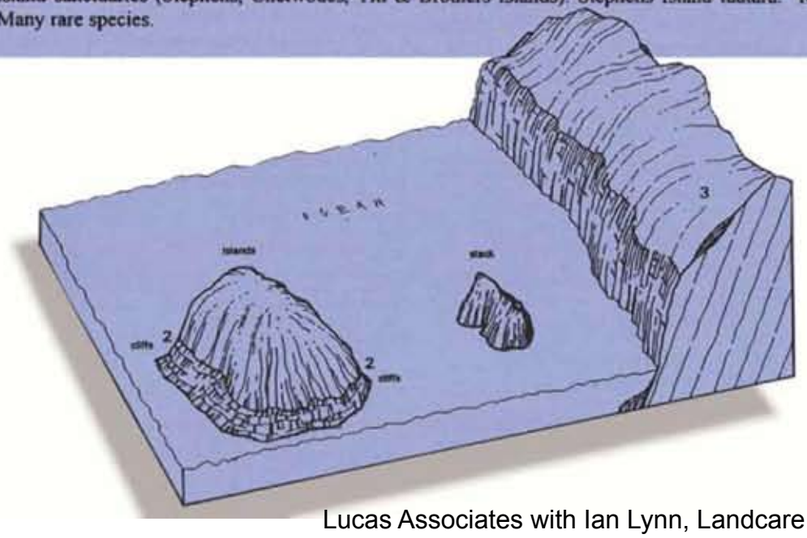


► ***refined at a more detailed level*** *(above & below)*

3. COOK STRAIT

Taupata, Ngaio, Rengarenga, Tuatara, Diving Petrel, Exposed, Dry, Maritime Ecosystem

Highly exposed maritime land ecosystem. High coherence of cliff face landforms with a collection of jagged stacks and harsh rocky islands. Steep, exposed and daunting sea cliffs, peninsulas and headlands. Wild & scenic sea coast Dry climate coupled with small catchment areas and few streams. Elevation is low and rocks are predominantly a range of schists and sedimentary strata. Exposure and maritime influence is extreme. Brutal exposure to the elements has shaped a unique Cook Strait vegetation. The sheer nature and the topography and inaccessibility has left some areas, especially islands, predominantly in a natural state. High aesthetic coherence of pastoral landcover. A number of island sanctuaries (Stephens, Chetwodes, Titi & Brothers Islands). Stephens Island tuatara. King Shag stack roosts. Many rare species.



Marlborough Region & District
Cook Strait

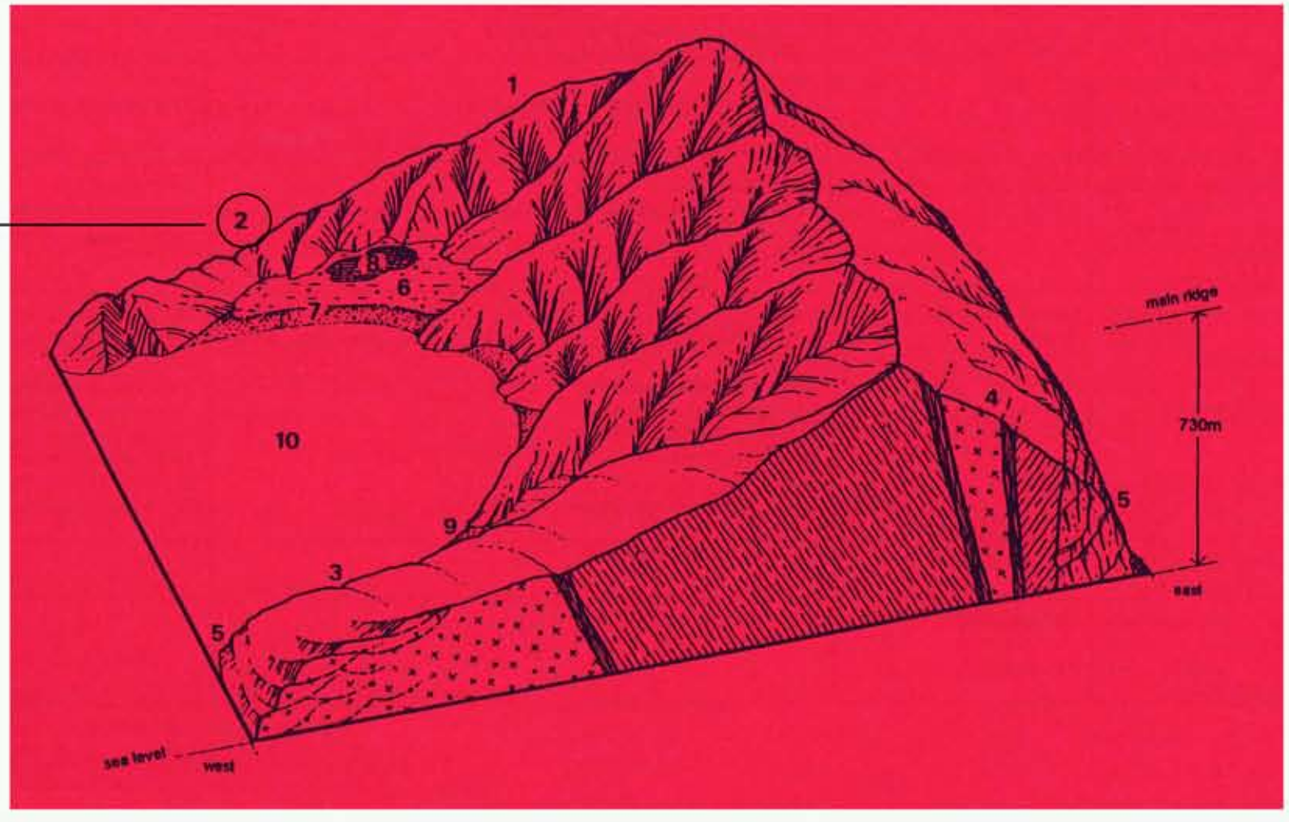
Land types *(extract from "Marlborough Sounds Land & Marine Ecosystems", Lucas Associates, 1997.)*

