

3. Ecological context

3.1 Background

There is little information available on the ecological characteristics of the Kate Valley CMA or of the broader Motunau Ecological District. The following notes are based on information that was collated as part of developing the resource consent application for the Kate Valley landfill. Other information on the area includes generalised geological, soil and climate maps and general information on vegetation pattern and vegetation history in North Canterbury.

3.2 Physical environment

The Kate Valley CMA is located in coastal North Canterbury in the Motunau Ecological District (Lowry Ecological Region). This ecological district comprises coastal hills and valleys, all below 600 metres asl, drained mostly to the east by small rivers. The geology is highly varied including greywacke, argillite and Tertiary sedimentary rocks, Quaternary outwash gravels, and coastal gravels and sands. The Kate Valley CMA is located within very old (1.8 to 65 million years) former seabed strata on the coastal side of Mt Cass and is consequently underlain by generally fine-grained compacted sedimentary deposits. The valley has moderately steep sides with surface erosion evident. Soils are broadly described as Stoneyhurst Hill soils, dominated by sandy loams.

The coastal environment consists of narrow sand and shingle beaches covered at high tide (Russell & Brown 1990). The beaches are backed by coastal cliffs up to 60 metres high. Slumping has occurred in the cliffs of the lower reaches of Kate Valley and nearby streams.

The annual rainfall of Kate Valley is 921 mm (1986-2000 average), although as with the rest of Canterbury, there is considerable variation both within years and especially between years. The area typically experiences very warm dry summers and cool wet winters. Snow is rare, although frost can occur in winter, especially in valley bottoms away from the coast.

3.3 Vegetation history

Information from pollen analyses and from a reconstruction of the potential vegetation cover of New Zealand, suggests that the Motunau Ecological District would have been covered by an almost continuous mantle of forest prior to human settlement. The only parts that would have lacked forest would have been bluffs, recently disturbed sites (e.g., slips along the coastal faces) and wetlands. The most specific information on the pre-human vegetation of the Motunau Ecological District comes from a pollen diagram from Swinton Park Amberley (Moar 1971), some 10 km southwest of Kate Valley. This pollen diagram shows the dominance of *Podocarpus* and *Nothofagus* pollen in the regional pollen rain and based on this it was suggested that the pre-human vegetation of the surrounding landscape was forest dominated by totara, matai and black beech. The more general reconstruction of the potential vegetation cover of New Zealand (Leathwick 2001) shows the Motunau Ecological District as supporting a mixture of lowland conifer forest and conifer/*Nothofagus solandri* forest.

This information together with information on the current distribution and composition of forest remnants suggests that the predominant pre-human vegetation would have been mixed podocarp-broadleaved forest with totara and matai occurring as emergent trees over a diverse canopy including kowhai, lemonwood, kohuhu, lowland ribbonwood, mahoe, five-finger and broadleaf amongst others. Examples of this forest type can be seen today on the southeast

facing slopes under the Mt Cass-Totara ridge 2 km northwest of Kate Valley. This forest type would have occurred on both limestone and loess substrates. In coastal sites, ngaio would have been the dominant canopy species (e.g., as seen today in the lower part of Kate Valley). Black beech forest is likely to have been of more limited extent, being confined to well-drained ridge crests and terrace faces and to substrates formed on low-fertility sediments.

The fossil evidence suggests that deforestation of the Motunau Ecological District was primarily by fire. This appears to have been the case throughout the eastern South Island, with a peak in burning occurring 500-700 years before present (Ogden et al. 1998). All the scientific evidence suggests that these fires were associated with early Maori settlement (Molloy et al. 1963, McGlone 1983, Ogden et al. 1998). This deforestation would have resulted in a dramatic reduction in forest cover and an expansion of tussock grassland and shrubland. While some forest regeneration would have occurred after fire, subsequent fires would have limited this. The vegetation encountered by the first European visitors to the Motunau Ecological District most likely comprised a mixture of short tussock grassland, cabbage tree treeland, mixed shrubland, kanuka regenerating forest, mixed podocarp-broadleaved forest, coastal broadleaved forest, and black beech forest.

3.4 Current vegetation pattern

Pasture and extensive grazing of sheep and cattle dominate the area around Kate Valley, the hill country between State Highway 1 and the coast. The steepness and erodability of the hills has limited the intensity of agriculture and therefore retained a stronger native vegetation component than in the more rolling hills and plains to the west and south. The larger areas of native vegetation in the Kate Valley CMA are discussed below (Section 3.7), while other native vegetation is generally limited to smaller patches of gully and riparian shrublands, scattered matagouri shrublands on steep faces, scattered tussocks on higher slopes, and wetland species in riparian and seepage areas.

The Kate Valley catchment, within which the Kate Valley CMA is largely located, comprises approximately 815 ha of modified farmland. The current vegetation is dominated by exotic pasture, although eight main vegetation types (with approximate percentage of land cover in brackets) are present:

- Exotic pasture (60%)
- Kanuka shrubland and mixed kanuka dominated broadleaved forest (15%)
- Matagouri/*Coprosma* (grey) shrublands (10%)
- Gorse shrubland (7%)
- Conifer plantations (3%)
- Wet pasture (3%)
- Native dominated wetlands (<1%)
- Black beech forest (<1%)

Exotic pasture is dominated by exotic grasses, clover and herbs and varies with moisture levels and exposure. In a few areas scattered silver tussock is present. Most of the gorse shrublands comprises a variable density canopy of gorse with grasslands interspersed in more open areas.

