

IN THE MATTER OF The Resource Management Act
1991

AND

IN THE MATTER OF A submission to the Board of
Inquiry into the proposed New
Zealand Coastal Policy Statement
2008

NZCPS SUBMITTER... 68
EVIDENCE 1 OF 2
DATE 14.10.08

EVIDENCE OF MICHAEL JOHN HILTON

1.0 Background

My name is Michael John Hilton. I am a Senior Lecturer in Geography at the University of Otago. I hold a doctorate from the University of Auckland (1990). I have been lecturing coastal processes and coastal management since 1992. During 1990 and 1991 I coordinated the preparation of the first New Zealand Coastal Policy Statement.

I remain closely involved with coastal management practice in New Zealand. I have served as the Minister of Conservation's representative on several hearings involving restricted coastal activities, including recent hearings for seawall development on Stewart Island. I have served in this manner for the last five years, which has greatly contributed to my understanding of resource management practice. I have also presented expert evidence at Environment Court hearings on behalf of the Department of Conservation.

My submission today is primarily concerned with the recognition and protection of coastal dunes. The geomorphology, ecology, restoration and

management of coastal dunes in New Zealand and Australia has been my primary academic focus for almost a decade. I have published a number of monographs, book chapters, scientific papers and reports on coastal dunes, including a national inventory of active dune systems. My applied research includes studies of the effect(s) of exotic species on dune function and ecology in the dune systems of Australia and New Zealand. I have looked at a range of species over the last decade, with a particular focus on marram grass (*Ammophila arenaria*) and tree lupin (*Lupinus arboreus*) in New Zealand; and PYP grass (*Ehrharta villosa*), sea spurge (*Euphorbia paralias*) and sea wheat-grass (*Thinopyrum junceiforme*) in southeast Australia. These weeds pose a major threat to the few remaining dune systems that retain high conservation values in New Zealand, either because they are in New Zealand and widespread (marram grass, tree lupin); have recently been introduced to New Zealand (PYP grass); or have the potential to self-introduce (sea spurge, sea wheat-grass).

Figure 1 – the spread of exotic dune species to Australian and New Zealand dune systems.

2.0 The recognition of national priorities in the New Zealand Coastal Policy Statement

The primary function of the NZCPS is to state national priorities for coastal management in New Zealand. In my view the proposed NZCPS fails to state these priorities in clear terms. The time for such ambiguity has passed. The pressures on the coast have increased significantly since 1994. The RMA1991 has *inter alia* formalized and improved decision-making processes in relation to resource use and development, however, the quality of decisions is being hindered by a lack of national leadership. The focus of my evidence today is on the protection of coastal dunes. Coastal dunes are worthy of particular attention because they contribute significantly to the natural character of our coastline and because they are critically threatened.

The NZCPS now needs to state specific policies for specific sites and their associated values – including coastal dunes of national significance. This argument is based on my observation of coastal dunes, dune systems and their associated natural and cultural values. I will present evidence that very few dune systems now remain intact in terms of their natural geomorphology, flora and ecology. Only a handful remain intact or in large part intact. These dune systems, or most of them, were identified in the Sand Dune and Beach Vegetation Inventory, published in 1992 (Johnson, 1992; Partridge, 1992). The dune systems that retained high natural values were described as “dune systems of national conservation value”. A total of 53 sites were identified as national priority sites for conservation – 23 in the North Island, 30 in the South Island and Stewart Island. Just 53 sites of national significance remain, in a country that extends from subtropical to sub-Antarctic latitudes. In a country that contains well over 1,000 dune systems, just 5 per cent retain high natural values.

Figure 2 – dune systems of national significance identified by Johnson (1992) and Partridge (1992), with additions (Hilton, 2006).

The condition of New Zealand’s coastal dunes is significantly worse than this statistic indicates, since many of dunes have not been closely examined since the mid 1980s and some have since been overwhelmed by weeds. Each of the above 53 sites, and a few more that have been identified since the Inventory was published, warrant recognition and careful management, if the natural character of the coastal environment of New Zealand is to be preserved. It is not sufficient to allude to the values associated with coastal dunes in the NZCPS, it is time to identify them, to map them and to state that their preservation is a matter of national priority.