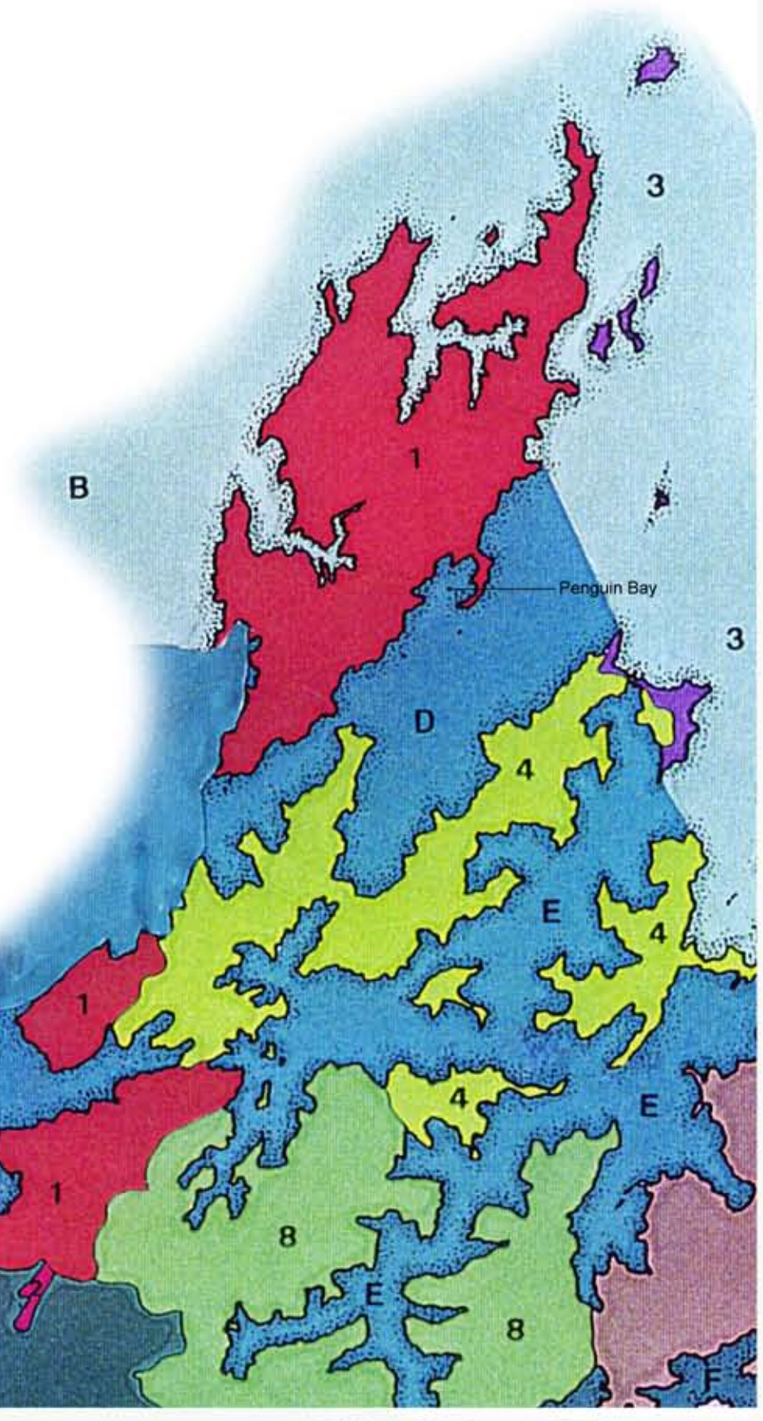
Marlborough Region & District D'Urville

1. D'Urville Land Ecosystem

Hard Beech, Manuka, Weka, Bellbird, Coastal Ultramafic-Dominated Ecosystem

Indigenous vegetation and landforms			
landform units	**geology**	**remnant native vegetation**	**past and potential native vegetation**
2. moderately steep to steep lower hill slopes on sedimentary rocks 0-500m. elevation	sandstone and siltstone of Rai and Greville Formations	**Forest** Kohekohe-karaka forest Kohekohe-tawa-nikau forest Mahoe-mixed broadleaf forest Hard beech forest with kamahi; hinau, tanekaha in places and scattered emergent rimu. Pukatea-mahoe, nikau-supplejack-mixed broadleaf forest. Kanuka forest with ponga, fivefinger, mingimingi, *Gahania*, heketara **Scrub** Rewarewa-manuka scrub Manuka scrub **Vineland** Nikau-kiekie-vineland	**Forest** Kohekohe-karaka forest kohekohe-tawa-nikau forest Hard beech forest with kamahi, hinau, tanekaha in places and scatter emergent rimu. Pukatea-mahoe-nikau-supplejack-mixed broadleaf forest.





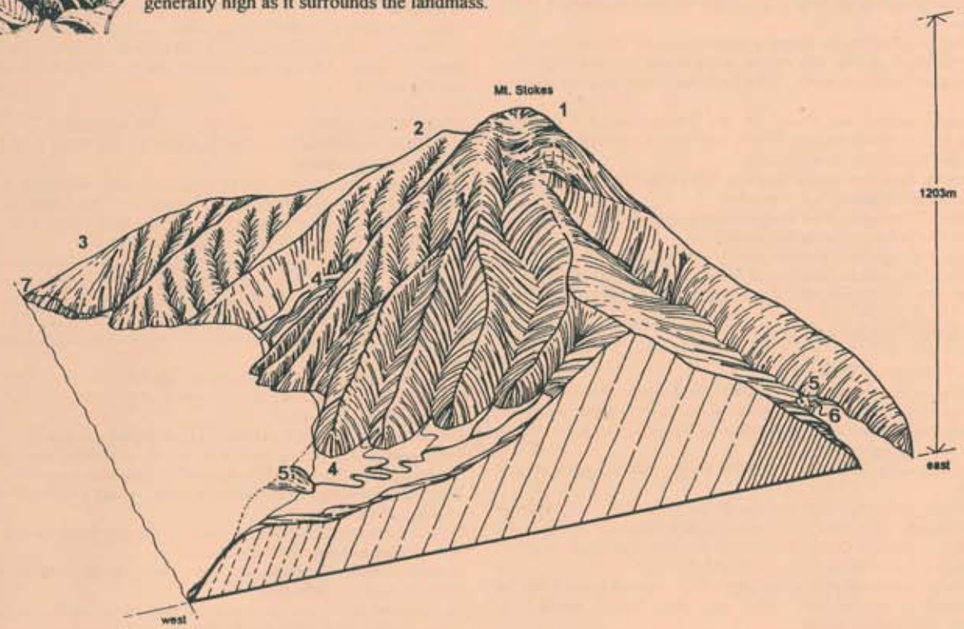
D'Urville Land Ecosystem

source: Marlbourgh Sounds Land and Marine Ecocystems

7. STOKES

Silver Beech, Stoppy-Stop, *Celmisia macmahonii*, Mohua, Sounds, Wet, Weakly To Strongly Schistose Ecosystem

Very steep to moderately steep, evenly contoured coastal hills and mountain slopes with steep and rolling upper ridge crests and summits feature here and together form the substantial Stokes massif. The coastline is characterised by several large, deeply incised inlets and prominent headlands. At the land-sea interface, confined coastal inlets and undulating to rolling prograding inlet heads are evident with alluvial flats, fans and dunes present. Foliation of schist baserock into layers ranges from weak to strong. There is a great range in height and rainfall gradient from sea level to mountain tops, which are fierce, highly exposed and sometimes covered in snow. Overall, the influence of the sea is generally high as it surrounds the landmass.



