Eco-domains for the Wellington Region

Processes and patterns for defining diversity and distinctiveness.

Quality for Life

greater WELLINGTON
THE REGIONAL COUNCIL | Environment

Preface

The importance of understanding and managing ecological processes and of protecting the values of special areas of the Region is recognised in the ***Regional Policy Statement for the Wellington Region***. The policy intent is clear. What is less clear is how good policy intentions might be effectively translated into good management of the Region's ecosystems.

A number of Regional Council functions and responsibilities have impacts on ecological processes and valued areas (e.g. consent granting, water supply, land and water quality management, flood protection, biosecurity, transport planning). There is also information of variable quality and age that helps tell us something about those processes and important areas.

What we haven't had is a framework to help make sense of the bio-physical information. A framework that incorporates processes, places and patterns would give structure and provide a more rigorous basis for understanding, prioritising and focusing our own Council actions. Through better understanding, we can more accurately reflect local ecological characteristics and manage ecosystems for their distinctiveness. Further, we can present stronger arguments for appropriate ecological management in submissions on local authority consents and plans and, if necessary, in evidence to the Environment Court.

This report records how we have begun to build a framework for enhanced understanding and decision making. It is an original piece of work that, in a way, marries science and art. The report's author, Isobel Gabites, has used what scientific information does exist about geology, geomorphology, meteorology, biology and human use of natural resources, and combined it with a sensitive and extensive personal knowledge of the ecological processes and characteristics of the Region. In her synthesis, Isobel has developed a mosaic of some 60+ ***eco-domains*** - areas that have unity within themselves but distinctiveness from each other.

Originally, the work was conceived as being principally for the Regional Council's own use. Over the last couple of years, however, there has been a growing need for good information about local ecological processes to support the many community restoration projects that are getting underway. In working with groups and agencies, we have used the concept of ***eco-domains*** and shared the information now contained in this report. Recognising its tremendous value, we felt that the time was right to open up Isobel's work to a much wider audience.

Nonetheless, the document is best understood as a "work in progress". The "work" began some years ago and continues its "progress" today as Isobel further develops and refines the ***eco-domains*** through more localised delineation and description for local authorities in the Region.

We would be pleased to discuss how the work can be made available and used by all those people concerned with managing and enhancing the Region's ecosystems in ways that seek to reflect and emphasise their diversity.

John Holmes

Section Leader, Policy Advice

Greater Wellington, the Regional Council

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The **Domain map** for the whole Region appears at the end of the document, following page 31.

What are we trying to achieve?

To help New Zealanders understand their environment, and how to live within it in the least detrimental way, it is useful to recognise units of landscape which share similar ecological and physical processes.

Landscape models which are based solely on data bases of physical data often overlook the ecological integration of, for example, land and sea (and the populations of wildlife which are dependent upon both) or active processes such as faulting, geothermal activity or uplift which may influence environmental characteristics.

Ecological domain delineation attempts to correlate biogeoclimatic information in such a way that strong linkages and dependencies and 'natural' disturbances are taken into account.

A domain represents a cluster of repeating biogeoclimatic patterns. Each domain displays different characteristics from its neighbours, but may be duplicated elsewhere in the region. Within each domain we would expect a consistent, predictable response of ecosystems to impacts and changes.

It is important to recognise that these units are holistically derived and holistically applied: they are not simply mapping vegetation or soils - they are mapping energy regimes which are relevant to all forms of life, and physical process. The term 'domain' is used for delineated zones to emphasise their unbiased nature (rather than using terms involving landscape or ecosystem which might imply either purely visual or purely biological characteristics).

Although mapping has the drawback of locking you into 'reading' landscape at a particular spatial scale, this mapping has been undertaken at a scale (1:100,000) which should provide a conceptual framework flexible enough for major processes to be recogniseable, while being useful at an operational level.

At a local level, mapping at 1:50,000 can be more fruitful for land-use planning and protection management At that stage 'domains' are broken down further into 'sub-domains' or into their constituent repeating compenents.

Application to Landscape Ecology

Modelling ecological driving processes in this way contributes to our understanding of the causal processes that have lead to current biological patterns. The information, however, must be combined with an analysis of physical and social landscape impacts in order to better understand our current state of biodiversity. Domain information may also help predict potential niches of taxa if landuses or environment conditions change, but this requires a moderate understanding of the taxa's preferences to begin with.

Which factors are important?

The controlling environmental factors which are significant at regional scales are primarily climate, top rock and topography and active seismic and coastal processes. Combined, these factors determine the type of biological communities possible, soil characteristics, erosion and hydrological patterns.

Ecological studies stress the significance of energy, temperature, moisture stress, and nutrient availability for determining the success and strategies of biological communities. Particular limiting factors include frosts, which will damage plant growth, kill insects and fungi; low temperatures which limit growth and increase the energy requirements of wildlife; strong winds that can cause physical damage, lower humidity and, if carrying salt and sediment, will influence nutrient levels and extreme soil conditions that may contribute to physiological drought or chemical toxicities in plants.

Such limitations are manifest in vegetation associations and wildlife distributions. Thus, a geoclimatic map becomes an ecological map when its boundaries correspond to significant biological boundaries.

Methodology

Availability of data for these environmental factors varies in its scale and extent. This delineation exercise has involved, therefore, generalised and non-statistical correlations of available data that best offers the information required to define the major ecological threshholds. Existing databases, private data, local knowledge and interpretation of dynamic processes were combined to provide indications of where boundaries should lie.

Limited availability of data prevented evapotranspiration being included to the extent desired. Humidity data, although an important influence of ecological character, is not measured in a way that contributes to building up an ecological picture so was not used in a quantitative way. Soil types, although generally a reflection of both rainfall and top rock, were taken into account because they offer greater mapping detail than extrapolated rainfall data.

Refer to Appendix I for detail of data sources referred to.

It is generally accepted that at this scale of mapping, climatic factors tend to dominate the delineation. Some very abrupt boundaries are evident, for example, as a product of climate and altitude inducing dwarf forest, treelines, subalpine and alpine environments as temperatures drop and growth seasons shorten.

In some cases our interpretation of other factors may override the influence of climate. For example, an abrupt change in toprock between the sands and alluviums on the Kapiti Coast not only reflects different dynamic processes (on-shore wind-driven sand accumulation and floodplain alluvium deposition respectively) but their hydrological

regimes also create greatly different ecological character even though they share a similar climate.

Less dramatic changes may warrant only sub-domain distinction rather than full domain status, hence some domains are mapped as xa, b or c.

The 'reality check' involved interpreting remnant native vegetation patterns to identify the 'significant biological boundaries', and discussions with Regional Council field staff and locals.

The limitations of this map

The obvious limitation is that of having to use a line of finite thickness to represent boundaries which in reality are gradients. At 1:100,000 it is impossible to fairly represent a boundary, although, where possible, ridgelines or streambeds have been followed in order to 'capture' a complete energy/nutrient system.

At this scale it is difficult to represent one particularly distinct environment: the part of the coastal zone greatly influenced by salt, which is often too narrow to be distinguished from its hinterland.

The data used spans various time periods and cannot be said to reflect any climate changes currently occurring. Some data is extremely patchy in its distribution, and local knowledge has helped extrapolate some of the hard data. In addition, a number of the map overlays used have already extrapolated data in non-terrain-modelled ways. As a result, local knowledge has taken on a greater significance than a purely statistical computer-modelled approach would have. This is seen to be an advantage, not a disadvantage.

Not all domains have been field-checked and those with limited ground-based clues for 'reality checking' would require an historical investigation in order to confirm exact boundaries. This map, therefore, should be regarded as conceptual - a first step in a process that can be further improved upon.

Using the domains map

The domain numbering starts with the Wairarapa coastline, then inland Wairarapa areas, then repeats the process for the western part of the region, including the Tararua and Rimutaka Ranges.

Because several discrete areas may bear the same domain number, geographical names have been applied to each domain to alert the reader that more than one location may be being described. While use of place names is not entirely desirable (as it can lead to misrepresentations when used out of context) it is simply the most convenient tool for the job.

Cross-section outlining key characteristics of ecodomains on the Kapiti Coast

47.This is a mild, humid, moderately low energy zone where moist westerly airstreams hit the foothills, and air drainage limits frosts. Air draining out of the Reikorangi basin similarly extends this zone across low-lying areas. Intermittent cloud cover and only moderate energy winds (compared to the turbulence of the ranges and the strong coastal winds) also limit evapotranspiration. Natural plant cover is of fast nutrient cycling species, contributing to deep, relatively fertile soils. With strong winds losing energy here, it has been a strongly depositional environment in the past - with deep loess accumulation - and generally continues to be so. Gullies are typically shallow, swampy or formed by slumping of banks.

