

## 2.0 BACKGROUND

### 2.1 HISTORY

Southland became home to Maori around 600 years before Europeans set foot on '*Murihiku*' – the name given to the South Island's southern land.

Hunting of moa, seals, birds and fish provided the main food sources. As skilled fishermen and navigators, the southern Maori travelled extensively throughout the region, naming the areas after geological features or food sources. Their settlements were small, often coastal and seasonal.

The first Europeans to set foot on the South Island's southern coast were sealers in the late 1700s. Others intent on harvesting flax came in the early 1800s and whalers began arriving from 1829. Sailors, traders and entrepreneurs followed.

Invercargill started to take shape when people from the Scottish settlement of Dunedin began buying land for sheep runs in the far south. The farmers needed to import stock from Australia, so in 1856 they presented a petition to Thomas Gore Browne, the Governor of New Zealand, for a port at Bluff.

The Governor consented and at the same time suggested a corresponding township be called Invercargill. He wanted to pay tribute to William Cargill, a high profile Scottish pioneer involved in the administration and settlement of the Otago/Southland region. The name stuck and soon after Chief Surveyor John Turnbull Thomson declared the site.

A vast indigenous podocarp/swamp forest covered much of Invercargill at the time of Thomson's survey. This forest held spiritual significance to the local Maori who referred to it as Taurakitewaru.

The first general legislation providing for the establishment and administration of public reserves was the Public Reserves Act 1854. However, it was not until around the early 1900s that people began to place any real value on the native forest remnants. Up until then, the forest was being progressively cleared for farming purposes, with the forest being a valuable source of wood for fencing and building construction.

### 2.2 SOILS AND GEOMORPHOLOGY

#### Joeys Island

The soil is classified as organic of the Invercargill series and yellow-brown sands of the Riverton series. The island has medium drainage. The terrain is relatively flat with estuarine mud flats and peat bog surrounding the island.

#### Metcalf and Seaward Bush

The soil is almost entirely classified as Mokotua soil. Mokotua soils are derived from tuffaceous, greywacke loess over gravels, sands and silts. They form a reasonably deep layer of granules - crumbly silt loam overlying a yellow-brown, iron and humus-stained heavy silt loam, over a base of brown-yellow silt. The

terrain is slightly undulating, with wet and boggy hollows and swales, alternated with drier mounded areas. It is possible that some of the swales may have formed small rivulets, but drainage ditches now carry away most surplus surface water. The higher areas are reasonably well drained, although in other areas, deep peaty layers have formed and they tend to remain quite moist, except in the driest of conditions.

### **Omaui Reserve**

Omaui Reserve has a rocky surface and is most likely to be comprised of 'Omaui 63c' soil. Within that category there are sandy, peaty and silty loams. The parent materials of such soil are known as tuffaceous greywacke sand, overlying norite and ultra basic rocks. It is very low in natural nutrients, but responds well to treatment. The soil combinations can vary in consistency and colour with sample descriptions including firm, crumbly, stony, nutty, brown, yellow and mottled.

### **Otatara Reserves**

The typical soils of the Otatara area are yellow brown sands with coastal sand flats and undulating sand dunes in relatively sheltered or moist situations. Reserve remnants are located on a sand dune or sand plain, characteristic of the Otatara forest ecosystems.

"These soils have developed under forest and form a chronosequence of increasing age from Riverton to Otatara soils" (Norton, 1996).

"Most soils have distinct topsoils and subsoils with definite structure and staining of sand grains" (Norton, 1996).

"These soils have higher organic matter and cation-exchange capacity than the yellow-brown sands in drier areas (e.g. Eastern Otago, Canterbury and Nelson)" (Norton, 1996).

"Soil pH is typically around 6" (Norton, 1996).

Taiepa Dune Reserve and Paterson Reserve lie on ground that is part of an old dune system east of the Oreti River mouth. The soils are a free draining sandy loam except for areas which are poorly drained.

### **Red Tussock Reserve**

Red Tussock Reserve is in a low lying damp alluvial site. Soils typical of wetland and lowland environments tend to be peaty and more compact.

### **Tikore Island**

In the Foveaux Ecological District, where Tikore Island is located, the geology is "Palaeozoic Bluff complex and Anglem complex ultra-basic, basic and intermediate intrusives. Soil is mainly strong leaches acid and infertile podzolised soils from a range of intrusive and sedimentary rocks and coastal sands. Topsoils tend to be peaty and iron-cemented pans are present in subsoils" (McEwen, 1987).

## Esplanade Reserves

Soils and geomorphology of the esplanade reserves can be different across each of the three Invercargill Ecological Districts.