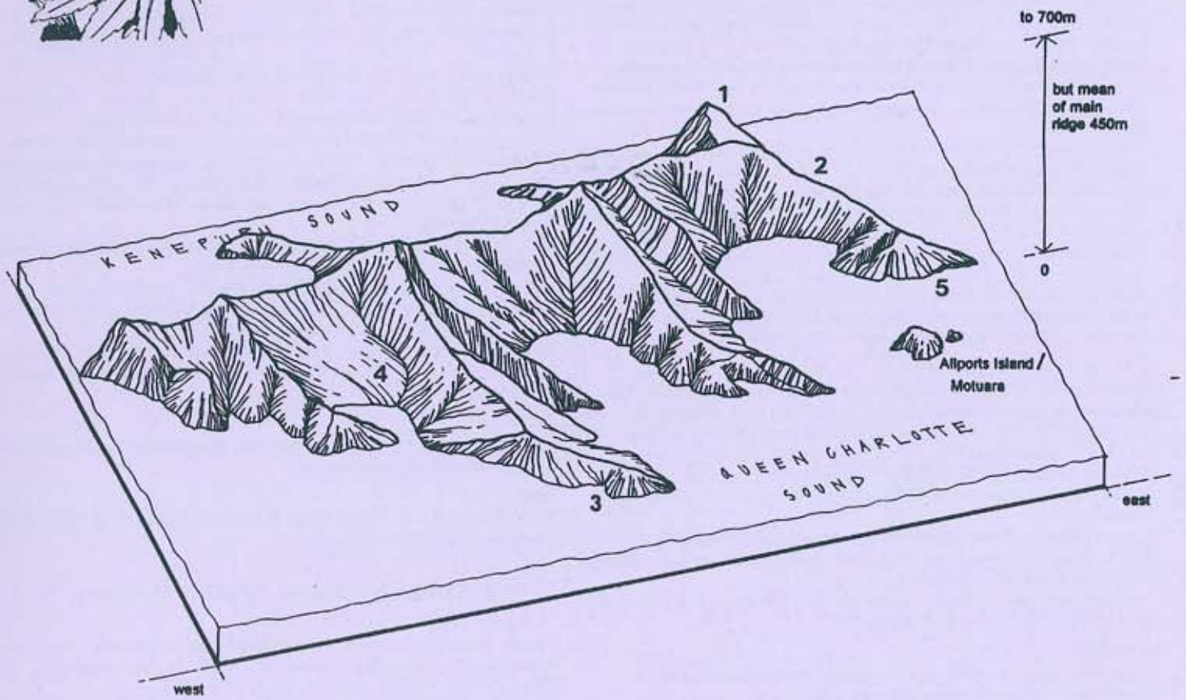
Indigenous vegetation and landforms — 7. STOKES ECOSYSTEM

	landform component	geological formation	remnant native vegetation	past & potential vegetation
1.	**strongly rolling to moderately steep broad mountain summits and upland ridge crests** 1100-1200 m. elevation	siliceous, weakly to strongly developed Marlborough Schist	Shrub-tussock-boulderfield. Shrub-tussock/sedgeland. Shrub-sedge-cushionfield (*Carpha alpina, Donatia n-z, Oreobolus pectinatus*).	**Grassland** Shrub-tussock/sedgeland. Shrub-sedge-cushionfield (*Carpha alpina, Donatia n-z, Oreobolus pectinatus*). Shrub-tussockland.
2.	**steep to very steep upper hill and mountain slopes** 600-1100 m. elevation	siliceous, weakly to strongly developed Marlborough Schist	Horokaka rockland Silver beech forest with leatherwood in places. Silver beech-red beech forest with halls totara, southern rata, toro and toi.	Horokaka rockland **Forest** Silver beech forest with leatherwood in places. Silver beech-red beech forest with halls totara, southern rata, toro and toi.
3.	**moderately steep to steep lower hill slopes** 0-600 m. elevation	siliceous, weakly to strongly developed Marlborough Schist	Rimu/hard beech - toro-kamahi forest with halls totara, miro. Tawa - mixed broadleaf forest. Kohekohe - mixed broadleaf forest. Mixed broadleaf-mamaku forest. Tauhinu - bracken shrubland.	**Forest** ?
4.	**undulating terraces, floodplains, fans and associated wetlands and deltas** [P27/980050, 970098] 0-20 m elevation	recent alluvium from predominantly schistose rocks	(Kahikatea)/tawa - pukatea forest on alluvium. Kanuka forest on alluvium	**Forest** Kahikatea-pukatea-nikau swamp forest. Kahikatea-pukatea-nikau swamp forest.
5.	**minor prograding inlet heads and fans, eg** [P26/980110, 030165] 0-20 m. elevation	recent alluvium from predominantly schistose rocks; minor swamp deposits	Kohekohe-mixed broadleaf forest. Kanuka forest on alluvium. Kaikomako-kahikatea-mahoe-tawa forest. Matai-titoki-tawa forest. Marsh ribbonwood shrubland. Manuka-Carex shrub sedgeland.	**Forest-shrubland** Matai-titoki-tawa forest. Marsh ribbonwood shrubland. Manuka-Carex shrub sedgeland. Kahikatea-matai-totara-tawa-titoki forest.
6.	**beach ridges and dunes, eg** [P26/056202] 0-20 m. elevation	recent marine sand and gravel		Spinifex-pingao duneland.
7.	**minor steep to precipitous eroding sea cliffs.** 0-100 m. elevation	siliceous, weakly to strongly schistose Marlborough Schist	Horokaka rockland. Silver tussock tussock-loamfield. Taupata-whaririki-tauhinu flax-shrubland.	Horokaka rockland. Silver tussock tussock-loamfield. Taupata-whaririki-tauhinu flax-shrubland.

6. PORTAGE

Kanuka, Rewarewa, Pipipi, Sounds, Dry, Strongly Schistose Ecosystem

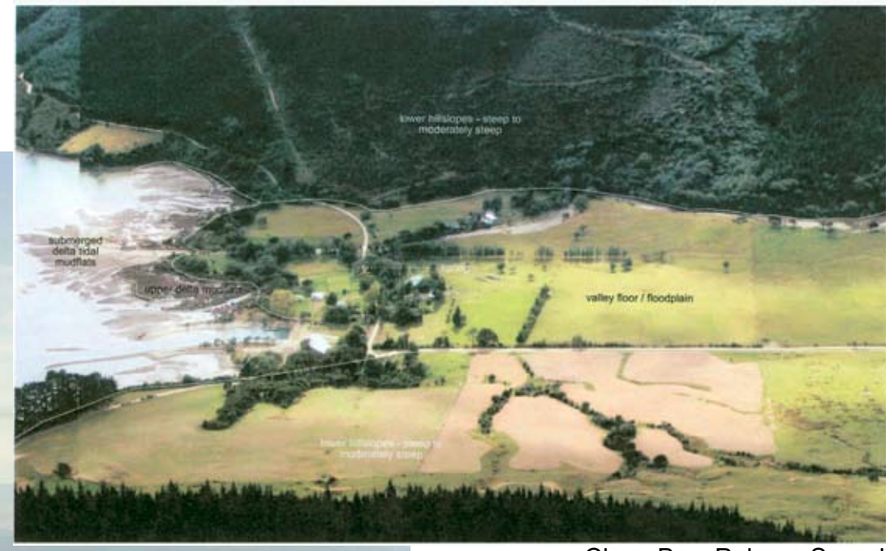
A strongly dissected long low ridge with many bays forming a gnarled finger separates two water bodies. Rocks are strongly schistose and slopes steep. Both maritime influence and rainfall are moderated. Due to the excessively drowned nature and low relief of the landmass, flats and gentle slopes are common. Slopes generally merge into the sea sometimes terminating in steep rocky shorelines but not usually with tall cliffs.