I recall there was much debate on the issue of specificity and ambiguity during the development of the first drafts of the New Zealand Coastal Policy Statement 1994. The NZCPS as a statement of national policy, at the top of a formal hierarchy of policy statements and plans, was unprecedented - although

simple statements of national coastal policy had been released before. There were those within the policy team, including myself, that favoured a more explicit statement of policy, a more prescriptive statement of policy and one that offered greater guidance to local authorities. Ultimately, however, the NZCPS went through multiple iterations and the specificity of policy faded with each iteration. The imperative for leadership in coastal management was, I think, subsumed by the complex politic surrounding the resource management law reform process. It is timely for central government to provide that leadership, while significant values remain.

Failure to articulate national priorities for the protection of the natural character of the coastal environment has two consequences. Firstly, the national significance of a particular site may go unrecognized in the consent-granting or policy formulation processes. Few people are aware of the natural values of coastal dunes, in part because most accessible systems are extensively modified. Most South Island residents, for example, would be surprised to learn that marram grass is not an indigenous species and would have little or no idea of the pre-marram flora and fauna. [I use the term 'dune system' to capture the diversity of environments and habitats in unmodified dune systems.] This is a critical failing when one considers how few dune systems are left in many regions. For example, only one significant dune system remains intact on the entire east coast of the South Island, between the Catlins and the Marlborough Sounds (Kaitorete Spit). Similarly, only one dune system of national conservation value has been identified on the east coast of the North Island between East Cape and Cape Palliser (Porangahau South) – though perhaps more could be added. We have surely already lost considerable regional dune biodiversity because of the failure to recognize and protect key sites.

Secondly, I have observed, during Environment Court hearings, a lack of recognition of values associated with coastal dune systems. For example, consents were granted by the Court to continue to mine sand from the inshore bar along Pakiri Beach despite the values associated with the adjacent dune system, which were recognized by Partridge (1992). These included

significant populations of the critically endangered fairy tern, banded dotterels, variable oystercatchers, and the New Zealand dotterel. The foredune contains the most extensive population of pingao (*Desmoschoenus spiralis*) in the Auckland Region.

Figure 3 – coastal permits have recently been granted to mine sand from the seabed adjacent to one of the last remaining semi-pristine dune systems on the east coast of the Northland Peninsula, and the most remote and intact beach/dune system on the east coast of the Auckland Region.

3.0 The nature and state of New Zealand's coastal dune systems

Coastal dunes of late-Holocene age are a distinctive element of the New Zealand coast. Active dunes, the focus of this evidence, are characterised by ongoing or periodic eolian sedimentation and a sparse or patchy vegetation cover. They contain a diversity of dune environments and plant communities, and plant and animal species adapted to exposure and sand movement. This is a special and distinctive ecology which is often transitory as dune systems cycles of sand migration and stability.

Figure 4 – Active dune system, Mason Bay, Stewart Island. The landscape is largely the result of west to east sand transport, however, topographic diversity gives rise to a mosaic of habitats, including stonefields, wetlands, shrublands, coastal turf, mobile dunes and lakes. The flora is generally dominated by specialist dune plants. The site is one of three roosting and feeding locations for the threatened New Zealand dotterel, South Island subspecies.

The active dunes of New Zealand represent the most recent phase of dune mobility and dune system development. The genesis of these dunefields has been examined, but not resolved. Debate has centred on the relative

importance of human versus climatic disturbance (e.g. McGlone 1983, McRadgen 1989). The Polynesian settlers of New Zealand may well have disturbed, de-vegetated and destabilised particular dune systems. It is clear, however, that active dunes have been heavily modified since the arrival of Europeans in New Zealand, primarily as a result of the recent, widespread and very rapid stabilisation of active dune systems with marram grass (*Ammophila arenaria*).

The majority of active dunes in New Zealand now bear little resemblance to the accounts of Leonard Cockayne, one of New Zealand's founding botanists. Since Cockayne's early descriptions of the flora and vegetation communities of dunes (Cockayne 1909, 1911), marram grass has been planted throughout New Zealand to stabilise active dunes, establish foredunes for property protection and prepare dunes for afforestation with North American conifers, particularly *Pinus radiata*. These activities, often in conjunction with sand mining, stock grazing, infrastructure development, urbanisation and the introduction of a wide range of exotic plant, shrub and tree species, have contributed to the loss of the extent and natural character of active dune systems. Active coastal sand dunes may be New Zealand's most threatened natural habitat, measured both in terms of the diminished extent and modification of vegetation of remaining areas.