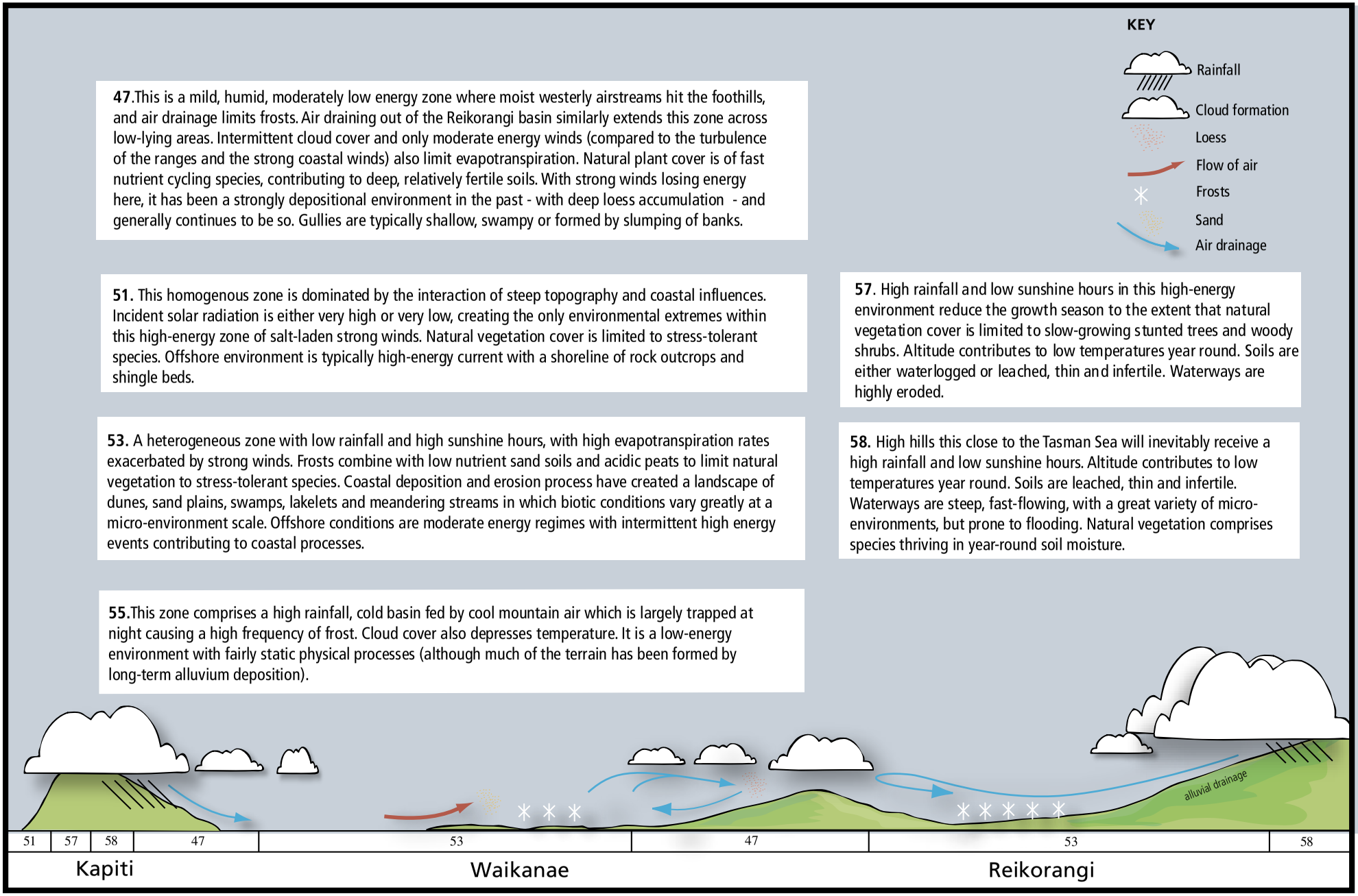
51. This homogenous zone is dominated by the interaction of steep topography and coastal influences. Incident solar radiation is either very high or very low, creating the only environmental extremes within this high-energy zone of salt-laden strong winds. Natural vegetation cover is limited to stress-tolerant species. Offshore environment is typically high-energy current with a shoreline of rock outcrops and shingle beds.

53. A heterogeneous zone with low rainfall and high sunshine hours, with high evapotranspiration rates exacerbated by strong winds. Frosts combine with low nutrient sand soils and acidic peats to limit natural vegetation to stress-tolerant species. Coastal deposition and erosion process have created a landscape of dunes, sand plains, swamps, lakelets and meandering streams in which biotic conditions vary greatly at a micro-environment scale. Offshore conditions are moderate energy regimes with intermittent high energy events contributing to coastal processes.

55. This zone comprises a high rainfall, cold basin fed by cool mountain air which is largely trapped at night causing a high frequency of frost. Cloud cover also depresses temperature. It is a low-energy environment with fairly static physical processes (although much of the terrain has been formed by long-term alluvium deposition).

57. High rainfall and low sunshine hours in this high-energy environment reduce the growth season to the extent that natural vegetation cover is limited to slow-growing stunted trees and woody shrubs. Altitude contributes to low temperatures year round. Soils are either waterlogged or leached, thin and infertile. Waterways are highly eroded.

58. High hills this close to the Tasman Sea will inevitably receive a high rainfall and low sunshine hours. Altitude contributes to low temperatures year round. Soils are leached, thin and infertile. Waterways are steep, fast-flowing, with a great variety of micro-environments, but prone to flooding. Natural vegetation comprises species thriving in year-round soil moisture.



Cross-section outlining key characteristics of ecodomains on Wellington isthmus

44. The escarpment is largely protected from prevailing NW wind, and S winds are usually accompanied by rain so salt is not as significant an influence as on dry coasts. The steepness of the slopes ensures a frost-free zone, but also excessive drainage and low incident solar radiation so biotic communities comprise species tolerant of drought.

47. This is a mild, humid, moderately low energy zone where moist airstreams hit the foothills, and air drainage limits frosts. Intermittent cloud cover and only moderate energy winds (compared to the turbulence of the ranges and the strong coastal winds) also limit evapotranspiration. Natural plant cover is of fast-nutrient cycling species, contributing to deep, relatively fertile soils. With strong winds losing energy here, it has been a strongly depositional environment in the past – with deep loess accumulation – and generally continues to be so. Gullies are typically shallow, swampy or formed by slumping of banks.

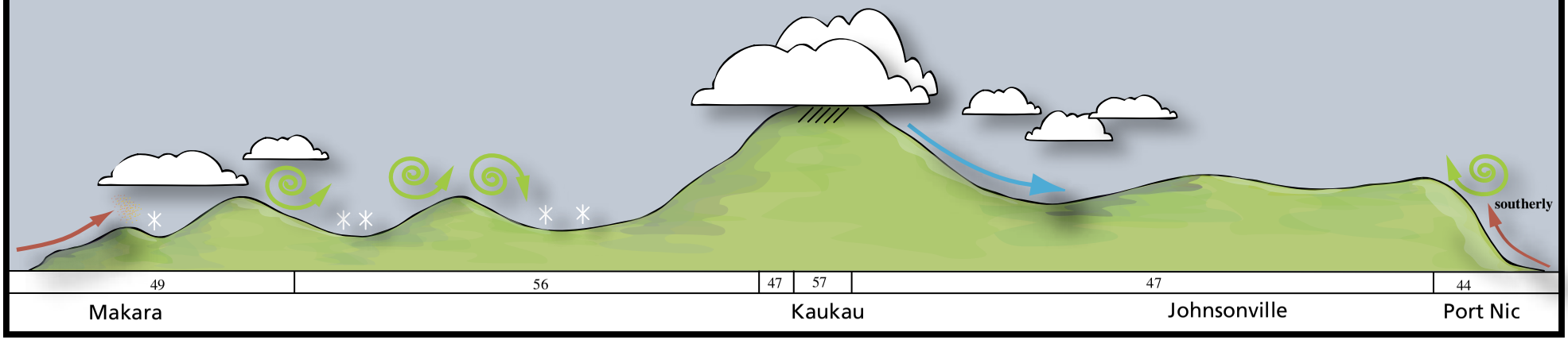
49. Very high energy zone, with strong funnelling winds carrying loess and sand. The extreme windiness creates high evapotranspiration rates even though rainfall is moderately high. Frosts in winter are not severe enough to restrict vegetation. Low sunshine hours.

56. This hilly zone is characterised by turbulent winds and seasonal rainfall (compared to coastal zones). The developed soils, however, retain moisture year-round (although their erosion results in aspect playing a greater role in defining plant communities). Valleys may be broad basins, or deep contorted gullies which reduce air moment; both are moist and cold places prone to frost. Numerous crush-zones and fractures result in a diversity of substrate and hydrological conditions.

57. High rainfall and low sunshine hours in this high-energy environment reduce the growth season to the extent that natural vegetation cover is limited to slow-growing stunted trees and woody shrubs. Altitude contributes to low temperature year round. Soils are either waterlogged or leached, thin and infertile. These features occur at lower altitudes than would be expected in the ranges.

KEY

- Rainfall
- Cloud formation
- Loess
- Turbulent winds
- Flow of air
- Frosts
- Air drainage
- Sand



Coastal Domains

Delineation of coastal domains reflects:

- dynamics; where a physical process such as sand drift, alluvial transportation or scree accumulation off coastal escarpments is a major environmental factor. Some domains, therefore, such as the Kapiti dunelands, extend inland and may encompass driving factors such as frost which are not normally associated with foreshore environments;
- the extent of salt-burn, salt toxicity, dessication and wind turbulence which, in combination, limit biota not especially adapted;
- the habitat linkages between sea, foreshore and hinterland and, related to this, the dominant characteristics of the littoral, tidal and subtidal environment (rockiness, depth, water temperature, sediment transport etc).

The coastal domains contain probably the most specific ecological dependencies of any terrestrial system other than freshwater systems and therefore are the most ecologically vulnerable. Some examples include the pingao cicada and pingao found solely in mobile sand; blue penguins, skinks and rocky toeslopes; seals and rock-pool foreshores; marine birds and bluffs and rock stacks; waders and open flats.

Some of the significant features of the Wellington Region which influence the coastal zonation include:

- offshore currents of differing water temperature: warm waters sweep down the east coast to a point off Honeycomb Rock. South of there water temperature is influenced by the cool Antarctic currents; water to the west of Cook Strait is slightly warmer than water to the east. Sea temperatures are a likely influence on local climate;
- the venturi effect of Cook Strait not only increases wind speed through the Strait but causes a semi-permanent area of low pressure near Karori Rock which influences local climate;
- the prevailing NW winds create a deeper band of salt-wind influence on the western coastline than on the eastern coastline. The rainshadow effect of NW Nelson on the Kapiti Coast during westerly airstreams causes relatively dry weather which intensifies the damaging effects of salt.
- high hills along the east coast mean that the strength of the prevailing northwesterlies is localised, as winds are funnelled down valleys in some areas whilst on nearby stretches the wind flows 'overhead'. The prevailing winds here do not cause salt-burn. The easterlies and winter southerlies which would, are often wet, lessening salt damage potential;
- fine sand is transported southwards down the Horowhenua coastline to be deposited in the vicinity of Waikanae. Sand bars, created across rivermouths by longshore drift, cause waterways to pond and meander;
- sediment moves both northwards and southwards from Porirua Harbour. The northwards drift of scree washed off the hills above Centennial Highway (Fishermans Table) to Paekakariki, for example, has significant implications for the stability of the eroding sand coastline there;
- alluvium disgorging from the Orongorongo Rivermouth is transported northwards (apparently in pulses) towards Eastbourne, dam-

ming the outlets of several streams on the way to form semi-tidal lakes;

- the seabed off the eastern Wairarapa coast is characteristically muddy (with rocky reefs near the shore);
- the only stretch of seabed characterised by coarse sand and pebbles is through The Narrows of Cook Strait.