Indigenous vegetation and landforms — 6. PORTAGE ECOSYSTEM

	Landform component	geological formation	remnant native vegetation	past & potential vegetation
1.	**steep to very steep upper hill and mountain slopes, minor component** 600-700 m. elevation	siliceous, strongly developed Marlborough Schist.	Red beech-silver beech-kamahi-mountain totara-southern rata-tree fuchsia forest.	**Forest** Red beech-silver beech-kamahi-mountain totara-southern rata-tree fuchsia forest.
2.	**moderately steep to steep lower hill slopes** 0-600 m. elevation	siliceous, strongly developed Marlborough Schist.	Rimu-kahikatea/tawa-kohekohe-pukatea-nikau-hinau forest. Tawa-mixed broadleaf forest. Hard beech-kamahi-ponga-mingimingi forest on ridges and spurs. Secondary mixed broadleaf mamaku forest (mahoe, kaikomako, rangiora, hketara, mapou, fivefinger, wineberry, putaputaweta, karamu). Tawa-pukatea forest (kohekohe, nikau, kiekie in places). Manuka scrub stands with emergent rewarewa. Kanuka forest	**Forest** Rimu-kahikatea/tawa-kohekohe-pukatea-nikau-hinau forest. Tawa-pukatea forest (with kohekohe, nikau-kiekie in places). Rimu/hard beech-kamahi forest. Rimu-matai-kahikatea tawa pukatea forest.
3.	**moderately steep low broad headlands** 0-50 m. elevation	siliceous, strongly developed Marlborough Schist	Black beech forest.	**Forest** Rimu/black beech forest.
4.	**minor prograding inlet heads, fans, and wetlands** eg [P27/877978, 870935] 0-20 m. elevation	recent alluvium from predominantly schistose rocks, minor swamp and estuarine deposits	Sea rush-jointed rush rushland with marsh ribbonwood.	**Shrubland** Shrub Rushland Sea rush-jointed rush rushland with marsh ribbonwood.
5.	**steep coastal cliffs,** minor component 0-100 m. elevation	siliceous, strongly developed Marlborough Schist	Coastal fringe of rangiora-akiraho-whaririki-akeake shrubland.	**Shrubland** Coastal fringe of rangiora-akiraho-whaririki-akeake shrubland.

Marlborough Region & District Pelorus Sound



Clova Bay, Pelorus Sound

Lucas Associates with Ian Lynn, Landcare Research 2006

6. Portage Land Type

Cullen Point

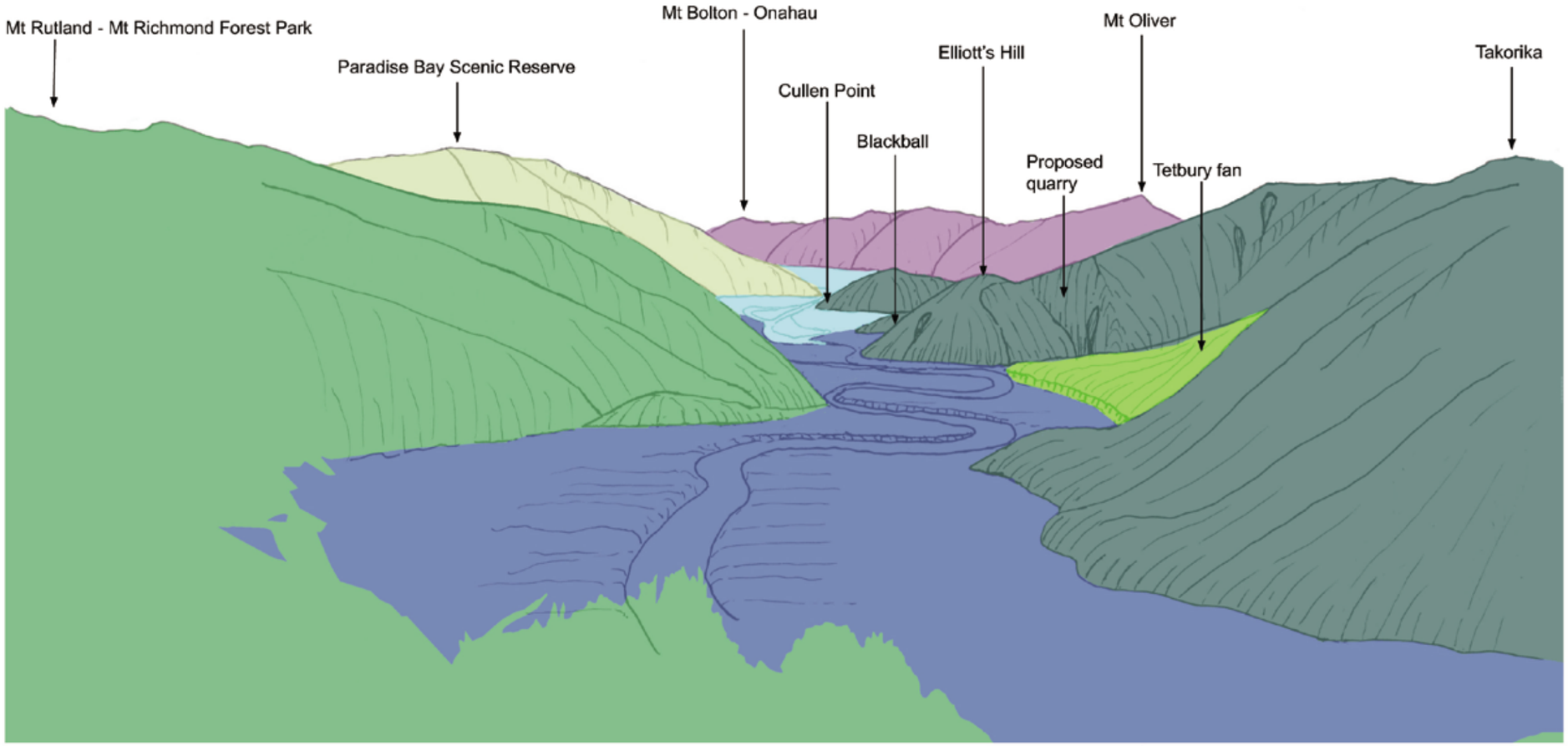
Havelock

10. Kaituna Land Type

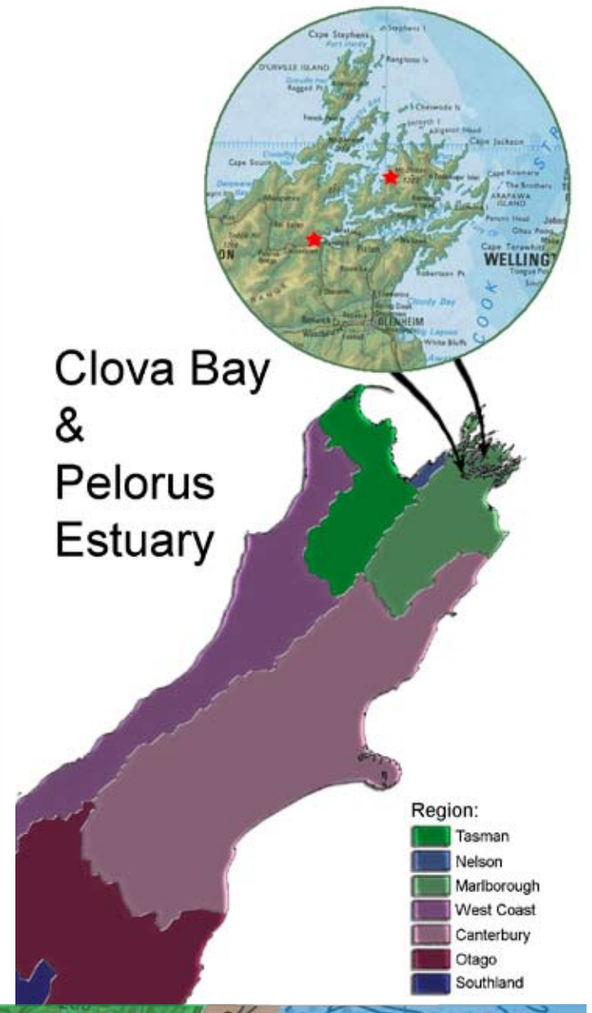
Pelorus Estuary

Elliot's Hill

9. Pelorus Land Type



View north east to Pelorus Estuary & Sound



Land Types & Landform Components

L9 Pelorus:

- 2 Moderately steep to steep lower hill and mountain slopes
- 4 Narrow sinuous floodplain - prograding delta / tidal flat
- 5 Prograding delta / tidal flat