I mentioned a national study of New Zealand's active dunes above (Hilton, 2004, 2006). This study showed that the total area of active dunes in New Zealand in the early 1900s comprised 128,740 ha (Cockayne 1911). This is close to the estimate derived from the 1940s/1950s topographic maps used in this study. Active dunes were present in all regions, however, the largest systems occurred along the west coast of the North Island.

The area of active dunes in New Zealand declined from 129,402 ha in the 1950s to 38,949 ha in the 1990s - a reduction over the last 40 years of about 70 per cent (Hilton, 2006). All regions experienced a decline over this period, although the proportion varied. The extent of active dunes declined 7 per cent in the Wellington region, but the Manawatu Region lost over 80 per cent.

Regions with the largest area of active dune in the 1950s experienced the greatest decline.

Loss of active dunes occurred throughout the post-World War II period, although at different rates in different regions. Canterbury region experienced a 60 per cent decline between the 1950s and 1970s, largely as a result of stabilisation and afforestation of the Pegasus Bay dunes. In contrast, the area of active dune in Otago changed little until the 1970s, when many dune systems north and south of Dunedin were stabilised with marram grass and farmed or converted to plantation forestry. The area of active dune then declined rapidly. Nationally, the rate of loss of active dune has slowed since the 1990s, probably because many remaining dune systems are in the conservation estate.

Figure 5 – The decline in the area of active dunes on the Aupouri Peninsula resulted from Pinus radiata afforestation.

Retention of a relatively large amount of active dunes in some regions is notable, given the national trend. Southland, incorporating Fiordland and Stewart Island, lost just 31 per cent of active dunes and the West Coast only 14 per cent. The area of active dunes on Stewart Island (1,258 ha) has not changed significantly since the first available maps and aerial photographs, although marram grass has invaded large areas of the Doughboy Bay and Mason Bay dunes. Stewart Island and Fiordland comprise just 3.8 per cent and 2.1 per cent of the New Zealand post-War area of active dunes, respectively. However, they contain a disproportionately large number of sites identified by Johnson (1992) and Partridge (1992) as dune systems of national conservation significance - 23 of the 53 national priority sites occur in Southland, 10 of these in Fiordland, and nine on Stewart Island. A further 12 such sites are in Northland, even though that region lost approximately 76 per cent of its active dunes. This pattern is the result of two circumstances. Firstly, marram grass has only established recently in the remote Fiordland and Stewart Island dune systems, probably from the early 1960s. Populations of marram grass on these coasts result from long-distance dispersal, rather

than deliberate and concerted introductions. Secondly, marram grass does not, in general, displace *Desmoschoenus* or *Spinifex* from the foredune in the north of the North Island.

Figure 6 – Fiordland, Stewart Island and the Far North retain relatively intact dune systems. Kaitorete Spit is a key site on the east coast of the South Island. The southern dune systems must be actively managed to prevent and control marram grass, tree lupin and other weed species.

Causes of the decline in area of active dunes

The decline in area of New Zealand's active dunes is largely the consequence of the introduction and dispersal of marram grass, forestry and agriculture. Urbanisation, infrastructure development, sand mining, waste disposal and military activities have also been important, particularly near major urban centres. Marram grass has been used to stabilise active dunes prior to their conversion for these purposes. Marram grass was first recorded growing in New Zealand in 1873 at Miramar, near Wellington (Buchanan 1873). By 1900 large quantities were being imported from Australia, primarily to stabilise active dunes near major cities. The distribution of marram grass increased significantly when the (former) Lands Department began planting marram following the publication of Cockayne's 1911 report. Cockayne advocated the stabilisation of sand dunes, with the intention of reducing sand dune migration and establishing production forestry. The (former) New Zealand Forest Service subsequently developed technology to stabilise and fertilise active dunes and establish *Pinus radiata* plantations. Large areas of formerly active dunes in Northland, Auckland, Manawatu and Waikato were afforested during the 1960s, 1970s and 1980s (McKelvey 1999) following the general planting of marram grass. The decline in area of active dunes on the Aupouri Peninsula, for example, following World War II (from 32,100 ha to 8,735 ha), was a consequence of afforestation.