Inland Domains

A zone which is prevalent in the west of the region occurs in hill country between the salt and wind-dominated coastal zone and the cool, wet inland hill and mountain country. Moist air blowing in off the sea, but without the severe salt loading of the coastal zone, combines with a relatively frost-free climate (due primarily to nightly air drainage off hills) to create a mild, humid domain. These conditions may extend up to approximately 250m altitude. Vigorous mull-forming species such as kohekohe thrive here (outcompeting tawa as a native canopy dominant). Nikau was once also prevalent on hillslopes in this zone and often remains the only landscape clue of a lost native biological community.

Through Cook Strait this zone occurs close to the coast (a band too narrow to be mapped at the scale of this delineation); in a wide band along the west coast as far north as Waikanae (refer Nos. 49, 52, 47); on the flat Kapiti Coast where these conditions are found further inland, in the foothills of the Tararua Ranges (refer No. 47).

Since this is the zone where strong prevailing winds generally lose their energy, the zone is characterised by deep loess deposition creating a mantled landscape where stream banks typically slump to create wetlands.

Note that kohekohe dominated vegetation is often referred to as semi-coastal forest: our domain delineation emphasises that there are a number of factors that induce this type of biological community, and that the implication that salt is one of them is misleading.

Factors dominating the flat inland country in the west of the region are frostiness, high sunshine hours and summer water stress in stony alluvial soils (Waikanae-Te Horo-Otaki alluvial plains). Note that although the flat dune areas nearby experience similar climatic conditions their processes have coastal origins; alluvial plain processes have inland origins and influences. This, and higher nutrient levels experienced on alluvial and silt plains, distinguishes the two domains.

The hilly western country including the Wellington Peninsula experiences wind turbulence, patchy frostiness and moderate year-round rainfall (refer Nos. 45, 46, 49). Extreme wind funnels are a significant feature of No.49.

The Hutt River and the Eastern Hutt Hills (refer No. 61) is an area where tectonic tilting has caused damming of drainage, formation of swampland and accumulation of alluvial deposits. Hillside soils are of low fertility, inducing a natural cover of kamahi and beech species rather than podocarp broadleaf in most parts.

The eastern lowlands of the region are distinguished by strong climatic influences, as drying NW winds impact on infertile, soft substrates or on the diverse topography of harder

greywacke hill country. The presence or absence of rain, and shelter from prevailing winds, has a far more pronounced influence on biotic patterns here than elsewhere in the region. The Wairarapa is generally a windy place, and with a tendency for stronger winds in spring and summer plant life in particular is vulnerable to exposure. Geology is diverse which is reflected in the landforms. There is much soft strata. Combined with a general downcutting of rivers through the eastern region, this has produced the riparian cliffs and river terraces that are a feature of eastern domains.

The vast expanse of the Wairarapa Plains with its shallow lakes at the southern end and alluvial fans and flats can be subdivided into a number of domains which reflect differences in climate; the moderating influence of Lake Wairarapa on local climate (but cold, wet soils surrounding it which shorten growing seasons); and hydrological processes, all of which influence biological potential.

In hilly and mountainous areas a close spatial correlation between rainfall, cloud cover, temperature and altitude creates distinct biological boundaries between domains. Generally, the Tararua Ranges are higher, wetter, colder and cloudier than the Rimutaka Ranges which in turn are wetter, colder and cloudier than the Aorangi Ranges. In each case, their western aspects are wetter and cloudier than eastern parts of the ranges and this too is reflected in the vegetation zonation (lower treelines in the west) and in forest composition. Uplift is a major influence in the Rimutaka Ranges which experience a greater amount of erosion than other areas (with significant downstream effects).

(i) Above the treeline we expect shrubland, tussockland and bare ground; relatively little insect and birdlife, long winters, cloudy weather and precipitation is often in the form of snow. Such areas are mapped as a single domain.

(ii) Below the treeline (around 1100m) cloud forest generally comprises silver beech (or where beech species are absent, kamahi and miro) which supports primarily insectivorous birdlife. Streams are generally in small, steep gullies with minimal sediment accumulation. With decreasing altitude red beech and some podocarps may enter the canopy.

There are a number of hilltops around the Wellington Peninsula where low cloud cover and exposure to cold, windy conditions induces a similar cloud forest but at lower altitudes compared with similar zones in mountain areas (No.57).

iii) Below 500 to 550m there is a distinct change in forest composition to podocarp-broadleaf forest (in moist, fertile regions) or lowland beech species mixed with broadleaf species to varying degrees (on less fertile substrates and in drier or more seasonal climates). In both these cases a broader variety of birdlife and insect life is supported by fruiting and flowering species. There is a gradient of podocarp-broadleaf forest composition within this lowland zone, with rimu and hinau and kamahi dominating the higher canopies and with rata and rimu emergent over a tawa canopy on the lower, most fertile slopes. Streams are steep, fast, often jammed with debris creating a variety of habitats and broaden out into valleys with accumulations of sediment and deep pools.

1. Castlepoint - Mataikona Rivermouth

Rainfall: av.Jan 41-80mm
av.July >160mm
mean annual: 971mm

Temp. av. max. Jan 22^0 C
av. min July 5^0 C
mean annual: 13^oC

Inc. Solar Radiation Summer Solstice:
moderate - low

Wind: N/A

Frost: free

Character: Narrow coastal strip with exposed rock strata; rivermouths with large sand flats and beaches (mouth of Mataikona has a 40ha sand blow forming hillslope). Rivers carry large sediment loads, contributing to sand deposition but there is a net loss through to coastal erosion. Mild, dry climate with moderate seasonality (summer drought, winter rainfall). Long growing season. Mean summer air temperature is the highest in the region.

Top Rock: mixture of mudstone, argillite and crushed argillite

Soils: Yellow brown earths

Biological notes: coastal shrubland, grassland, herbfield

1a

As above

1b

In vicinity of Mt Percy - higher rainfall. Strong funneling of NW winds. Floodprone, with large sediment loads reaching coast. Minimal foreshore.

1c

Between Castlepoint and Mt Percy, coastal hillslopes are softer mudstone strata. Drier soils here (YBE and YBE-YGE intergrades) and extensive areas of sand deposition

2. Castlepoint Headland

Rainfall: av.Jan 41-80mm
av.July 81-160mm
mean annual 903mm

Temp. av. max. Jan 22^0 C
av. min July 6^0 C
mean annual: 13^oC

Inc. Solar Radiation Summer Solstice:
moderate - high

Wind: mean ann. speed 13 kts

Frost: free

Character: An area of sandy beach, reefs, lagoon, cliffs and steep headland which experiences a dry year-round climate with early spring soil warming. It is very windy (gusty) around the headland and bay and exposed to NW. Soft tertiary strata create a sandy to pebbly beach.

Top Rock: mudstone, sandstone

Soils: Yellow Brown Earths and YB-YG intergrade on promontory

Biological notes: coastal shrubland, grassland, herbfield

3. Riversdale - Castlepoint (South Of Headland)

Rainfall: av.Jan 41-80mm
av.July 81-160mm
mean annual: N/A

Temp. av. max. Jan 22 C
av. min July 8 C
mean annual: 13^{0}C

Inc. Solar Radiation Summer Solstice:
moderate -high

Wind: N/A

Frost: free

Character: Coastal flats & terraces that are drought-prone and stretches of foreshore duneland created by the soft tertiary sediment of moderately steep hillslopes behind. Low seasonality (dry all year). Dominant strong NW winds have very localised effects (foreshore is often sheltered in lee of hills). Offshore reefs.

Top Rock: mudstone or fine siltstone, loess, sand

Soils: yellow brown earths, sand, some areas of drier YBE-YGE intergrades

Biological notes: dune and alluvium coastal shrubland, grassland, herbfield

4. Karaka Bay - Riversdale (Uriti)

Rainfall: av.Jan 21-40mm
av.July 81-160mm
mean annual 900-1100mm

Temp. av. max. Jan 23^{0}C
av. min July 5^0 C
mean annual: 13^{o}C

Inc. Solar Radiation Summer Solstice:
moderate

Wind: N/A

Frost: free

Character: A lowland 18km long and several hundred metres wide of prograded shoreline comprising dunes, backswamp, alluvial flats and including the escarpment behind. Steep beach; offshore reefs. Highly seasonal rainfall with wet SE storms in winter and very dry summers.

Top Rock: soft tertiary strata; sandy and pebbly foreshore

Soils: Yellow Brown Earths & YBE - YGE intergrades; Yellow Brown Sands on foreshore; recent soils at rivermouths.

Biological notes: Dune and swamp associations; cropping potential on younger fertile alluvials.

5. Karaka Bay

Rainfall: av.Jan 41-80mm
av.July 81-160mm
mean annual: 1100mm

Temp. av. max. Jan 23^0 C
av. min July 4 C
mean annula: 13^0C

Inc. Solar Radiation Summer Solstice:
low

Wind: N/A

Frost: free

Character: Narrow, stable rocky foreshore; rocky offshore; steep shaded greywacke cliffs behind. Low seasonality.

Top Rock: greywacke

Soils: dry soils: yellow brown-yellow grey intergrades

Biological notes: Salt and wind tolerant shrubland and coastal herbfield. Crayfish.

6. Glenburn - Flat Point

Rainfall: av.Jan 41-80mm
av.July 81-160mm
mean annual: 1134mm

Temp. av. max. Jan 24^0 C
av. min July 4^0C
mean annual: 13^0C

Inc. Solar Radiation Summer Solstice:
moderate (hillslopes) - high (flats)

Wind: N/A

Frost: free

Character: Coastal flats approx.1km wide. Some dune formation and sand blows with gravel fans spilling out of stream-mouths. Moderate slopes behind. Slightly seasonal, with dry summers. Deeper and cooler water offshore than northern Wairarapa.

Top Rock: crushed argillite

Soils: to the north - sandy beaches, yellow brown sands, yellow brown-yellow grey intergrades. To the south - yellow brown soils and recent soils on terraces.