The **Foveaux Ecological District** comprises esplanades located in the Bluff area (Ocean Beach and Stirling Point). This district is extremely oceanic, with a cool temperate, humid, frequently cloudy, windy climate.

The underlying geology of the Bluff-Omaui area is Palaeozoic aged volcanic and ultramafics supporting generally strongly leached, acidic and infertile podsolised soils.

The **Southland Plains Ecological District** comprises the flat to gently undulating Southland Plains, formed on Quaternary sediments, with smaller areas of sand dunes and recent alluvial deposits (along Waihopai River).

"Soils vary depending on underlying substrate but are generally moderately fertile and well drained" (Norton, 1997).

"**Waituna Soils** (Colyers Island) are poorly drained deep acidic peats with strongly leached to podzolised on surrounding undulating land from loess and sands. Some soils are poorly drained in areas of sand soils on coastal dunes and flats" (McEwen, 1987).

Soils around the coast can be expected to include estuarine mudflats and peat bog. There may also be nutrient rich soil, and organic of the Invercargill series, or the yellow -brown sands of the Riverton series.

## 2.3 VEGETATION

The earliest maps prepared by J T Thomson in 1857 and Theophilus Heale in 1865 illustrate the extent of the forest cover in the Southland Region at the time.

Much of this has been cleared for farming and settlement and only small areas of the original vegetation cover remains today. This has resulted in edge effects, facilitating the influx of weed species in some places.

The pre-Maori vegetation of the Southland Plains is believed to have been dominated by podocarp forest: mainly matai forest, kahikatea forest and mixed podocarp forest.

Other forest types that would have been found include kowhai-ribbonwood forest along river margins, totara forest in the Otatara-Sandy Point-Oreti Beach area, silver beech forest along the Mataura River, and mixed broadleaved (podocarp) forest and rata-kamahai forest on the limestone hills.

The original vegetation included areas of valley floor swamp, raised peat domes and shrub land communities.

Coastal dunes were dominated by sand tussock grasslands and pingao sedge lands, with some turfs associated with swales and small dune lakes.

The New River Estuary contained a variety of salt marsh, rush and shrub land communities.

Semi-braided beds of the Mataura, Oreti and Aparima Rivers would have been dominated by gravel with a light cover of low herbs and small shrubs.

A lot of this vegetation still exists in the Otatara-Sandy Point region, where predominantly totara, sand dune and sand plain forest remnants are still naturally occurring. In other areas native plants have regenerated or have been planted to protect native wildlife and increase the beautification of the Invercargill District.

The significant sand dune and sand plain forest remnants of the Otatara-Sandy Point area have been ranked as nationally representative (Bill, 1999) for the following reasons:

- Nationally, sand dune and sand plain ecosystems have been altered by human activities, resulting in the loss of indigenous vegetation cover, especially forest.
- Otatara has the best remaining example of coastal totara and totara-matai sand dune forests in New Zealand.
- This area has the only example of a sequence of totara, totara-matai and mixed podocarp forest remnants on differently aged sand dune and sand plain surfaces in New Zealand.
- Although fragmented, the forest remnants are large enough and connected enough to ensure their future viability/survival.

## 2.4 THREATS TO INDIGENOUS VEGETATION

Fragmentation and the clearance of forest remnants, and changes to wetland hydrology have all had a significant impact on the indigenous ecosystems and habitats of the Southland Region.

The introduction of exotic vegetation and animals to New Zealand has meant weeds and animal pests have become numerous and varied within Southland reserves.

Weeds such as gorse and broom are threats to tussock lands and willows, while elder threaten riparian forests.

Animal pests are a problem and have a detrimental effect on the ecology of environmental reserves. They damage native flora and reduce numbers of native wildlife (especially birds) associated with each reserve environment.

Most forest remnants contain possums, rabbits or hares, rats, mice, hedgehogs, stoats, ferrets, magpies and domestic and feral cats.

Animal pest numbers can be controlled and monitored through approved methods to protect the conservation values of the reserves. Ongoing management is necessary to control and reduce numbers of unwanted pest animals from environmental reserves.

Ongoing removal of animal and plant pests and monitoring of regeneration will allow habitats to recover and populations of bird species to grow. This will ensure the sustainability and viability of the reserves is maintained.

Other key threats include: housing (causing increased nutrient status in the forest, altered hydrological conditions and herbicide impacts from unwanted plant control), and soil compaction.

While it is impossible to turn back the clock and reproduce exactly what was present prior to human occupation, careful planning will ensure that those small remaining remnants are protected for future generations.