Marram grass is able to disperse and invade active dunes very rapidly, as illustrated by the case of Mason Bay, on the west coast of Stewart Island. Farmers at the southern end of Mason Bay introduced the grass in the 1930s (Hilton et al. 2005). In 1958 a few small areas of marram grass were present north of Martin's Creek (8.8 ha), approximately 9 km north of the liberation site. By 2000, the area of active dunes containing marram grass had increased to 270 ha, which then equalled about approximately 47 per cent of the active dunes north of Martin's Creek. The rate of invasion during this period was exponential (Jul, 1998).

Figure 7 – Marram grass displaces the indigenous dune flora and fauna, builds different landforms and landscapes and destroys natural dune function.

Figure 8 – Marram grass has degraded most dune systems south of Auckland, except those that are being actively managed in Southland and on Stewart Island and where natural conditions have slowed marram invasion (e.g. Kaitorete Spit).

Figure 9 –The Department of Conservation has spent significant time and money eradicating marram grass from Doughboy Bay, on the southwest coast of Stewart Island.

Figure 10 - This process experiences occasional setbacks as a result of new rhizome strandings, such as the one illustrated (Doughboy Bay, Sept 2008). Dunes exposed to marram grass invasion must be actively managed because of the ongoing risk of marram dispersal by floating rhizome. Remaining dune systems must be recognized and actively managed. All will require ongoing weed management.

Marram grass is now widespread in New Zealand and is the main threat to the remaining active dune systems. The Sand Dune and Beach Vegetation Inventory surveyed 332 South Island and Stewart Island beaches and 289 North Island beaches during the 1980s (Johnson 1992, Partridge 1992). At the

time marram grass was the dominant or only foredune species around much of the coast of the South Island between Cape Foulwind in the northwest and Puysegur Point in the southwest. Marram grass was also found in Fiordland and on Stewart Island, as well as many remote beaches in south Westland. Many of the infestations were small and indigenous foredune species were still common. By the 1980s marram grass had been widely planted in the North Island, particularly in the large active dune systems of Northland, Auckland and the Manawatu. Indigenous species still dominated the foredunes north of Hawkes Bay on the east coast. However, by this time marram grass was the dominant species on most of the west coast of the North Island.

The cover of marram grass increased significantly in the period 1985-2005. In the South Island, only two areas, Fiordland and Stewart Island, still contained dune systems substantially free of marram grass by 2005. Kaitorete Spit, south of Christchurch, contains marram grass, however, the active dunes are still relatively intact, although with a large infestation of tree lupin. Marram grass is now the dominant species around most of the North Island, with the exception of the northeast coast between North Cape and East Cape and scattered sections of coast north of Hawkes Bay, Wellington and Auckland. Indigenous species have not been displaced between North Cape and East Cape on the northeast coast of the North Island, except where marram grass is being actively managed in association with forestry operations (e.g. Pakiri), or in areas of coastal subdivision and development. It seems likely that, within 20 years, marram grass will dominate the foredunes of nearly all New Zealand dune systems, except where it is being actively controlled. The potential for marram grass to invade dune systems on the northeast coast of the North Island, between East Cape and North Cape, as well as the west coast of the Northland Region, has yet to be determined.

4.0 The New Zealand Coastal Policy Statement needs to provide stronger direction to local authorities and government agencies

Coastal dunes and their associated indigenous flora and fauna are in a perilous state. The natural character of most dune systems has been lost and only active management can secure the remaining systems. The New Zealand Coastal Policy Statement needs to include a policy that ensures the remaining dunes of high conservation value are recognised and protected. I cannot see how the purpose of the RMA 1991 and the preservation of the natural character of the coastal environment can be achieved without such a policy. While some dune systems are recognised, particularly those within the national parks of southern New Zealand are recognised, many are not. Moreover, those dune systems that are being actively managed are subject to pressures from adjoining lands, including the movement of weed propagules. Long-term preservation of some dune systems may require the establishment of buffer zones and effective management of cross-boundary effects.