Biological notes: Salt and wind tolerant coastal vegetation

7. White Rock - Honeycomb Rock

Rainfall: av.Jan 41-80mm
av.July 81-160mm
mean annual: 1100mm

Temp. av. max. Jan 24^0 C
av. min July 4 ^{0}C
mean annual: 13^{o}C

Inc. Solar Radiation Summer Solstice:
moderate (hillslopes) - high (flats)

Wind: N/A

Frost: free

Character: Narrow coastal flats or foreshore strip. Very steep hillslopes behind. Rocky coastline that experiences hot dry summers. Deeper and cooler water offshore than northern Wairarapa.

Top Rock: see below

Soils: see below

Biological notes: Salt and wind tolerant coastal vegetatio*n*

7A

Mixed geology of mudstone, argillite and gravels. Soils are Yellow Brown Earths

7B

Argillite and sand. Soils are Yellow Brown Loam - Earth intergrades at Pahoa Rivermouth and Yellow Brown Earths on hills. Terraces have recent soils (gravels).

7C

Greywacke. Terraces have recent soils (gravels). Yellow Brown Earth soils on hills. Steep beach.

8. White Rock

Rainfall: av.Jan 41-80mm
av.July >160mm
annual: 1100mm

Temp. av. max. Jan 24^0 C
av. min July 4^0 C
mean annual daily: 13^{o}C

Inc. Solar Radiation Summer Solstice:
moderate - high

Wind: N/A

Frost: free

Character: Sandy beach with gravel flats behind. There is a heavy sediment load from the Opouawe River which drains erosion-prone argillite and mudstone country. Very seasonal climate with dry summers and wet winters (from SE storms). Dry soils. Deeper and cooler water offshore than northern Wairarapa.

Top Rock: mudstone, argillite, gravels, sand

Soils: Yellow brown sand foreshore and yellow grey earth behind.

Biological notes: Salt and wind tolerant coastal vegetation

9. Cape Palliser / Turakirae Head - Ocean Beach

Rainfall: av.Jan 81-160mm
av.July >160mm
mean annual: 1042mm

Temp. av. max. Jan 22^{0}C
av. min July 3^{0}C
mean annual daily: 12-14^{o}C

Inc. Solar Radiation Summer Solstice:
low

Wind: N/A

Frost: free

Character: Very steep, high altitude hills with scree slopes, shingle toeslopes; shaded narrow gravel flats and steep gravel beaches. Relatively wet coastline with low seasonality.

Top Rock: greywacke

Soils: predominantly bare rock with some yellow brown earth. Recent soils on flats.

Biological notes: salt and wind-tolerant vegetation (coastal shrubland, coastal alluvium and colluvium herbfield, brackish wetland associations)

9a

as above, to 550 m altitude. Highest mean annual air temp. in region.

9b

above 550m altitude

[expect change in vegetation]

9c

as above but with slightly wetter spring and cooler air temperatures year round.

10. Ngawi - Te Humenga / Turakirae - Fitzroy Bay

Rainfall: av.Jan 81-160mm
av.July >160mm
mean annual:1100-1200mm

Temp. av. max. Jan 22^{0}C
av. min July 4^{0}C
mean annual: 13^{o}C

Inc. Solar Radiation Summer Solstice:
moderate - high

Wind: N/A

Frost: free

Character: Rocky outcrops offshore, northwards long-shore drift of alluvials, steep gravel beaches, gravel coastal flats with moderately steep greywacke hills behind. Uplift of Turakirae Head has resulted in tiered coastal flats. There is a high diversity of microclimates. Exposure to NW and S gales causes salt burning. Rainfall is fairly constant year-round and sea fogs increase humidity. Soils are thin and depleted, with native grasslands a dominant feature.

Top Rock: greywacke

Soils: Screes and intergrades between yellow grey and yellow brown earths; gravelly sands on coastal terraces.

Biological notes: salt and wind-tolerant vegetation (coastal shrubland, coastal alluvium herbfield, brackish wetland associations); seal haulout sites.

10a. Ngawi

Broad gravel flats.Slightly cooler and moister than rest of domain. Coastal influence extends inland.

10b. Te Humenga

As above.

10c. Turakirae

Similar to 10a. Cooler than rest of zone. Gravel foreshore with rock outcrops. Steep greywacke hills behind.

10d. Fitzroy Bay

Similar to 10b, with its diversity of microclimates. Includes streams blocked by gravel bars which have created lakes periodically flooded with salt water. Hillslopes have some loess accumulations.

11. Lake Ferry - Whatarangi

Rainfall: av.Jan 41-80mm
av.July 81-160mm
annual 1000-1150mm

Temp. av. max. Jan 22^0C
av. min July 4^0 C
mean annual: 13^0C

Inc. Solar Radiation Summer Solstice:
moderate - high

Wind: N/A

Frost: free

Character: Soft strata are deeply incised and eroding along foreshore. This creates a high diversity of microclimates. Narrow, steep gravel beaches are supplied from long shore drift. Minor sand drift accumulation. Stream-mouths are impeded and tend to form rush-filled backwaters.

Top Rock: mudstone. Gravels along foreshore.

Soils: Bare rock and yellow brown-yellow grey earth intergrades.

Biological notes: salt and wind-tolerant coastal plant associations (grassland, alluvium herbfield); minor wetland associations (some are saline); shrubland sere of manuka-kanuka - tauhinu.

12. Ocean Beach - Lake Onoke Bar

Rainfall: av.Jan 81-160mm
av.July >160mm
mean annual: ~1000mm

Temp. av. max. Jan 22^0 C
av. min July 13^0 C
mean annual 13^0C

Inc. Solar Radiation Summer Solstice:
moderate (to the west) to high (nearer outlet)

Wind: N/A

Frost: free

Character: Raised shingle bar. Steep, mobile gravel beach. Escarpment or Lake Onoke behind.

Top Rock: gravels

Soils: yellow brown earth behind bar

Biological notes: salt and wind tolerant vegetation (coastal alluvium herbfield, grassland, shrubland sere of manuka-kanuka - tauhinu.)

13. Pounui

Rainfall: av.Jan 81-160mm
av.July >160mm
mean annual: 1200-1600mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
variable: low - very high

Wind: mean ann. speed 9 kts

Frost: av.ground 28, av. air 11

Character: Deeply dissected Rimutaka footslopes, old marine terraces and a small lake. Diverse microclimates although overall little seasonal variation. Similar temperatures to Domain 38 but this is significantly wetter and frostier.

Soils: yellow brown earths, YBE-YGE intergrades, recent soils, yellow brown shallow and stony soil and gley soil

Top Rock: sandstone, gravels - in places coated with loess

Biological Notes: lowland beech species dominant; specific habitat for freshwater wildlife in lake.

14. Whangaimoana - Pirinoa

Rainfall: av.Jan 41-80mm
av.July 81-160mm
mean annual: 1000-1200mm

Temp. av. max. Jan 22^0 C
av. min July 5^0 C
mean annual: N/A

Inc. Solar Radiation Summer Solstice:
variable: moderate in gullies, very high on rolling slopes

Wind: N/A

Frost: N/A

Character: Gently rolling foothills to Aorangi Ranges; old marine terraces. Warm, dry, relatively low frost frequency. Similar temperatures and substrates to Domain 13 but less frost and drier.

Soils: mostly yellow brown earth; some yellow grey earths, yellow brown shallow and stony soils, recent and saline soils

Top Rock: sandstone, gravels - in places coated with loess

Biological notes: Lowland beech species dominant.

14a

Tableland with deeply incised gullies; swampy coastal flats. Longer growth season.

14b

Exposed to strong winds. Least frost here.

15. Dry River

Rainfall: av.Jan 80-160mm
av.July > 160mm
mean annual: 1200-1300mm

Temp. av. max. Jan 22^0 C
av. min July 2-4^0 C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
variable: low to very high

Wind: N/A

Frost: N/A

Character: Gently rolling foothills and moderately steep hillslopes at north end of Aorangi Ranges. Wet climate, cooler than on plains but low frost frequency. Variable substrates, generally well drained.

Soils: mixture of yellow grey and yellow brown earth; some gley, recent soils and yellow-brown shallow and stony soils.

Top Rock: mixture of loess, gravels, greywacke and siltstones

Biological notes: Pattern of free-draining site trees on river flats (titoki, kanuka, kowhai etc), high humidity broadleaf species (e.g. tawa, fuchsia, lemonwood) and podocarps dominant in deep gullies and some beech on drier spurs.

16. Lake Ferry - Lake Wairarapa

Rainfall: av.Jan 94mm
av.July 165mm
mean annual: 1000-1400mm

Temp. av. max. Jan 21^0 C
av. min July 8^0 C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
high to very high

Wind: mean ann. speed 12 kts

Frost: free

Character: An homogeneous Domain of flat, low-lying floodplains and shallow lakes. Lake Ferry is subtidal; Lake Wairarapa freshwater with an extensive hinterland that is periodically inundated and without drainage would be waterlogged year-round.. The area is frost free, in part because of the wind-run off the Rimutaka Range and light NE night-time winds. Windspeeds are high here. Rainfall is moderately seasonal. The ground is cold and wet through winter but has an 'early spring' .

Soils: mostly recent soils with some saline and gley and organic soil and, yellow brown sand.

Top Rock: alluvium; areas of sand and peat east of the lake.

Biological notes:vegetation tolerant of poor drainage; reed and turf zone around lake edge.

17. Western Wairarapa Plains

Rainfall: av.Jan 81-160mm
av.July > 160mm
mean annual: 940-1330mm

Temp. av. max. Jan 23^{0}C
av. min July 3^0 C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
moderate to high

Wind: N/A

Frost: air and ground frosts

Character: An area of old gravel fans, terraces (recent and old), floodplains which is significantly wetter than eastern plains domain (rainfall decreases away from mountains). Light winds and calms (sheltered by mountains) particularly in the northern part of domain. This is reflected in greater frost frequency to the north (av. ground frost 89, av. air frost 31) than in the south (av. ground 24, av. air 14).

Soils: A mix of recent, gley, organic and yellow-brown shallow and stony soils with YGE-YBE intergrades reflecting increased rainfall compared to the eastern plains

Top Rock: Alluvium, gravels, in the north are areas of loess, sandstone terraces west of Carterton.

