THE VEGETATION OF BROOKLANDS LAGOON AND ITS CONSERVATION VALUE

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Introduction

Brooklands Lagoon is situated approximately 20 km north of Christchurch between Spencer Park and the mouth of the Waimakiriri River. As well as providing habitat for a number of animal and plant species, Brooklands Lagoon is also much in use for recreation by the human species. Activities include power-boating, water-skiing, trail-bike riding, horse-riding, recreational hunting, bird watching and walking. Some of these activities are compatible with the natural values of the area, however, others are having a high impact. While the proximity of Brooklands Lagoon to Christchurch is the primary reason for high usage, it also endues the area with a special conservation value. Brooklands Lagoon is one of the few wetlands within easy driving distance of a major urban area and it still contains some of the indigenous species that once dominated the coastline.

The area discussed in this article includes the lagoon and surrounding marsh as well as the sandspit the separates the lagoon from the sea.

The History of Brooklands Lagoon

European settlement in Canterbury began around 1850 and by 1852 much of the land at the Waimakiriri River mouth was taken up by the "Sandhills" sheep run. By 1912 it was discovered that the combined effects of sheep, rabbits and hares had severely depleted the vegetation in all but the wettest areas, allowing sand to drift inland. Marram grass (*Ammophila arenaria*) and *Pinus* species were planted extensively to stabilize the shifting dunes.

The earliest map of the area, (1856), shows the Waimakiriri River mouth to be almost 3 km south of its present position. The present lagoon resulted from a northward shift of the river mouth. Subsequently, the bed of the lagoon has risen by nearly one metre in places as a result of the establishment of marsh vegetation and the increased sediment load in the Waimakiriri River caused by flood control programmes.

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Past Vegetation

The past vegetation of the Brooklands Lagoon area can be inferred from the general vegetation reconstructions for coastal sites of Molloy (1969) and the remaining indigenous vegetation of both the lagoon surrounds (MacMillan 1971, Mason 1984, Simpson & Mason 1981) and less disturbed coastal sites of a similar nature (Mason 1969). The mobile dunes would have supported a fairly open community of *Desmoschoenus spiralis* (pingao) and *Spinafex hirsutus*. *Leptospermum scoparium* and *Coprosma* scrub with *Phormium tenax*, *Cortaderia richardii*, ferns and grasses would have occurred on the more stable back dunes and in the moist dune slacks. The latter sites would also have supported an array of low-growing herbaceous species (Mason 1969).

Further inland the swamp and semi-swamp areas would have supported a coastal swamp forest assemblage of *Prumnopitys taxifolia*, *Dacrycarpus dacrydioides*, *Kunzea ericoides* and *Podocarpus totara* (Molloy 1969). A low coastal forest containing broadleaf species such as *Dodonea viscosa* and *Myoporum laetum* may have existed on old dune surfaces on the seaward side of the Lagoon.

Present Vegetation and its Conservation Potential

(i) The Dune System

The vegetation of the dune system is characterised by *Ammophila arenaria* on the dune crests and faces with *Lupinus arboreus* dominating the damper hollows and lees. Occurring infrequently with *Ammophila arenaria* are *Calystegia soldanella* and *Carpobrotus edulis*. The vegetation is patchily distributed with abundant bare areas on steeper slopes and blow-outs.

The older dune hollows support many more species, due undoubtedly to the more favourable moisture regime and reduced exposure. Here *Lupinus arboreus* and *Sambucus nigra* form the upper tier along with *Pinus* species and *Phormium tenax*. The ground layer is dominated by adventive herbs such as *Cirsium arvense*, *Cynosurus cristatus*, *Holcus lanatus*, *Hypochoeris radicata* and *Lotus paniculatus* .

While the dune system supports few indigenous species, the presence of pingao in five small isolated patches adds much conservation value. These patches are no doubt threatened by the aggressive habit of marram grass and active management will be necessary for their survival.

Apart from ensuring the survival of pingao and the few indigenous species that persist, there is little impetus for the restoration of the indigenous vegetation of the whole dune system. Such a programme would at present be unrealistic given the degree of modification of the vegetation although the planting of pingao instead of marram grass on blowout areas should be encouraged.

(ii) The dune slack/salt marsh margin
The vegetation of the zone between the dune system and the salt-marsh is a mosaic of *Phormium tenax, Plagianthus divaricatus, Ammophila arenaria* and *Leptocarpus similis.* This community has much more potential for restoration given the presence of a single adult *Dodonea viscosa,* several *Leptospermum scoparium* individuals, *Phormium tenax* and *Plagianthus divaricatus.* The additional planting of indigenous woody species such as these and others previously recorded from the area would not only add value to the Brooklands recreational area as a whole but would also remove the need for retaining self-sown pines as dune stabilisers.