The New Zealand Coastal Policy Statement should identify the remaining 50-60 dune systems of national conservation value (in a new schedule to the Statement) and direct that adverse effects arising from activities in or adjacent to these systems must be avoided. I request the inclusion of the following policy:

Policy # Preservation of coastal dunes of national significance

The preservation of the active coastal dunes listed in Schedule # is a national priority. Plans and policy statements and decisions must ensure these dune systems are protected from inappropriate use and development, by:

- (a) ensuring that activities within or adjacent to these dune systems do not spread or result in the establishment of invasive exotic plants;
- (b) ensuring the restoration of degraded dune systems;
- (c) providing appropriate public access and information;
- (d) avoiding development that adversely affects the ecology, botany or geomorphology of these dune systems, including disturbance to coastal sand systems in the adjacent coastal marine area;

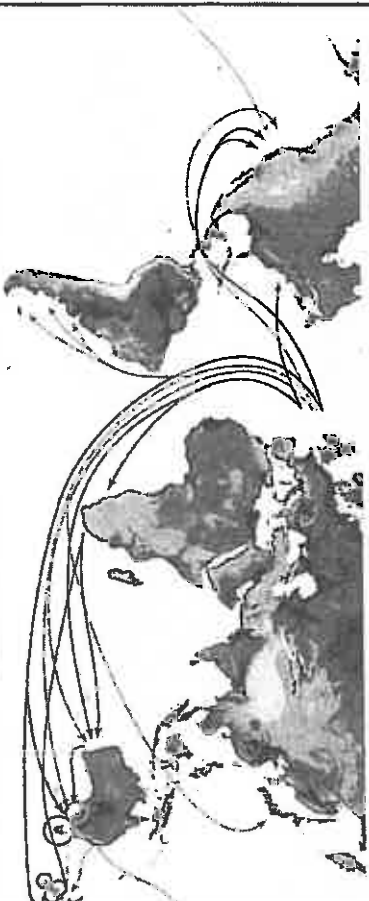
References

- Buchanan J (1873). List of plants found on Miramar Peninsula, Transactions of the New Zealand Institute, 6, 349-352.
- Cockayne L (1909). Report on the Sand Dunes of New Zealand: The Geology and Botany with their Economic Bearing, Department of Lands, Wellington.
- Cockayne L (1911). Report on the Dune-Areas of New Zealand: Their Geology, Botany and Reclamation, Department of Lands, Wellington.
- Hilton (2004)????????????????
- Hilton M J, Jul A and Duncan M (2005). Processes of *Amnophila arenaria* (marram grass) invasion and indigenous species displacement, Stewart Island, New Zealand, Journal of Coastal Research, 21, 175-185.
- Hilton (2006)????????????????????
- Johnson P (1992). The Sand Dune and Beach Vegetation Inventory of New Zealand. II. South Island and Stewart Island, Land Resources Scientific Report Number 16, Department of Scientific & Industrial Research, Christchurch.
- McFadgen B (1989). Late-Holocene depositional episodes in coastal New Zealand, New Zealand Journal of Ecology, 12, 145-149.
- McGlone M (1983). Polynesian deforestation of New Zealand: a preliminary synthesis, Archaeology in Oceania, 18, 11-25.
- McKelvey P (1999). Sand Forests, Canterbury University Press, Christchurch.

Partridge T (1992). The Sand Dune and Beach Vegetation Inventory of New Zealand.