Biological notes: plants tolerant of rapid drainage and frosts such as totara and kanuka dominant on gravel terraces; plants tolerant of waterlogged soils such as kahikatea dominant on swampy silts.

18. Eastern Wairarapa Plains

Rainfall: av.Jan 55mm
av.July 91mm
mean annual: 780-900mm

Temp. av. max. Jan 22^{0}C
av. min July 3^0 C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
high to very high

Wind: mean ann. speed 5 kts

Frost: air and ground frosts

Character: A very dry part of the plains with low seasonality of rainfall and light winds. The Ruamahanga River meanders tightly through the southern section across a broad floodplain.

Soils: mainly recent soils and yellow grey earths, with lesser areas of gley soil, yellow-brown shallow and stony soils, organic soil and yellow brown earths

Top Rock: alluvium, gravels, large areas of loess

Biological notes: plants tolerant of rapid drainage and frosts such as totara and kanuka dominant on gravel terraces; plants tolerant of waterlogged soils such as kahikatea dominant on swampy silts.

18a

Tightly meandering Ruamahanga River is dominant landscape and freshwater habitat influence.

18b

Ruamahanga River has straighter course resulting in more open freshwater habitats.

19. Eastern Wairarapa Foothills

Rainfall: av.Jan 41-80mm
av.July 81-160mm
mean annual: 800-950mm

Temp. av. max. Jan 23^0 C
av. min July 2^0 C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice: variable: very low to very high

Wind: N/A

Frost: N/A

Character: Loess covered slopes with dry summer soils, pugged winter soils. Low seasonality of rainfall (winter max.) Drying NW winds are more prevalent in spring and summer.

Soils: mostly yellow grey earths and intergrades between them and yellow brown earths and rendzinas. Also some recent soils and yellow brown earths.

Top Rock: loess, greywacke and massive siltstone

Biological notes: N/A

20. Kourarau - Popoiti - Ruakokopatuna

Rainfall: av.Jan 81-160mm
av.July >160mm
mean annual: 1000-1100mm

Temp. av. max. Jan 22^0 C
av. min July C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
variable: very low to very high

Wind: N/A

Frost: av ground 62, av. air 20

Character: Gently sloping to moderately steep hillslopes rising to high altitude limestone ridgeline. Moderately seasonal rainfall (winter max.) with heavy frosts. Noticeably wetter and cooler than surrounding domains. Short growing season.

Soils: mainly intergrades between yellow brown earth and rendzina, and yellow brown earth and yllow grey earths. Also some recent soils, yellow brown earths and yellow grey earths.

Top Rock: limestone on ridgeline, loess on slopes. Minor sandstone

Biological notes: N/A

21. Pariwhariki Escarpment

Rainfall: av.Jan 41-80mm
av.July 81-160mm
mean annual: 1100-1200mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low- very low on steeper slopes, pockets of very high on footslopes

Wind: N/A

Frost: free

Character: Mudstone/siltstone escarpment facing SE. Steep at the top with loess covered gently sloping toeslopes. Lower rainfall here than on western side of ridge but sheltered from prevailing NW so adequate year-round soil moisture. Fertile soils. Frost free. Snow sometimes lies on ridgetop.

Soils: YGE-YBE intergrades

Top Rock: massive siltstone escarpment, limestone ridgetop, loess on slopes, some banded sandstone.

Biological notes: nikau as indicator species

22. Hinakura - Hikawera Hill Country

Rainfall: av.Jan 71mm
av.July 137mm
mean annual: 1178mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
variable: from very low to very high

Wind: N/A

Frost: N/A

Character: N/A

Soils: mostly YGE-YBE intergrades wih some recent soils, yellow brown loams, yellow brown earths, yellow grey earths and yellow-brown - rendzina intergrades

Top Rock: mostly jointed siltstone

Biological notes: N/A

23. Eastern Wairarapa Hill Country

Rainfall: av.Jan 81-160mm
av.July > 160mm
mean annual: 1100-1400mm

Temp. av. max. Jan 21-23 C
av. min July 2-5 C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low to very low

Wind: N/A

Frost: N/A

Character: Hard greywacke hills. Highly seasonal rainfall (winter max) but long growth season. Moderate to steep rugged hill country with broad-topped ridges.

Soils: mostly yellow-brown earths. Some YBE-YGE intergrades and recent soils.

Top Rock: predominantly greywacke and argillite with small areas of mudstone and sandstone

Biological notes: black beech and podocarp mixed vegetation. Moisture-dependent broadleaf species. Kanuka / manuka regeneration.

23a

(southern end) as above

23b

Contains Mt Percy which experiences strong NW gales, higher rainfall and altitudinal vegetation zonation to subalpine grasslands. Hills generally higher altitudes in this zone.

24. Aorangi < 500m

Rainfall: av.Jan 81-160mm
av.July >160mm
mean annual: >1500mm

Temp. av. max. Jan 18-20°C
av. min July 2-3°C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low

Wind: N/A

Frost: at any time of year

Character: Wet climate but relatively drier mountain area compared to others in the region. There is not the same cloud cover here as on other ranges in the region, however, strong southerlies bring heavy rain. Vegetation dominated by beech species, but with podocarp/braodleaf forest in valleys and moister sites sheltered from prevailing NW winds. Steep terrain, with rapid downcutting of rivers creating v-shaped valleys, truncated spurs, sharp ridge crests.

Soils: Makara steepland soils - stony, relatively unstable on steep slopes, medium fertility.

Top Rock: greywacke and argillite, shattered bedrock in many places

Biological notes: Podocarp-broadleaf forest (predominant species are mahoe, hinau and rewarewa) in sheltered valleys; lowland beech species (black and hard) on drier ridges and red beech-podocarp forest on moister sites.

25. Aorangi > 500m - Treeline

Rainfall: av.Jan 81-160mm
av.July >160mm
mean annual: >1500mm

Temp. av. max. Jan 18-20°C
av. min July 2-3°C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
very low

Wind: N/A

Frost: at any time of year

Character: Silver beech dominated high altitude forest. Steep terrain, with rapid downcutting of rivers. There is not the same cloud cover here as on other ranges in the region, however, strong southerlies bring heavy rain.

Landforms: v-shaped valleys, truncated spurs, sharp ridge crests

Soils: Makara steepland soils - stony, relatively unstable on steep slopes, medium fertility.

Top Rock: greywacke and argillite, shattered bedrock in many places

Biological notes: Red beech joins silver beech on moister, more fertile sites but generally forest comprises silver beech canopy.

26. Opouawe River

Rainfall: av.Jan 41-80mm
av.July > 160mm
mean annual: 1200-1400

Temp. av. max. Jan 23°C
av. min July 4°C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
moderate to very high

Wind: N/A

Frost: N/A

Character: Highly seasonal area with summer drought in rainshadow of Aorangi Ranges and high winter rainfall from S and SE. Hot summers, mild winters. Long growth season. The Opouawe River transports coarse gravels derived from eroding greywacke and crushed argillite.

Soils: mostly yellow-brown earth; some YBE-YGE intergrades, yellow grey earths and recent soils.

Top Rock: greywacke, argillite, jointed sandstone

Biological notes: Lowland beech species (black)

27. Tururumuri Hill Country

Rainfall: av.Jan 41-80mm
av.July > 160mm
mean annual: 1300-1600

Temp. av. max. Jan 22°C
av. min July 3°C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low to very high

Wind: N/A

Frost: N/A

Character: Area of highly erodable crushed argillite. Very windy with high seasonality of rainfall (winter max).

Soils: mostly yellow-brown earth with some YBE-YGE intergrades and recent soils

Top Rock: greywacke, argillite. Area of massive siltstone in south.

Biological notes: Lowland beech species dominate.

28. Oterei River Hill Country

Rainfall: av.Jan 81-160mm
av.July 81-160mm
mean annual:1200-1400

Temp. av. max. Jan 22-24°C
av. min July 3-4°C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
varies from generally moderate to high in the south to low to moderate in the north

Wind: N/A

Frost: N/A

Character: Erosion-prone hill country largely of faulted argillite. Climate relatively mild year-round.

Soils: mostly yellow-brown earth with some YBE-YGE intergrades and recent soils.

Top Rock: encompasses greywacke and argillite areas and large area of siltstone and sandstone in the NW and S of Domain

Biological notes: N/A

29. Mt Adams Hill Country

Rainfall: av.Jan: 81-160mm
av.July: >160mm
mean annual: 1200-1600

Temp. av. max.Jan: 23^{0}C
av. min July: <2^{0}C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
moderate to low

Wind: N/A

Frost: N/A

Character: High hills, with narrow ridges, diverse geologically. Moderately seasonal rainfall with high rainfall on western slopes of Mt Adams (greatest rainfall in eastern Wairarapa). Cold, frosty winters.

Soils: mostly yellow-brown earth with YBE-YGE intergrades; some bare rock

Top Rock: greywacke, argillite, crushed argillite, mudstone, limestone

Biological notes: N/A

29a

Dominated by Mt Adams which is exposed to strong NW winds, higher rainfall.

29b

As above

30. Ngaumu

Rainfall: av.Jan 74mm
av.July 137mm
mean annual: 1188

Temp. av. max. Jan 22^0 C
av. min July 1^{0}C
mean annual daily: 11^{0}C

Inc. Solar Radiation Summer Solstice:
moderate to very high

Wind: N/A

Frost: av ground 106, av, air 57

Character: Rolling sandstone and mudstone plateau with deeply incised gullies and infertile soils. Cold winters with heavy frosts. Moderately high seasonality of rainfall (winter max, averages 17 to 19 water deficit days from December to February).

Soils: mostly yellow-brown earth with YBE-YGE intergrades

Top Rock: banded sandstone, massive siltstone, alluvium.

Biological notes: N/A

37. Rewa Hill Country

Rainfall: av.Jan: 81-160mm
av.July: >160mm
mean annual: 1400mm

Temp. av. max. Jan: 21^{0}C
av. min July: 3^{0}C
mean annual daily:

Inc. Solar Radiation Summer Solstice: moderate to very low

Wind: N/A

Frost: N/A

Character: Hill country of crushed argillite. Environmental factors unclear, but hard beech dominates vegetation which is unusual in lowland Wairarapa hill country. Wetter and cooler in summer than surrounding areas.