Just a note: Simpson & Mason (1981) recorded a ngaio (*Myoporum laetum*) near the single *Dodonea viscosa* , however despite a thorough search it was not encountered.

(iii) The salt marsh
The salt marsh is dominated by *Leptocarpus similis* and several species of *Juncus.* Slightly lower lying areas within the rush community and along the track around the lagoon edge support an assemblage of herbaceous species including *Plantago coronopus, Samolus repens, Selliera radicans* and *Triglochin striatum.* While *Salicornia australis* has been reported as being common on the saltflat (Simpson & Mason 1984), the area lacks the stands of pure *S. australis* that typify the saltflats of Lake Ellesmere, one of the few other substantial saltmarshes near Christchurch. This difference could be due either to a texturally coarser substrate or, more likely, a lower salt concentration allowing the dominance of less tolerant species.

The saltmarsh assemblage is the least modified vegetation type in the Brooklands Lagoon area; still retaining a high proportion of indigenous species especially in the turf-forming communities. As such it has high conservation values and should be managed to ensure that these values are retained. In addition to protecting the existing indigenous vegetation, a conservation strategy for the saltmarsh could include the reintroduction of saltmarsh species, previously recorded along the Canterbury Coast, that are becoming

endangered due to loss of habitat (e.g., *Baumea rubiginosa, Eleochaeris gracilis, Juncus holoschoenus* and *Scirpus lacustris*).

The infilling of the Lagoon with sediment will increase the area of marsh and eventually that of dry land also. The protection and encouragement of the remaining indigenous vegetation in the saltmarsh and in other areas will increase the likelihood of later successional stages on the Lagoon surface having a high indigenous component.

Conclusions

While the vegetation of Brooklands Lagoon is highly modified, it still contains a number of the indigenous species that once dominated the Canterbury coastline. As a 'crumb' of our indigenous heritage it is worth conserving and restoring, particularly as there are so few remotely natural areas remaining close to Christchurch.

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References

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Species List

Zones: 1: sand dune system
2: dune slack/salt marsh margin
3: salt marsh
4: at south end of Wildlife Refuge only

Indigenous

Acaena anserinifolia 2
Apium prostratum 3
Calystegia soldanella 1
Carex buchananii 4
Cassinia vauvilliersii 1
Cordyline australis 4
Cortaderia richardii 4
Desmoschoenus spiralis 1
Dodonea viscosa 2
Juncus caespiticus 3
Juncus gregiflorus 3
Juncus maritimus var *australiensis* 3
Leptinella dioica 2
Leptospermum scoparium 2
Phormium tenax 1,2
Plagianthus divaricatus 2
Plantago coronopus 2,3
Pteridium esculentum 1
Samolus repens 3
Scirpus pungens 3
Selliera radicans 3
Senecio glomeratus 2
Triglochin striatum 3
Typha orientalis 4
Zostera sp. 3

Adventive:

Agrostis stolonifera 4
Ammophila arenaria 1,2
Carpobrotus edulis 2
Cirsium arvense 1,2
Cirsium vulgare 1,2
Conium maculatum 1
Conyza canadensis 1,2
Cupressus macrocarpa 2
Cynosurus cristatus 1,2
Erica lusitanica 2
Festuca arundinacea 2
Holcus lanatus 2
Hypochoeris radicata 2
Juncus bufonius 3
Juncus effusus var *compactus* 3
Juncus planifolius 3
Leontodon taraxicoides 2
Lotus paniculatus 1,2
Lotus tenuis 2
Lupinus arboreus 1
Pinus pinaster 1,2
Populus alba 2
Rumex crispus 4
Salix fragilis 2
Sambucus nigra 1,2
Senecio sylvaticus 2
Sonchus oleraceus 2
Spergularia marginata 2
Stellaria media 2
Taraxacum officinale 1
Trifolium repens 2
Ulex europaeus 2
Vicia sp. 2

Other species recorded by Macmillan (1971) and Simpson & Mason (1984):

Achillea millefolium
Agropyron junceiforme
Alnus glutinosa
Atriplex 'hastata'
Bromus diandrus
Carex pumila
Centaurium erythraea
Chenopodium ambiguum
Cotula coronopifolia
Crepis capillaris
Cytisus scoparius
Deyeuxia billardieri
Epilobium billardierianum subsp. *cinereum*
Erigeron canadensis
Galium aparine
Gnaphalium luteo-album
Hypericum perforatum
Hypochoeris glabra
Montia perfoliata
Oenothera stricta
Parapholis incurva
Puccinellia stricta
Rosa rubiginosa
Rumex acetosella
Salicornia australis
Schoenus nitens var *concinnus*
Scirpus cernuus
Scirpus nodosus
Senecio elegans
Senecio jacobaea
Solanum nigrum
Sonchus asper
Suaeda maritima
Tamarix sp.
Trifolium arvense