1. North Island, Department of Scientific & Industrial Research, Christchurch.

1. Origin of the exotic species that pose a major risk to dune systems



Marram grass
Ammophila arenaria



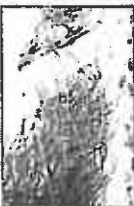
Sea spurge
Euphorbia paralias



Pyp Grass



Sea wheat-grass
Thioplyrum junceiforme



Tree Lupin
Lupinus arboreus

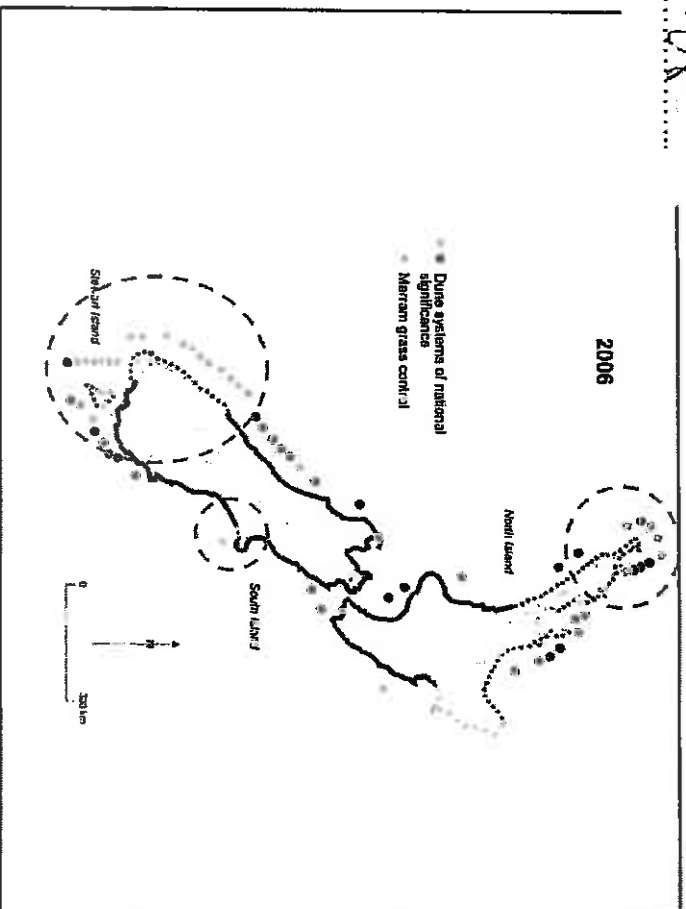


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DATE *14.10.08*



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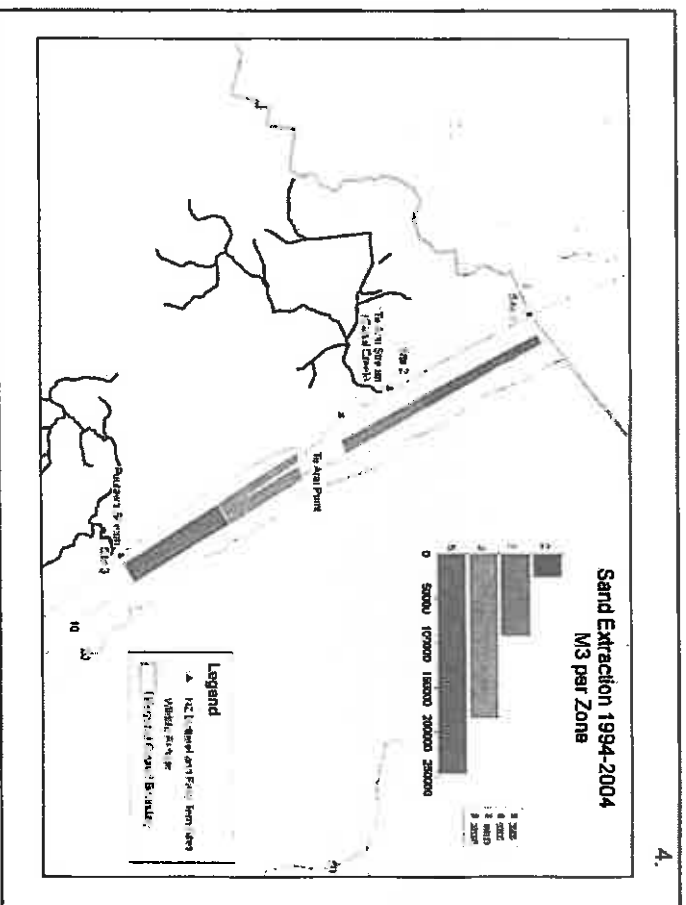
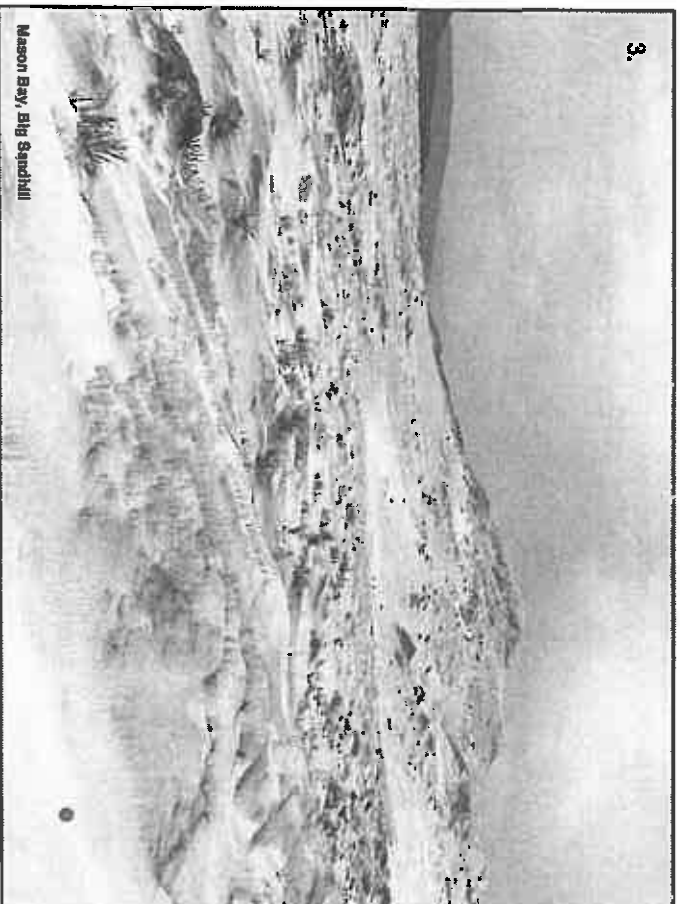
Dune systems of national significance