Soils: mix of yellow-brown earth with YBE-YGE intergrades

Top Rock: crushed argillite

Biological notes: N/A

32. Homewood

Rainfall: av.Jan: <20mm
av.July: 81-160mm
mean annual: 1000-1200

Temp. av. max. Jan: 23^{0}C
av. min July: 5-6^{0}C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low to moderate on steep slopes; high to very high on flats

Wind: N/A

Frost: N/A

Character: Highly dissected escarpment above broad flats of poorly drained old marine gravel terraces with deeply incised gullies. This domain experiences winter rain and summer drought. Air drainage reduces frost occurrence. Growing season is relatively long.

Soils: mix of recent soil, yellow-brown earth and YBE-YGE intergrades

Top Rock: ridge top - argillite; slopes - band of mudstone, loess; alluvium flats with mudstone outcrops

Biological notes: N/A

33. Mt Misery - Maungapakeha

Rainfall: av.Jan: 41-80mm
av.July: >160mm
mean annual: 1000-1100

Temp. av. max. Jan: 21-22^{0}C
av. min July: 4^{0}C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low to moderate

Wind: N/A

Frost: N/A

Character: Seasonal, with wetter winters but mild year-round.

Soils: mostly YBE-YGE intergrades, with some recent soils, yellow brown earths and bare rock

Top Rock: greywacke, argillite, siltstone

Biological notes: N/A

34. Northern Wairarapa Hill Country

Rainfall: av.Jan: 41-80mm
av.July: 81-160mm
mean annual: 1100-1200

Temp. av. max. Jan: 21^{0}C
av. min July: 3-4^{0}C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
variable; moderate to very high

Wind: N/A

Frost: N/A

Character: Hill country that is diverse geologically and topographically. Air movement reduces occurrence of frost.

Soils: mostly YBE-YGE intergrades and yellow brown earth, with some recent soils, yellow grey earth and rendzina-yellow brown earth intergrades

Top Rock: mudstones and sandstones to the west; greywacke and argillite to the east.

Biological notes: N/A

34a

less rainfall in this sub-zone

34b

greater rainfall and stronger winds in this northern sub-zone

35. Mauriceville Hill Country

Rainfall: av.Jan: 81-160mm
av.July: >160mm
mean annual: 1200-1600

Temp. av. max. Jan: 21^{0}C
av. min July: 3-4^{0}C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
variable; moderate to very high

Wind: N/A

Frost: av. ground 74, av. air 33

Character: Wet hill country. Heavy frosts. Diverse geologically.

Soils: mostly yellow-brown earth with some yellow brown loam, recent, gley and rendzina soils and YBE-YGE intergrades

Top Rock: loess, sandstone, limestone, mudstone

Biological notes: podocarp-broadleaf dominates

36. Rangitumau Escarpment

Rainfall: av.Jan 69mm
av.July 119mm
mean annual: 1100-1200

Temp. av. max. Jan 22^0 C
av. min July 3^0C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
very low to moderate

Wind: N/A

Frost: N/A

Character: East-facing limestone ridge and mudstone escarpment with deeply incised streams. Frosty (unlike surrounding domain).

Soils: mostly YBE-YGE intergrades with rendzina, recent soils and yellow brown earths

Top Rock: mudstone, limestone

Biological notes*: N/A*

37. Lower Mataikona

Rainfall: av.Jan: 41-80mm
av.July: >160mm
mean annual: 1200-1400

Temp. av. max. Jan: 22^0C
av. min July: 5^0C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low on hills, high in valleys

Wind: N/A

Frost: N/A

Character: Extensive flood plains, moderate to steep hillslopes. Highly seasonal with summer drought; wet but mild winters.

Soils: mostly yellow-brown earth with recent soils and YBE-YGE intergrades

Top Rock: argillite, crushed argillite, alluvium

Biological notes: N/A

38. Upper Mataikona

Rainfall: av.Jan N/A
av.July N/A
mean annual: 1400-1700

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low to moderate

Wind: N/A

Frost: N/A

Character: N/A

Soils: mostly yellow-brown earth, with some recent soils, bare rock and YBE-YGE intergrades

Top Rock: argillite, crushed argillite, greywacke

Biological notes: N/A

39.Whareama River

Rainfall: av.Jan: 41-80mm
av.July: 81-160mm
mean annual: 1100-1400

Temp. av. max. Jan: 22^{0}C
av. min July: 5^{0}C
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice: see below

Wind: N/A

Frost: N/A

Character*:* Broad river flats with silty and alluvial soils.

Soils*:* mostly recent soils, with some yellow-brown earth and YBE-YGE intergrades

Top Rock*:* alluvium; some mudstone and argillite outcrops

Biological notes*:* N/A

39a

Soils are cold in spring. Shorter growing season.Moderate to high incident summer solstice radiation.

39b

River is tidal in lower reaches. Longer growth season. Fertile soils. High to very high incident summer solstice radiation.

40. Taipos

Character: Abrupt outcrops with steep escarpments, with distinctive vegetation associations and habitats including seepages on bluffs.

Soils: N/A

Top Rock: greywacke (Moore's Taipo, Te Maipi, Maungapakeha,Pahaoa) or sandstone (Tinui)

Biological notes: N/A

41. Pencarrow Head - Eastbourne

Rainfall: av.Jan N/A
av.July N/A
mean annual:1000-1500mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual:

Inc. Solar Radiation Summer Solstice:
moderate to low

Wind: N/A

Frost: free

Character: Narrow coastal platform with steep, stable hills behind. Beaches are gravel with rock outcrops. The influence of salt laden gales is manifest in a broader belt here than within the harbour. In strong northerlies the Hutt River passes close to this shore, reducing salinity which enriches algal diversity.

Top Rock: greywacke

Soils: yellow grey - yellow brown earth intergrades; greywacke scree; well-drained stony loam.

Biological notes: coastal shrubland on hillslopes and colluvium; coastal alluvium herbfield.

42. Eastbourne - Point Howard / Seatoun - Scorching Bay

Rainfall: av.Jan 84 mm
av.July 152mm
mean annual:1100-1400mm

Temp. av. max. Jan 20 ^{0}C
av. min July 5.5 ^{0}C
mean annual daily: 12.5^{0}C

Inc. Solar Rad. Summer Solstice:
14(a) moderate to high on foreshore, 14 (b) low to moderate

Wind: N/A

Frost: free

Character: Narrow coastal strip with steep, stable hills behind. Shallow sandy or pebbly beaches separated by rock outcrops and headlands. The influence of salt laden gales is manifest in a narrower belt here than further towards the harbour entrance. There is often a calm belt immediately below the cliffs. Mild winters.The Eastbourne subzone receives more rainfall.

There is low seasonality of rainfall.

Soils: sand, colluviam, bare rock, yellow grey earth

Top Rock: greywacke

Biological notes: coastal grassland, coastal cliff shrubland, lowland beech forest

42a

Sand accumulation. Shallow offshore. The prevailing northerly is dessicating in spring and summer.

42b

Pebbly - sandy beaches separated by rocky outcrops. Steep hillslopes close to shore cause shading and sheltered microclimates at base. The subtidal zone of this protected harbour shoreline is dominated by flapjack and bladder kelp.

43. Seaview - Petone

Rainfall: av.Jan 76 mm
av.July 157mm
mean annual: ~ 1300mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Rad. Summer Solstice:
high to very high

Wind: N/A

Frost: free

Character: Shallow beach with dunes, backswamp and flat hinterland. Highly seasonal (higher winter rainfall) and frost free or light ground frosts only. Salt laden southerly gales are major influence. Flooding of Hutt River and nearby streams introduces large sediment loads to harbour here.This is an area of major fresh water influence to the harbour environment both through direct flow and submarine upwelling from artesian sources.

Soils: -

Top Rock: sand

Biological notes: Salt and wind-tolerant coastal plant associations in both wetland and freely drained habitats.

44. Petone - Kaiwharawhara

Rainfall: av.Jan N/A
av.July N/A
mean annual: ~ 1200mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
very low to moderate

Wind: N/A

Frost: free

Character: Narrow coastal raised rock platform, rocky offshore, with steep, stable hillslopes behind. The escarpment is fault defined. This strip is often in the lee of NW gales.

Soils: friable, well-structured yellow brown earths with minimal erosion.

Top Rock: greywacke

Biological notes: salt and wind tolerant vegetation adapted to rocky substrates.

45. Wellington City

Rainfall: av.Jan 76mm
av.July 127m
mean annual: 1151mm

Temp. av. max. Jan 17 C
av. min July 8^0C
mean annual daily: 12.5^0C

Inc.Solar Rad.Summer Solstice: moderate (on hills) to high (on city flats)

Wind: moderate wind run: 341 km/day

Frost: light ground frosts inland (patchy distribution)

Character: Hilly area has mild maritime climate,high sunshine hours and is warmer than the rest of the Wellington Peninsula (the Miramar Peninsula is the warmest part). Moderately steep to steep hillslopes, bluffs and deep gullies provide diversity of microclimates. Immediate coast has raised rock coastal platform; gravel beaches. High evopotranspiration rates reflect windiness. Moderately seasonal rainfall (winter max.)

Soils: Thin loams over clay and weathered greywacke. Truncated topsoils on many ridges. Low moisture retention and compacted soils limit plant productivity.

Top Rock: greywacke

Biological notes: Wind and salt tolerant plant associations.

46. Miramar Flats

Rainfall: av.Jan 66mm
av.July 109mm
mean annual: 1027mm

Temp. av. max. Jan 20^0C
av. min July $6\ ^0$C
mean annual daily:13^0C

Inc. Solar Rad. Summer Solstice: moderate - high

Wind: high wind run: 672 km/ day

Frost: light ground; rare air frosts

Character: Wind derived duneland and backswamp area that included a shallow lake prior to 1855 earthquake. The valley which is sheltered from northerly winds is more frost-prone than the exposed, extremely windy flats. The foreshore itself is frost-free. High evapotranspiration rates. Winters are mild and the area is drier year-round than rest of Wellington Peninsula.