## 2.5 CLIMATE

Being the most southerly part of mainland New Zealand, Southland is cooler than the rest of the country. It has more frosts and substantially less sunshine. Invercargill is located between latitude 46 and 47 degrees, meaning it is in the latitude of prevailing westerlies. The funnelling effect caused by Foveaux Strait also increases the severity of the coastal winds.

The westerly winds normally bring a plentiful supply of moisture so that Invercargill's rainfall is very evenly distributed throughout the year. The positioning of anticyclones as they pass over New Zealand greatly influences rainfall and its frequency. Anticyclones often have shower cloud around their outer edges and when they pass too far north, Invercargill experiences showers instead of fine weather. These anticyclones are frequently followed by rapidly moving fronts which bring further rain.

Sunshine is another important factor and the amount of sunshine that Invercargill receives is strongly influenced by a coastal cloud belt associated with Foveaux Strait. Invercargill receives 20%-25% less sunshine than centres in the sunnier climes north of latitude 45 degrees and up to 40% less than centres such as Nelson and Blenheim. Cloudy days are frequent and there are long periods when very little sun is recorded.

Lack of sunshine has a very marked influence on plant growth, especially when combined with cool temperatures, strong salt laden winds and frequent showers.

### **Summary**

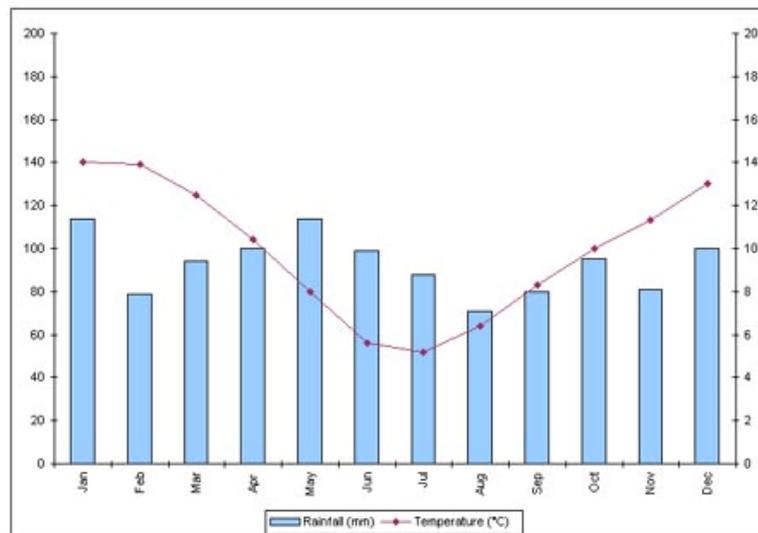
Invercargill has a cool temperate climate with a relatively high rainfall, strong persistent winds which are often strongly salt laden and frequently cloudy skies. The winds reach their greatest intensity during the spring months and to a lesser extent, with the autumn equinox and the summer solstice.

Invercargill experiences an average of about 94 days of ground frost per year.

While the local climate is an inhibiting factor for some plants common in other parts of New Zealand, it also favours a large number of plants from cool temperate regions.

Climate contributes to reserve edge effects which damage any exposed and internal vegetation through changes in external temperature and moisture, depending on the amount of site exposure the reserve has.

Snowstorms occur on an average of three to five days per year, but snow seldom lies on the ground for more than two to three hours. However, the one off snow activity in 1996 and 2010 caused a lot of canopy damage to trees in reserves. Trees collapsed under the heavy weight of the snow which opened up light gaps amongst the vegetation.



Average Rainfall and Temperature - NIWA

### Summary of Invercargill's Climate

Mean annual values for period 1971-2000<sup>1</sup>

	<b>Invercargill</b>	<b>NZ Average*</b>
Rainfall	1112 mm	1114 mm
Wet days	158 days	115 days
Sunshine hours	1614 hrs	2023 hrs
Mean temperature	9.9 °C	12.74 °C
Very highest temperature	32.2 °C**	
Very lowest temperature	-9.0 °C	
Ground frost	94 days	54 days
Mean wind speed	18 km/hr	14 km/hr
Gale days (over 63km/hr)	18 days	5 days

\* Average of 26 New Zealand main centres for period 1971-2000.

\*\* Record high temperature of 34.4 °C on 23 January 2006.

<sup>1</sup> NIWA - *Taihoro Nukurangi* - [www.niwa.cri.nz/edu/resources/climate/summary](http://www.niwa.cri.nz/edu/resources/climate/summary)