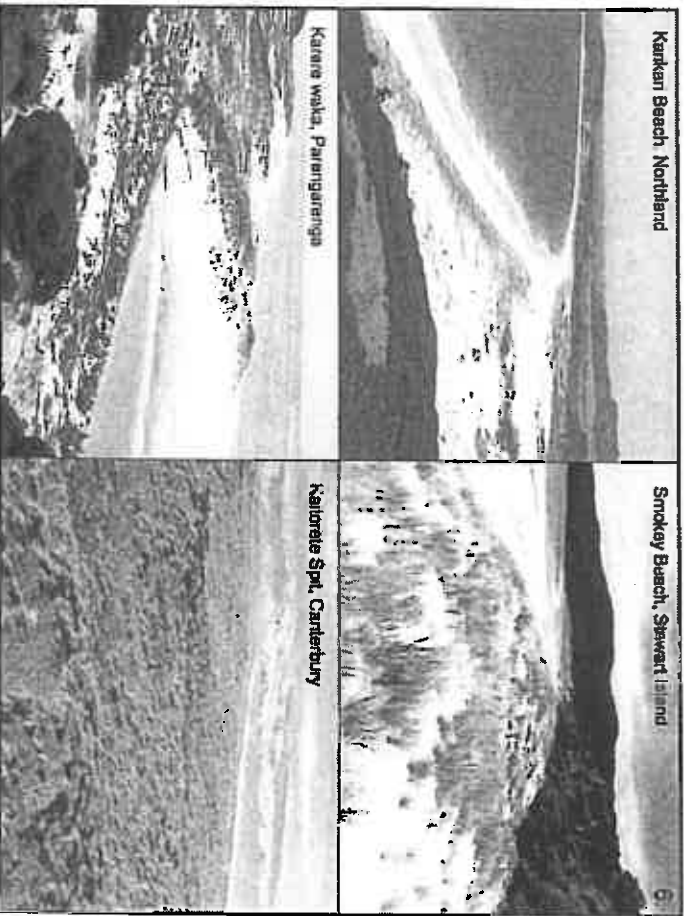
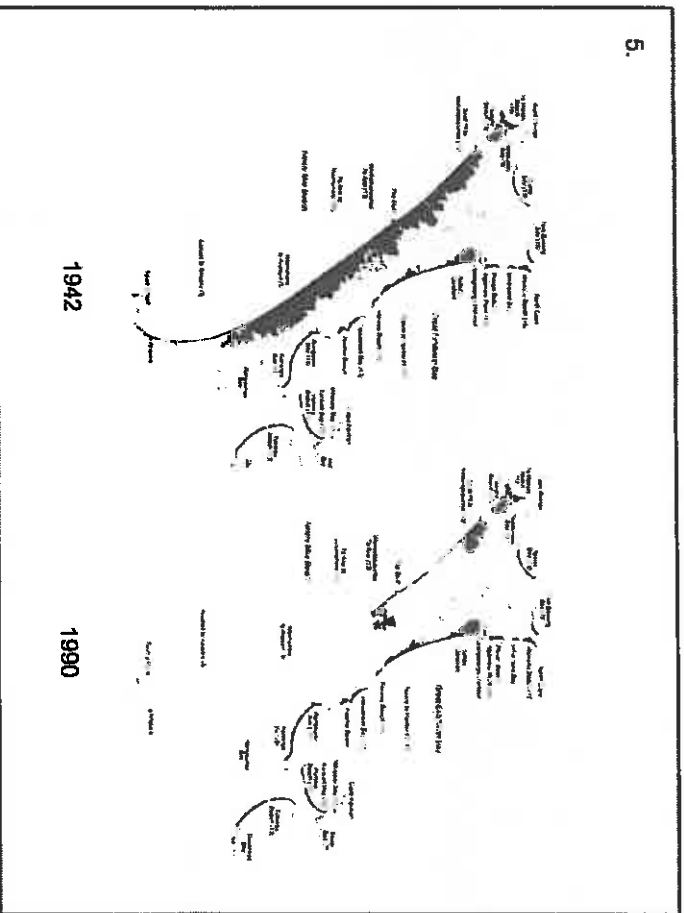
Marram grass control