Soils: sand

Top Rock: greywacke

Biological notes: Vegetation tolerant of rapid drainage, moisture stress and occasional air frost.

47. Western Temperate Foothills

Rainfall: av.Jan ~85mm
av.July ~146mm
mean annual: 1150-1400mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low to moderate with isolated patches of high on Peninsula

Wind: N/A

Frost: light

Character: An extensive band of greywacke hill country inland from coastal domains, with moderate seasonality and milder year-round temperatures than hill country further inland. The vegetation reflects generally moist, mild, cloudy, fertile conditions. Complex topography creates spatial variation in temperatures and soil moisture, and frosts are patchy and light. Wind is turbulent, with channelling and eddying in valleys, and is often salt-laden although salt-burn is infrequent. Upper altitudinal boundary is around 250m in most areas.

Soils: mostly yellow brown earths with some YBE-YGE intergrades and yellow brown loams

Top Rock:greywacke

Biological notes: Kohekohe-tawa dominate remnant canopies. Tawa can only survive in the more sheltered, humid sites and is susceptible to wind and frost damage if exposed, and is now more prevalent on eastern and southern aspects. Kohekohe is at an advantage in most regenerating forest. Nikau is an indicator of the mild, frost-free, moist soils in sheltered valleys in this Domain. Manuka and tauhinu dominate pioneer vegetation.

48. Point Dorset - Makara

Rainfall: av.Jan 66mm
av.July 102mm
mean annual: 1037mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily:

Inc. Solar Rad. Summer Solstice:
moderate to very low

Wind: N/A

Frost: N/A

Character: A deep zone comprising rocky foreshore, bluffs and steep, stable hillslopes that are exposed to salt-laden southerly gales, and strong turbulence. High humidity year-round. The coastline is fringed with the small kelp Lessonia.

Soils: Yellow grey - yellow brown intergrades. Thin silt loams over clay and weathered greywacke. Truncated soils on many ridges. Low moisture retention compared to soils further inland.

Top Rock:greywacke; gravel on terraces and stream flats

Biological notes: Salt and wind tolerant plant associations.

48a

Higher diversity of microclimates than rest of zone. Warmer temperatures (by 1^0C). Note pockets of high incident radiation which may influence wildlife habitat preferences (e.g. lizards).

48b

Higher rainfalls. Isolated sand blows and deposits. Very low incident summer radiation here except at Terawhiti.

48c

Slightly less rainfall. Moderate to moderately low summer incident radiation.

49. Makara - Pukerua Bay

Rainfall: av.Jan 71mm (Makara)
av.July 140mm (Makara)
mean annual: 1170mm (Pukerua Bay);
1206mm (Makara)

Temp. av. max. Jan 22^0C
av. min July $1\ ^0$C
mean annual daily: 11^0C

Inc. Solar Rad. Summer Solstice: low - high

Wind: high wind run: 641 km/ day
mean annual: 9m/s

Frost: annual av. ground 19; no air frost

Character: Although the Makara domain has low sunshine hours (40% of yearly possible) and high moisture levels, it has a higher than expected evapotranspiration rates compared to rest of Wellington Peninsula due to its extreme windiness. The Pukerua Bay zone experiences similar conditions (also being wetter and windier than surrounding domains). Cold winters with ground frosts but not air frosts. Consolidated wind-accumulated sands mantle moderate slopes and are prone to erosion. In Pukerua Bay the very deep gorge is fault induced. Moderately steep hillslopes; flat valley floors; coastal bluffs, rock stacks, steep gravel beaches.

Soils: Consolidated yellow brown sands, rapidly drained (leaching develops iron pan)

Top Rock: greywacke, gravels, loess, moderately consolidated sand

Biological notes: Rabbit populations can become significant. Kanuka dominates the pioneer sere inland from foreshore. Kohekohe-tawa dominates forest sere, however, tawa is highly susceptible to wind exposure and will only survive and regenerate in sheltered sites. North facing sites with higher incident radiation have high lizard populations.

50. Pipinui Point

Rainfall: av.Jan N/A
av.July N/A
mean annual:1100-1200mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual: N/A

Inc. Solar Rad. Summer Solstice: very low

Wind: N/A

Frost: N/A

Character: Steep coastal escarpment and narrow rocky foreshore platform. Differs from other hilly western coastal domains primarily in soil type, with a more even moisture content here, limited erosion, more friable and well-structured soils. Similar to Domain 16 in these respects but with greater exposure to salt, wind and tidal currents.

Soils: Yellow brown earths

Top Rock: greywacke, minor loess

Biological notes: salt and wind tolerant vegetation. Ideal habitat for seabirds, penguins and seals.

51. Green Point / Centennial Highway / Raumati Escarpment

Rainfall: av.Jan 81mm
av.July 147mm
mean annual:1170-1371

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Rad. Summer Solstice: low - very low

Wind: N/A

Frost: free

Character: Steep coastal hillslopes and cliffs with mobile scree; narrow rocky foreshore with gravel beaches. Offshore stacks and reefs. Note that the domain includes the flatter ridgetops above the steep escarpments: this recognises nutrient systems and is important for protection management. Raumati escarpment is old coast, now inland, so here salt exposure is less severe. Highly seasonal rainfall (winter max.)

Soils: Scree, bare rock, yellow grey - yellow brown intergrades (thin silt loam over weathered greywacke).

Top Rock: greywacke

Biological notes: salt and wind tolerant shrubland and forest adapted to stony substrates. Coprosma propinqua and tauhinu are dominant pioneers. Ideal habitat for penguin, seal, kingfisher, seabirds and waders, lizards.

51a

As above.

51b

Higher annual rainfall (1371mm) than rest of domain. Sea-spray mists significantly increase humidity.

51c

Not as severely influenced by salt-laden winds as rest of domain.

52. Porirua

Rainfall: av.Jan 66-90mm
av.July 110-145mm
mean ann: 1020-1030mm

Temp. av. max. Jan 21^{0}C
av. min July 5 ^{0}C
mean annual daily: 13^{0}C

Inc. Solar Rad. Summer Solstice:
moderate to very high

Wind: N/A

Frost: light

Character: A complex domain dominated by the harbour processes; wind-derived, fertile, loessal and sandy substrates on the gentle to moderately steep rounded hills; and relatively mild climate (warmer annual average than surrounding domains). Similar in nature to Domain 47. High incident solar radiation along this stretch of coast may influence wildlife habitat preferences. Subdivision of the domain recognises the areas where loessal cover is thin, over weathered greywacke, resulting in heavy clay soil which pugs in winter; areas of different harbour processes relating to energy regimes; gradient of increasing rainfall and decreasing temperature inland.

Soils: Silty or sandy loams over clay loams; variable moisture content during the year. Prone to erosion on steeper slopes.

Top Rock: weathered greywacke; sand

Biological notes: seasonal variation in nutrient run-off into harbour. An important Domain for wildlife, especially estuarine and wetland species (waders, fish,shellfish in particular) marine fish, shellfish and birds. Zoned saltmarsh, coastal shrubland, kohekohe - dominated coastal forest , kohekohe-tawa-podocarp with moisture tolerant broadleaf species in sheltered areas.

52a

Consolidated sand soils on hills (depositional environjment reflecting lower energy regime than coastal margin). Coastal influences, but this subzone is relatively sheltered from prevailing gales compared to Domains 50 and 51. Harbour processes are characterised by tidal flushing, storm surges, turbidity, dune or bar accumulation where wave energy drops due to offshore reefs, strong tidal flows in shallow waters. Sands and gravels accumulate between rocky headlands. Diverse coastal habitat for marine mammals, birds, lizards etc. Moderately seasonal rainfall (winter max); has slightly lower annual mean than rest of domain, at 1019mm.

52b

Clay-rich loams on gentle hillslopes are waterlogged in winter. Harbour is susceptible to fine sediment accumulation from hill runoff. Organic soils also susceptible to erosion and now mostly stripped. Stronger seasonality of rainfall (winter max.). Distinctive clay-cliff vegetation of kowhai-ngaio-kanuka.

52c

Inner harbour. A lower energy zone of narrow tidal channels amidst shallow mudflats; estuarine or silty tidal zone. Dense cockle population. Hillslope vegetation reflects variable soil moisture through year (winter max. rainfall)

52d

Low energy estuarine system in inner harbour. Zoned saltmarsh, with freshwater influence. Dense worm population in shallow water. Highly seasonal rainfall (winter max.) and wetter (1168mm) than rest of domain. Loamy sand and silt soils on flat to gently sloping hinterland. Cold air drains into the upper harbour at night.

53. Kapiti Coast

Rainfall: av.Jan: 76-79mm
av.July: 104- 119mm
mean annual: 950-1200mm

Temp. av. max. Jan 22^{0}C
av. min July 4 ^{0}C
mean annual daily: 13^{0}C

Inc. Solar Rad Summer Solstice: moderate - very high

Wind: mean ann. 17 km/hr

Frost: av. ground 47; av. air 10 days

Character: A complex wind-derived dune system dominates the landscape and ecological processes. Dune formation has impeded waterways, creating swamps and meandering streams in narrow, deep channels. Climate is warm and rainfall is moderately seasonal with dry summers. High sunshine hours (49% possible hours). Away from the foreshore ground and air frosts are common (and some in summer months), with increasing intensity and frequency northwards and inland, where night time air turbulence is minimised. Prevailing winds are N - NW (parallel and oblique to shoreline). Easterly storms are physically damaging (due to greater turbulence and low frequency of events).

Soils: yellow brown sands (mostly in 53(b)), yellow grey earths, recent soils, organic soils

Top Rock: sand, peat

Biological Notes: Habitat diversity is high, with vegetation determined by frost and salt tolerance, free draining soils and poorly drained, acidic soils. Kanuka dominates sandy pioneering sere; manuka dominates swampy pioneering sere. High rabbit numbers are a problem for vegetation and erosion. Significant domain for waterfowl, waders and aquatic biota.

53a

Subzone reflects zone of coastal erosion and northwards long-shore drift. There is less frost inland due to proximity of hills (greater nightime turbulence).

53b

Subzone reflects coastal progradation and southwards long-shore drift. There is greater frost frequency. 1100-1200mm mean annual rainfall.