L10 Kaituna:

- 2 Moderately steep to steep lower hill and mountain slope
- 5 (part) Undulating footslope fans

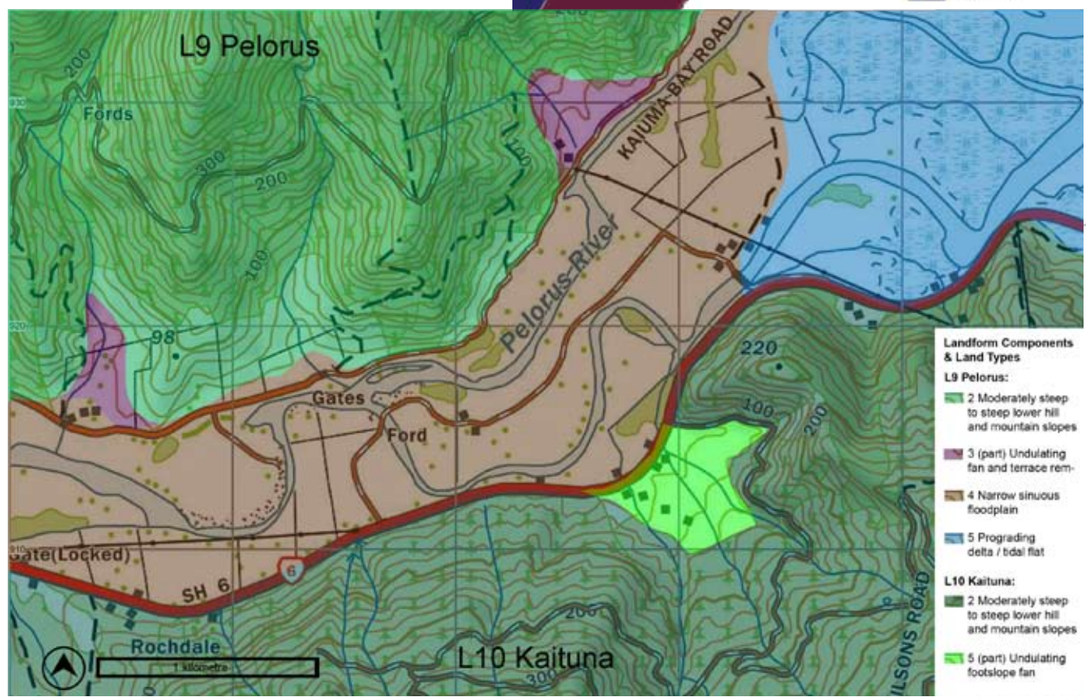
L8 Nydia:

- 2 Moderately steep to steep lower hill and mountain slope

L6 Portage:

- Sounds, dry, strongly foliated land type

Source: Ian H. Lynn, Landcare Research-Manaaki Whenua, 2008.



Marlborough Region & District

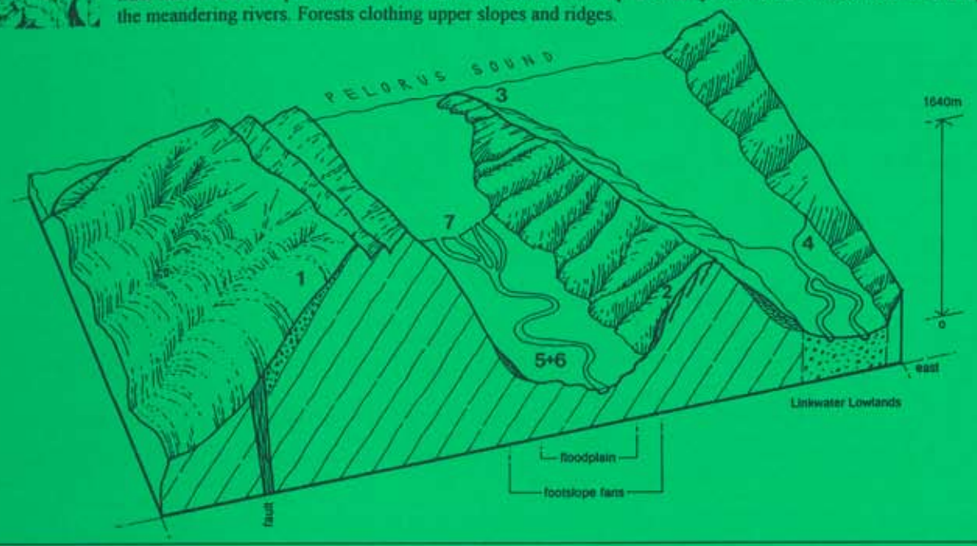
Pelorus Sound

Lucas Associates with Ian Lynn, Landcare Research 2008 **12.4.2**

10. KAITUNA

Papauma, Kamahi, Karearea, Inland Eastern Moist to Wet, Strongly Schistose Ecosystem.

Immense, broad, steep to moderately steep mountainous schist slabs with even contours and regular, minimally dissected structure are a dominant feature of this system. The grain of the land is moderately to strongly schistose with material being transported downwards as colluvium and alluvium, in some areas building up an ever-coalescing series of fans between the spurs. Elevation is high with an associated high rainfall. As the landmass only just touches the sea, the moderating effect of the sea on climate is minor. Snow is often found on these ranges and there are inhospitable frosts in the main valleys during winter. At the point where the land briefly merges with the warm waters, tidal flats and deltas provide a tentative interface and further up the valleys series of terraces remain as a legacy from the meandering rivers. Forests clothing upper slopes and ridges.



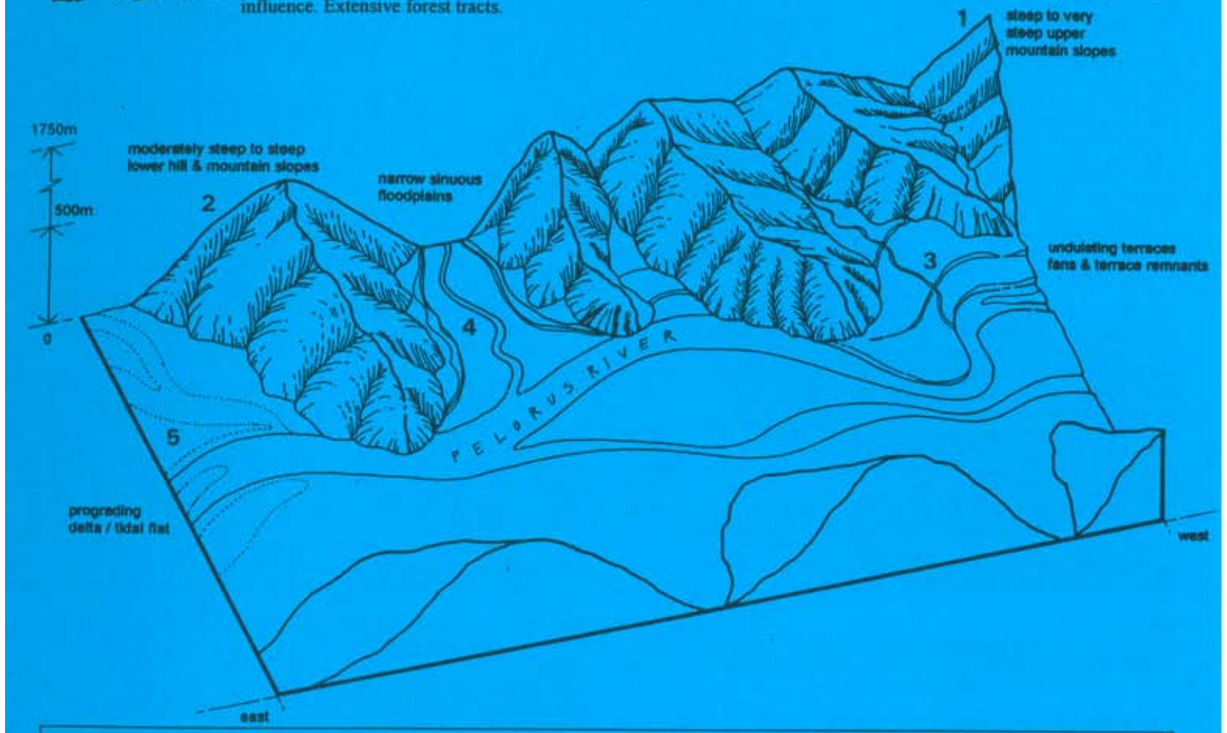
Indigenous vegetation and landforms — **10. KAITUNA ECOSYSTEM**