The kanuka shrublands and forests range from kanuka monocultures to more mixed stands with cabbage tree, small leaved *Coprosma* species, native broom, matagouri and taller stands with putaputaweta, five finger, mahoe and prickly mingimingi. The extent of understorey varies, presumably related to grazing pressures. Down-stream from Ella Bush SNA species associated with the coastal environment are evident including ngaio and golden akeke.

The grey shrublands are scattered within the valley with the most extensive areas on the north facing slopes of Ella Peak. They are generally open and interspersed with areas of pasture. Matagouri dominates and is found in association with *Coprosma crassifolia*, *Coprosma propinqua*, shrub pohuehue, native broom and occasional gorse. Silver tussock is also present. The conifer plantations are predominantly radiata pine, and some native species such as small leaved *Coprosma* species have colonised the understorey. The wetland areas are described below.

The black beech remnant known as Remnant "B" is dominated by black beech with other prominent woody species including kanuka, red matipo, soft mingimingi, mahoe, kohuhu, lemonwood and lancewood. Black beech is more abundant on ridges, where it can form a continuous canopy, while broadleaved species are more abundant in the gullies. The understorey of the beech area is sparse, although there can be local thickets of soft mingimingi and other species, but there is little evidence of recent beech regeneration. The black beech remnant is located amongst stands of kanuka and broadleaved species.

3.5 Fauna

A range of common native and exotic bush and open pasture bird species is present including bellbird, silvereye, grey warbler, fantail, chaffinch, yellowhammer, spur-winged plover, paradise shelduck and magpie. The invertebrate fauna of the beech remnant has been surveyed and comprises common species typical of both beech forest and the surrounding pasture. A population of the native carnivorous land snail *Wainuia edwardii* has been recorded near the road at Mt Cass/Tiromoana Scenic Reserve (DOC record December 2001). This is an outlying population of a species whose main distributional range is centered around Kaikoura. However, no snails have been found within the Kate Valley CMA, probably because potential habitats are restricted relative to the Mt Cass site due to historic and current grazing.

3.6 Waterways and Wetlands

Small streams incise the hill slopes forming tributaries to the main Kate Valley stream, which flows east to the coast. The upper reach descends through gorse and pasture dominated area to the middle reach, which is in a wide flat pastoral area. Prior to agricultural development this is likely to have supported an extensive wetland. The stream is now restricted to a small incised straight channel (probably artificially created). Below this area and the rock outcrops associated with the Ella Ponds, the stream descends down a waterfall and then, relatively steeply, through areas of shrubland and low forest. For the last 300 m, the stream meanders through pasture with steep eroding coastal cliffs to a sandy beach and the sea.

A freshwater fish fauna typical of soft sedimentary catchments in Canterbury is present in the area (NIWA 2000). All the species found (by electric fishing) are native and are mainly marine migratory species (ie., have part of their life cycle at sea). Only shortfin eel and upland bully (the only species that is not marine migratory) were occasional to common in the middle reaches and rare to occasional in the upper reaches of the stream. In the lower reaches inanga,

longfin eel, shortfin eel, common bully, upland bully and black flounder (rare) were also found. While not recorded from this stream, the habitat is typical for, and may support, lamprey, common smelt and giant bully.

The waterways are subject to high turbidity during times of high rainfall and runoff from the catchment. The low pasture dominated vegetation type intercepts less rainfall than a shrubland or forest community. This increases the amount of direct runoff and therefore silt load at times of high rainfall, although water quality should improve as reforestation occurs.

The Ella Pond complex consists of a permanent and an ephemeral pond and a connecting area of wetland vegetation. It was formed as a result of slumping of the adjacent side slope, which blocked the drainage of streams flowing to the coast. The ponds and wetlands formed behind the slumped material, which separates them from the Kate Valley stream. The slump landslide also reversed the flow so Ella Pond is now "up-valley", that is the ponds drain down towards the Kate Valley stream, rather than the stream flowing into the ponds and wetland area.

While the area is evidently affected by grazing there is still a strong native vegetation component including patches of purei, *Juncus gregiliflorus*, and other rushes and sedges, and one patch of raupo. Ella Pond flows down towards the middle reaches of the Kate Valley stream, where the wetland/wet pasture is dominated by pasture grasses with occasional rushes. Ella Pond is likely to have only limited fish species present given its location above the waterfall and limited connectivity with the Kate Valley stream. Eel may be present and it is possible habitat for banded kokopu although there is limited debris that would provide the appropriate habitat diversity. Mallard ducks, paradise shelducks, little shag, kingfisher, welcome swallow, and white-faced heron have been seen associated with Ella Ponds.

3.7 Adjacent natural areas

Nearby documented areas of high ecological value (Fig. 2) include two scenic reserves administered by DOC (Mt Cass/Tiromoana Scenic Reserve and Ella Peak/Tiromoana Scenic Reserve) and other areas listed in the Hurunui District Plan as Significant Natural Areas (Mt Cass Bush remnants, Ella Pond and Ella Bush). The Tiromoana Scenic Reserves were identified for reserve status in 1981 at the time of the creation of the Tiromoana title. The ecological values of Mt Cass bush remnants, Ella Bush and Ella Pond were identified by the former New Zealand Wildlife Service as Special Sites of Wildlife Interest, a list of areas that provide important habitat for wildlife. This restoration plan aims to provide connectivity between three of these sites, Ella Peak/Tiromoana Scenic Reserve, Ella Bush and Ella Pond which lie within or adjacent to the Kate Valley CMA.