53c

Drier (lowest mean annual rainfall of western region) at av.Jan 76mm, av. July 104mm, mean annual 950-1000mm and highest Inc. Solar Rad.

54. Te Horo - Otaki Alluvial Plains

Rainfall: av.Jan 69-74mm
av.July 99-109mm
mean annual:1094-1200mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
moderate on hillslopes, high to very high on flats.

Wind: N/A

Frost: av.annual ground 48, air 10

Character: This domain is dominated by alluvial substrates, both old gravel terraces and recent alluvium on floodplains. It is a relatively homogeneous domain. There is a slight to moderate seasonality in rainfall and annual rainfall increases with proximity to the hills. The domain incorporates the loess-coated gravel fans, deeply incised and scoured by streams, spilling off the Hemi Matenga hills. Alluvial and silty soils of old river terraces are deep and fertile but drain freely, drying out in summer. Some silts may be heavy in winter. Rivers are fast, shallow and flood readily, bearing sediments from greywacke catchments.
Soils: recent alluvial soils, yellow brown loams and yellow brown earth, some intergrades between yellow grey and yellow brown.
Top Rock: gravels, loess
Biological notes: Totara, kohekohe and titoki canopy and small-leaved understorey shrubs dominate current native vegetation associations, reflecting tolerance of generally well-drained gravels and frost (as well as grazing of more palatable species).

54a

Less frost is experienced in this subzone.

54b

Greater frequency of frost is experienced in this subzone.

55. Reikorangi

Rainfall: av.Jan N/A
av.July N/A
mean annual: 1300-1800
Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A
Inc. Solar Radiation Summer Solstice:
low on hills to very high in basin
Wind: N/A
Frost: significant

Character: A large basin formed by tectonic activity, filled with rock debris. Four rivers have cut a series of river terraces through the glacial period gravels and have fertile alluvial soils. Cold air accumulates in basin and drains out down the Waikanae River. Hillslopes are typically warm, moist and sheltered.

Soils: mostly yellow brown earths; some recent soils, yellow brown loam, YBE-YGE intergrades.

Top Rock: conglomerate, gravels, loess and greywacke

Biological notes: Rimu-rata over tawa-kamahi canopy.

56. Western Hills

Rainfall: av.Jan ~81mm
av.July ~145mm
mean annual:1150-1300mm **Temp**. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A
Inc. Solar Radiation Summer Solstice:
varies greatly: very low to very high
Wind: N/A
Frost: variable

Character: Although rainfall in these hills is more seasonal than in coastal areas, the friable, well-structured soils hold more moisture year-round. Erosion is minimal although weaker fault-induced crush zones and interglacial fossil gullies exist in places. Wind flow is turbulent with channelling and eddying in gullies. Complex topography of moderately steep hillslopes with smooth ridgelines due to old eroded peneplain surface, broad basins, gullies, fossil gullies and fault-defined valleys creates diverse microclimates. Frost is patchy and can be heavy in basins such as Karori, Tawa and Johnsonville where cold air collects.

Soils: yellow brown earths

Top Rock: greywacke, loess on ridgetops, gravels on stream flats

Biological notes: Native vegetation is dominated by podocarp/tawa forest with understorey species indicating moist, fertile conditions in gullies.

56a

On the Wellington Peninsula the air temperature is cooler and the climate wetter.

56b

In the Belmont-Judgeford area the air temp. is warmer and the climate drier.

57. Western Hills Cloud Zone >400m

Rainfall: av.Jan N/A
av.July N/A
mean annual: ~ 1200mm
Temp. av. max. Jan N/A
av. min July N/A
mean annual daily:N/A
Inc. Solar Radiation Summer Solstice:
low
Wind: N/A
Frost: N/A

Character: The vegetation reflects the distinct zone at which cloud frequently 'sits' on the hills of the Wellington peninsula. This cloud forest and shrubland zone occurs at lower altitudes here than would be expected in inland mountainous areas.

Soils: Yellow brown earths and YBE-YGE intergrades

Top Rock: greywacke

Biological notes: vegetation comprises moisture-dependent broadleaf species such as fuchsia, mahoe, peppertree and pigeonwood or depressed sub-alpine shrubland where burnt over.

58. Tararua < 550m

Rainfall: av.Jan N/A
av.July N/A
mean annual: 1400+mm
Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A
Inc. Solar Radiation Summer Solstice:
low
Wind: mean annual 20-22kt
Frost: at any time of year

Character: Mountainous domain with a strong correlation between climatic factors and altitude. Distinct growth limits occur for dominant species which relate to temperature and sunshine hours as well as the intensity of soil leaching due to increasing rainfall with altitude. Frost flats and cold air inversions occur on broad valley floors within the mountains. Generally shallow, infertile soils.

Soils: podsolised yellow brown earths

Top Rock: greywacke

Biological notes: In the west of this domain podocarp forest dominates with rata-rimu over a tawa/kamahi canopy below 400m, and rimu over a kamahi canopy is dominant above. To the east, lowland beech species become more dominant

58a

Lowland forest is influenced by higher westerly-derived rainfall than 31c, reflected in higher proportion of kamahi and fuchsia in natural

58b

Wetter and cooler in this subzone.

58c

Lowland forest has a higher proportion of hard and black beech, kowhai and other species that reflect more seasonal rainfall and less fertile conditions.

59. Tararua 550m - Treeline

Rainfall: av.Jan N/A
av.July N/A
mean annual: > 2000mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily:N/A

Inc. Solar Radiation Summer Solstice:
very low

Wind: mean annual:20-22kt

Frost: at any time of year

Character: Rugged mountainous domain; cool and wet climate..

Soils: yellow brown earths

Top Rock: greywacke

Biological notes: Above approximately 500-550m beech forest dominates, reflecting the increasing rainfall, colder temperatures and increased soil leaching of higher altitudes. Silver beech dominates, with red beech and kamahi occurring on more fertile lower altitude sites within the domain. In the far north, east of Mt Dundas, beech is absent and the cloud forest is dominated by kamahi and miro.

59a

Vegetation dominated by silver beech

59b

Vegetation dominated by kamahi and miro

60. Tararua > Treeline

Rainfall: av.Jan N/A
av.July N/A
mean annual: >4800mm
Temp. av. max. Jan N/A
av. min July N/A
mean annual: N/A
Inc. Solar Radiation Summer Solstice:
very low
Wind: N/A
Frost: N/A

Character: Cold, wet, cloudy subalpine leatherwood-dominated shrubland and alpine tussocklands above the zone where the mean temperature of the warmest month is approximately 10^0C. Snow lies for months in winter. There is little birdlife and insect life is limited.

Soils: subalpine gley soils

Top Rock: greywacke

Biological notes: shrubland and tussock-shrubland; herbfield

61.Wainuiomata - Hutt - Kaitoke

Rainfall: av.Jan 86-140mm
av.July 135-229mm
mean annual:1200-2400mm
Temp. av. max. Jan 26^0C
av. min July -1.0^0C
mean annual daily: 12^0C
Inc. Solar Radiation Summer Solstice:
low to moderate in hills; high to very high in valleys and basins
Sunshine Hours: 1907-1921 hrs
Wind: 156 km/day mean annual wind run
Frost: see below

Character: A repeating pattern of long, straight alluvial valleys containing shallow meandering rivers and hill country with broad swampy basins prone to heavy frosts. The climate is cloudier here than on the Wellington Peninsula with lower wind runs and lower evapotranspiration rates. This wet domain is anomalous is having heavy clay soils which are older, and less fertile and more deeply weathered than might be expected from its climate. The result is a natural vegetation cover of lowland beech species and kamahi. The western boundary of the domain is fault defined.

Soils: alluvial, heavy gley loams, peats in flat areas; yellow brown earth hill soils.

Top Rock: greywacke, extensive gravels along riverbeds, peat in basins, conglomerate in NE corner of Domain

Biological notes: Ridges are dominated by lowland beech species and kamahi; valley floors dominated by podocarp/broadleaf associations.

61a

High rainfall, highly seasonal (winter max). Frosty winters

61b

Highly seasonal rainfall. Light ground frosts but occasional air frost. (av. ground frost 21, av. air frost 3). High incident summer radiation.

61c

Moderately seasonal rainfall. Frosty winters - increasing frequency northwards to av. ground frost 87, av. air frosts 35.

61d

Moderately seasonal, high rainfall. Lower sunshine hours. Frosty winters. The river is contained in places between bedrock banks.

62. Rimutaka < 550m

Rainfall: av.Jan N/A
av.July N/A
mean annual: 1500-2200mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low to moderate

Wind: annual mean probably 20-22kt

Frost: N/A

Character: Mountainous domain influenced by periodic uplifts with subsequent high erosion rates and movement of alluvium down relatively straight, fast rivers and streams. Generally shallow, infertile soils.

Soils: Mostly yellow brown earths; some yellow brown loam, YBE-YGE intergrades, recent soils and yellow brown shallow and stony soils.

Top Rock: greywacke

Biological notes: The forest here (compared with similar altitude forest in the Tararua Ranges) contains more beech. Black beech replaces hard beech on drier spurs, with more black beech occurring in the northeastern sector. Generally, silver beech and kamahi increase dominance with increasing altitude, rainfall and lessening fertility and podocarps decrease. Mixed red and silver beech and podocarp forest predominate in lower altitude valleys.

62A

Generally wetter than 62b, with more kamahi, silver beech and podocarps than at the equivalent altitudes and aspects in 62b.

62B

Somewhat drier or more seasonal than 62a, reflected in higher proportions of hard and black beech in the equivalent altitudes and aspects.

63. Rimutaka > 550m

Rainfall: av.Jan N/A
av.July N/A
mean annual: >2200mm

Temp. av. max. Jan N/A
av. min July N/A
mean annual daily: N/A

Inc. Solar Radiation Summer Solstice:
low

Wind: annual mean probably 20-22kt

Frost: N/A

Character: Wet, cold, mountainous domain influenced by periodic uplifts that increase erosion rates and fill gullies with alluvium.

Soils: podsolised yellow brown earths

Top Rock: greywacke

Biological notes: Red and silver beech and kamahi dominated forest (red beech drops out with increasing altitude). There are pockets of Halls totara-miro forest.

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