landform component	geological formation	remnant native vegetation	past & potential native vegetation
1. **steep to very steep upper mountain slopes** (includes some large scale slab failures) 700-1641 m. elevation	siliceous, strongly developed Marlborough Schist	Silver beech forest with *Olearia lacunosa, Chionochloa cheesemanii* (forest snow tussock). Red beech forest with pataputaweta, silver beech, southern rata, mountain totara. Silver beech-red beech forest with mountain totara. Carpet grass turfland (Mt. Fishtail) Mid-ribbed snow tussock (Mt. Fishtail) Alpine herb-rockland (Mt. Fishtail)	**Forest** Silver beech forest with *Olearia lacunosa, Chionochloa cheesemanii* (forest snow tussock). Red beech forest with pataputaweta, silver beech, southern rata, mountain totara. Silver beech-red beech forest with mountain totara. **Alpine Grasslands** Carpet grass turfland (Mt. Fishtail) Mid-ribbed snow tussock (Mt. Fishtail) Alpine herb-rockland (Mt. Fishtail)
2. **moderately steep to steep lower hill and mountain slopes** (includes some large scale slab failures) 0-700 m. elevation	siliceous, strongly developed Marlborough Schist	Hard beech-kamahi-ponga forest with some rimu. Black beech forest with mingimingi, shining karamu. Mixed broadleaf forest mahoe, fivefinger, tree fuchsia, wineberry, pataputaweta. Tawa-titoki-white maire forest. Rimu-black beech forest. Manuka-kanuka scrub. Tawa forest with mixed broadleaf species mainly mahoe. Tauhinu scrub. Silver tussockland.	**Forest** Hard beech-kamahi-ponga forest with some rimu. Rimu-black beech forest.
3. **moderately steep low broad headlands** 0-50 m. elevation	siliceous, strongly developed Marlborough Schist	Black beech-kowhai-akiraho forest (Mahakipawa coastal fringe) Black beech forest with mingimingi, shining karamu.	**Forest** Black beech-kowhai-akirabe forest (Mahakipawa coastal fringe) Rimu-black beech forest.
4. **broad undulating terraces, floodplains and fans** [P27/840900] 0-20 m. elevation	recent and Pleistocene alluvium from predominantly schistose rocks		**Forest** Kahikatea-pukatea swamp maire forest. Kahikatea forest. Matai-totara-mixed broadleaf forest. Harakeke-cabbage tree flax-treeland.
5. **narrow undulating terraces and footslope fans** (Kaituna Valley) 5-120 m. elevation	Pleistocene alluvium from predominantly schistose rocks	Rimu-black beech forest.	**Forest** Rimu-black beech forest. Totara-matai-white maire forest. Kahikatea-matai-tawa forest.
6. **narrow sinuous floodplains** 5-20 m. elevation	recent alluvium from predominantly schistose rocks		**Forest** Kahikatea forest. Lowland ribbonwood-matai-totara-kowhai forest. Kahikatea-matai-tawa forest.
7. **prograding delta / tidal flat** [P27/745910] 0-3 m. elevation	recent alluvial and estuarine deposits	Oioi rushland.	Oioi rushland. Marsh ribbonwood-coastal shrub daisy-coprosma-tauhinu estuarine scrub. Kowhai-narrow-leaved lacebark, lowland ribbonwood forest.

9. PELORUS

Kahikatea, Rimu, Beeches, Alpine Tussocks, Kaka, Robin,
Inland Western, Wet, Non To Weakly Schistose Ecosystem

A collection of massive mountains, very steep dissected hills and large valley systems are the predominant feature of this land ecosystem. Sedimentary strata and weakly developed schists make up the very steep to moderately steep inland hills and mountains with substantial amounts of colluvium and alluvium coating the lower slopes and valley floors. The narrow floodplains between the ranges having had a constant progression of river courses snaking across the surface have built up a series of sinuous undulating terraces with layers of fans building up on the surface, themselves being cut into by subsequent rivers and streams. Towards the sea, narrow tidal flats mix the fresh and saline waters, deltas trying to constantly claim land back from the sea. Elevation is generally high and rainfall very high with snow on the tops in winter and the valley floors exhibiting extreme bitter frosts; there is very little maritime influence. Extensive forest tracts.



Indigenous vegetation and landforms — **9. PELORUS ECOSYSTEM**

landform component	geological formation	remnant native vegetation	past & potential vegetation
1. **steep to very steep upper mountain slopes** 700-1756 m. elevation	siliceous, Pelorus Group sedimentary rocks and weakly developed Marlborough Schist	Mid-ribbed snow tussockland. Carpet grass turfland. Coprosma - Hebe subalpine shrubland. Cushion-herb-rockland Mountain beech forest (treeline). Red-silver-mountain beech forest. Red beech-silver beech-kamahi forest.	**Grassland-Shrubland** Mid-ribbed snow tussockland. Carpet grass turfland. Coprosma - Hebe subalpine shrubland. Cushion-herb-rockland. **Forest** Mountain beech forest (treeline). Red-silver-mountain beech forest. Red beech-silver beech-kamahi forest.
2. **moderately steep to steep lower hill and mountain slopes** 0-700 m. elevation	siliceous, Pelorus Group sedimentary rocks and weakly developed Marlborough Schist	Hard beech forest with rimu emergent, kamahi, ponga. Mixed broadleaf forest. Tawa forest with mixed broadleaf spp. Hard beech-silver beech forest.	**Forest** Hard beech-silver beech forest. Hard beech forest with rimu emergent, kamahi, ponga. Rimu/tawa-mixed broadleaf forest.
3. **undulating terraces, fans and terrace remnants** 5-150 m. elevation	Pleistocene alluvium from predominantly sedimentary and schistose rocks	Rimu-totara-matai-black beech-tawa forest. Black beech-matai forest. Rimu/black beech forest. Silver beech-black beech-rimu forest.	**Forest** Rimu-totara-matai-black beech-tawa forest. Black beech-matai forest. Rimu/black beech forest. Silver beech-black beech-rimu forest.
4. **narrow sinuous floodplains** 5-20 m. elevation	recent alluvium from predominantly sedimentary and schistose rocks	Lowland ribbonwood-kowhai treeland. Kahikatea-matai forest. Totara-matai forest. Riparian flood zone shrublands and herbfields.	**Forest** Kahikatea-matai-totara forest. Lowland ribbonwood-narrow-leaved lacebark-kowhai forest. Cabbage tree-harakeke tree flaxland. Riparian flood zone shrublands and herbfields
5. **prograding delta / tidal flat** [P27/720930] 0-3 m. elevation	recent alluvial and estuarine deposits	Lowland ribbonwood-kowhai treeland. Oioi rushland. Marsh ribbonwood coastal shrubland.	Lowland ribbonwood-kowhai treeland. Oioi rushland. Marsh ribbonwood coastal shrubland.

Marlborough Region & District

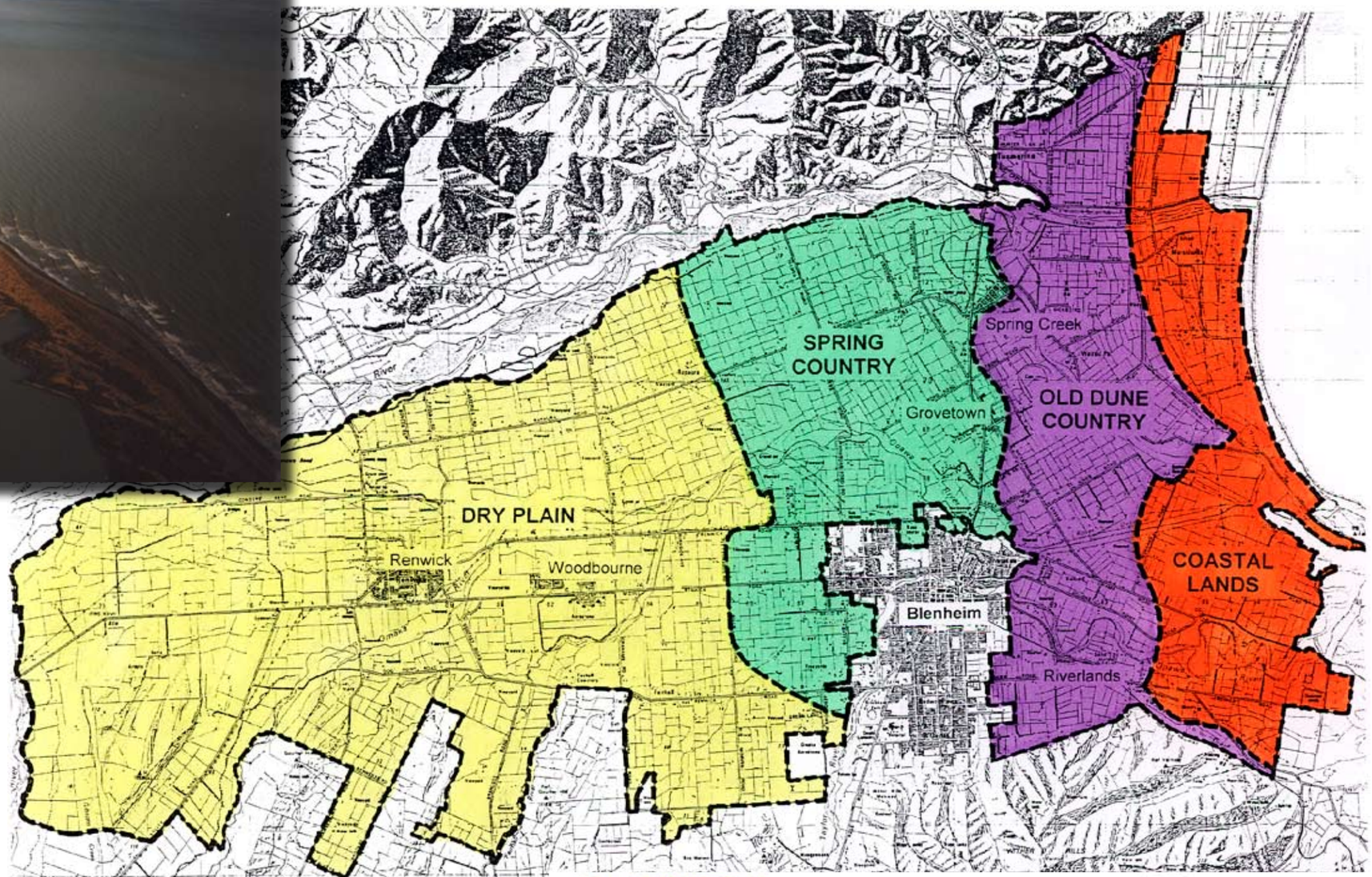
Cloudy Bay

photo: Neil Deans. View over Wairau lagoon with Vernon Hills left, and Wither Hills spread behind and right

Marlborough Region & District

Wairau Plain landscape types

Wairau Lagoon and
Cloudy Bay G. Matthews
1998

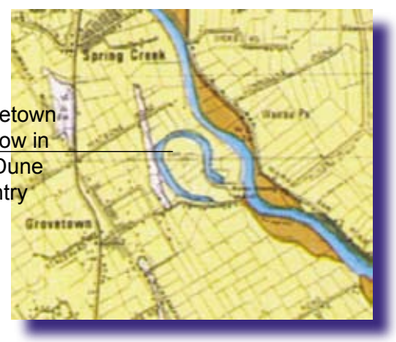


Typical forest character sought:

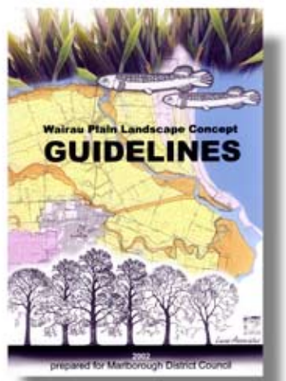
OLD DUNE COUNTRY

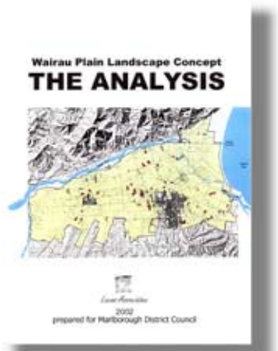
Terrace	*Upper Bank*	*Lower Bank*	*Margin*
turepo(15)	kanuka (11)	harakeke (4)	pukio (1)
totara (16)	myrsine (12)	toetoe (5)	raupo (2)
whauwhaupaku (17)	kaikomako (13)	ti kouka (6)	wiwi (3)
tarata (18)	houhere (14)	manuka (7)	
		kahikatea (8)	
		pukatea (8)	
		kohuhu (9)	
		kapuka (9)	
		manatu (10)	

mixed toetoe & harakeke



Grovetown Ox-bow in Old Dune Country





Wairau Plain

LANDSCAPE CONCEPT PLAN

Landforms Lucas Associates Ltd 2002

KEY

1 Active riverbed

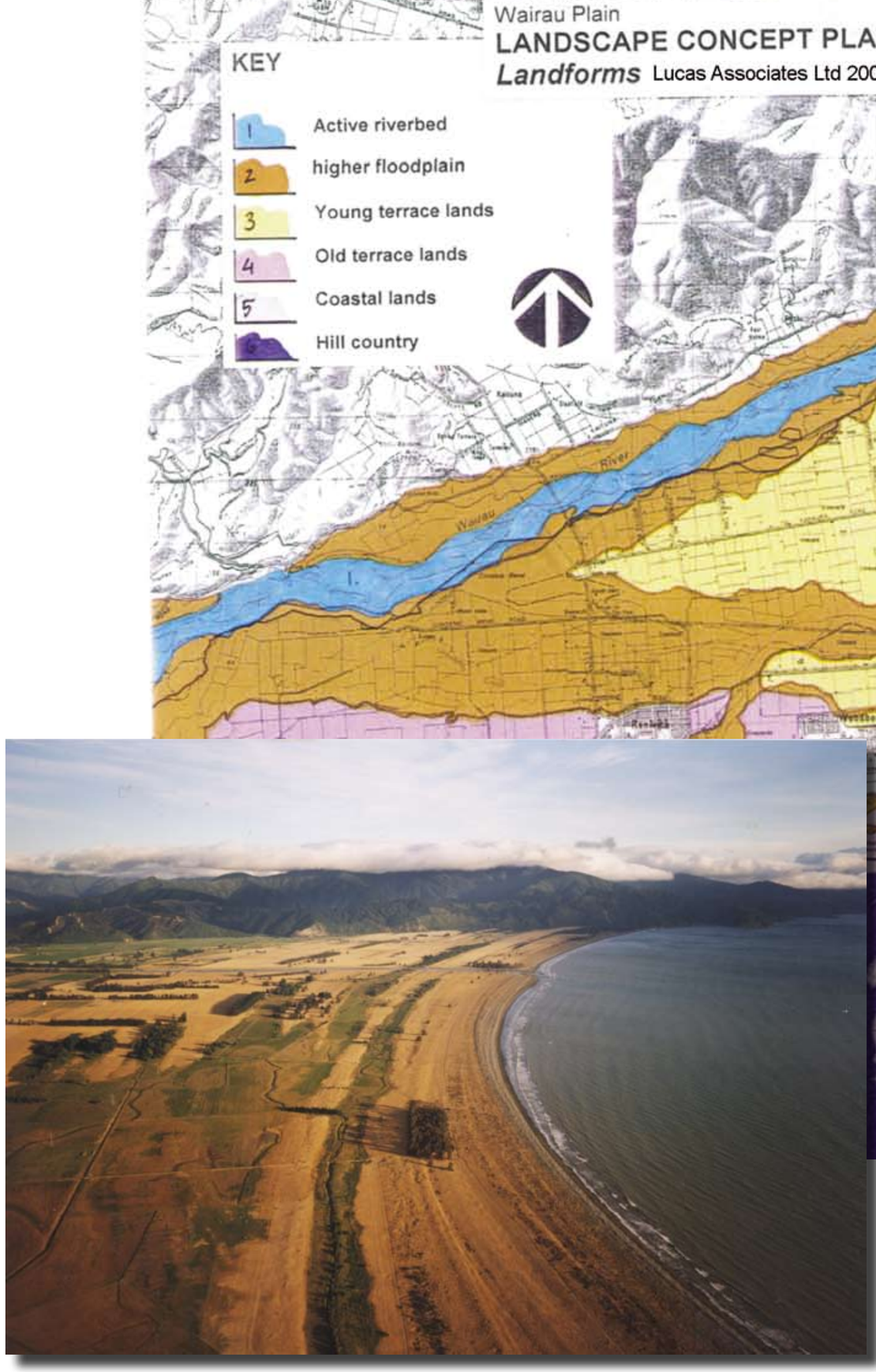
2 higher floodplain

3 Young terrace lands

4 Old terrace lands

5 Coastal lands

6 Hill country



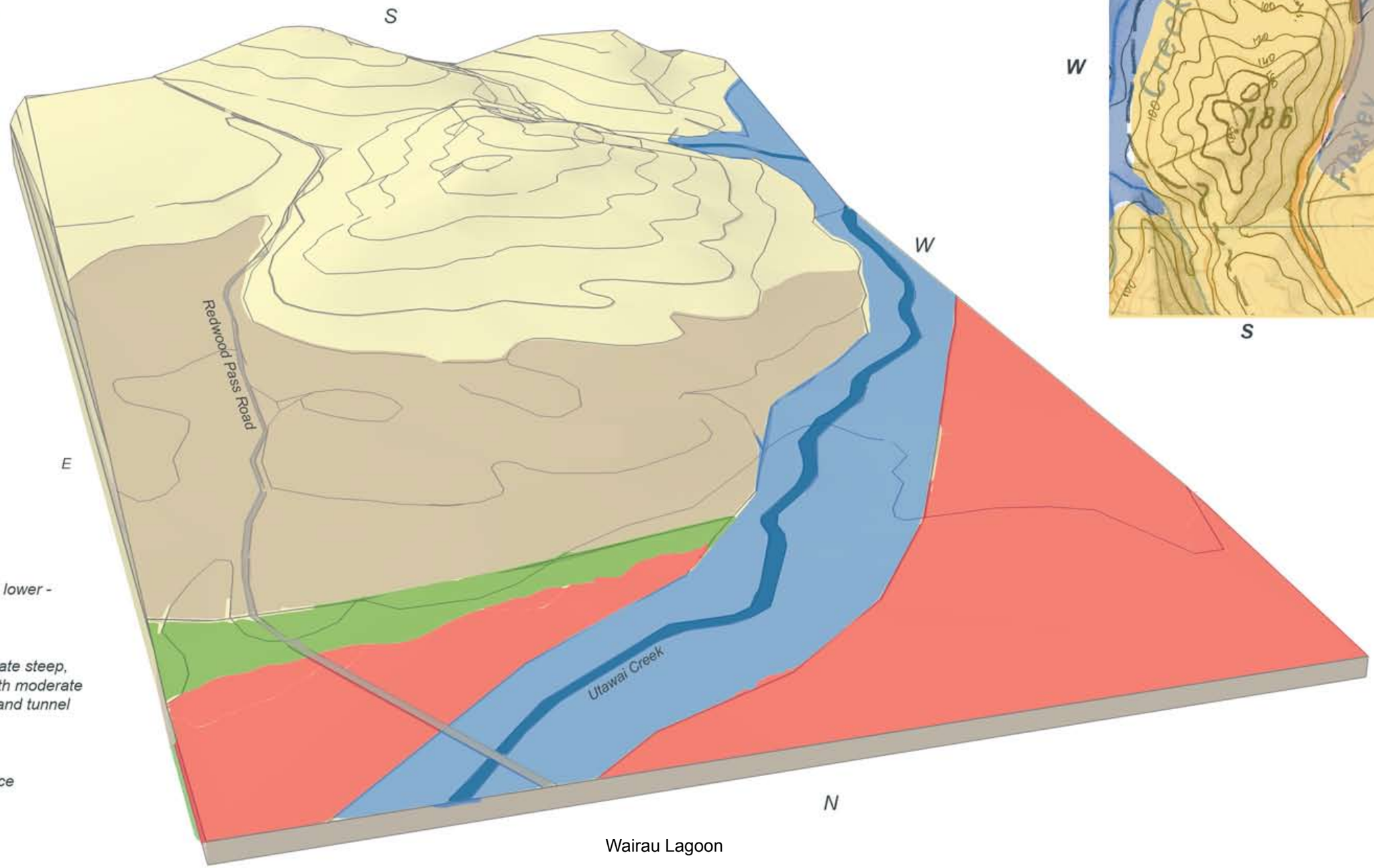
Wairau Plain landforms

Rarangi Young Terrace Lands and Cloudy Bay
G. Matthews 1998

Photos - Craig Potton. View over Wairau lagoon with Vernon and Wither Hills in background

Redwood Pass landforms

Location map of model area



Landform Components:

- **A** *Rolling lower slope*
- **B** *Rolling to strongly rolling lower - broad spur*
- **C** *Strongly rolling to moderate steep, mid and upper slopes with moderate to severe sheet soil slip and tunnel gully erosion*
- **D** *Dissected valley fill terrace*
- **F** *Incised floodplain*