North Island

South Island

0 200 km





7.

Impacts of marram grass

Short term (10^1 - 10^2 y)

displaces most indigenous dune plants

provides cover for predators

allows the establishment of other exotic species

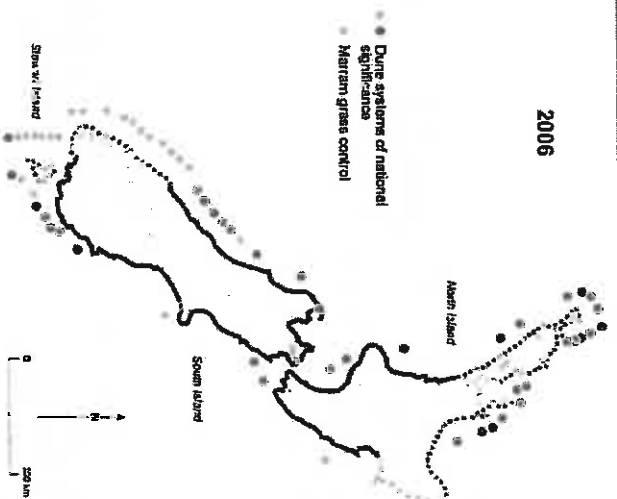
Medium to long term (10^2 - 10^3 y)

may prevent transgressive dune development

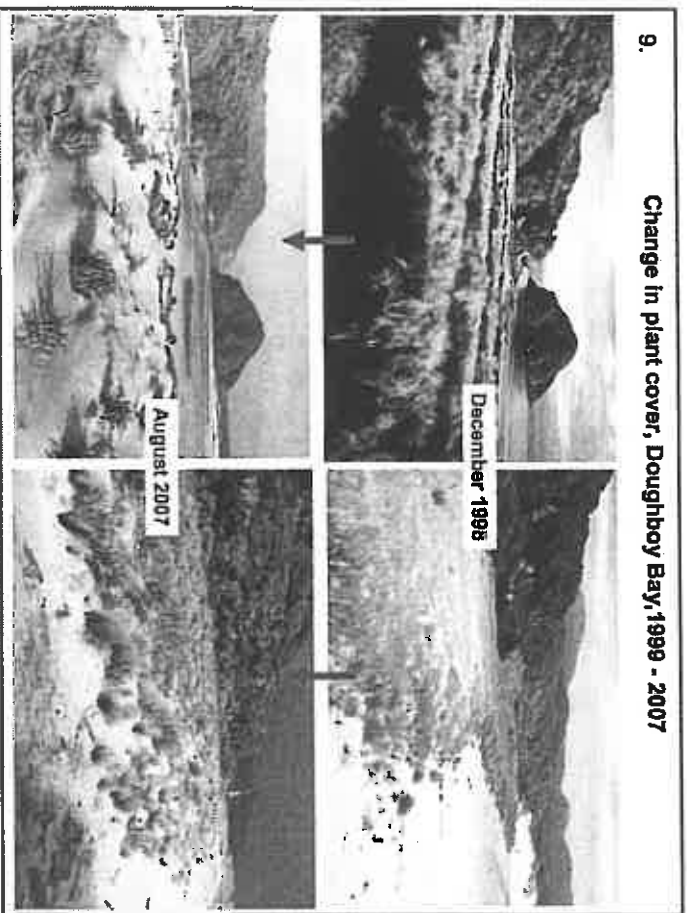


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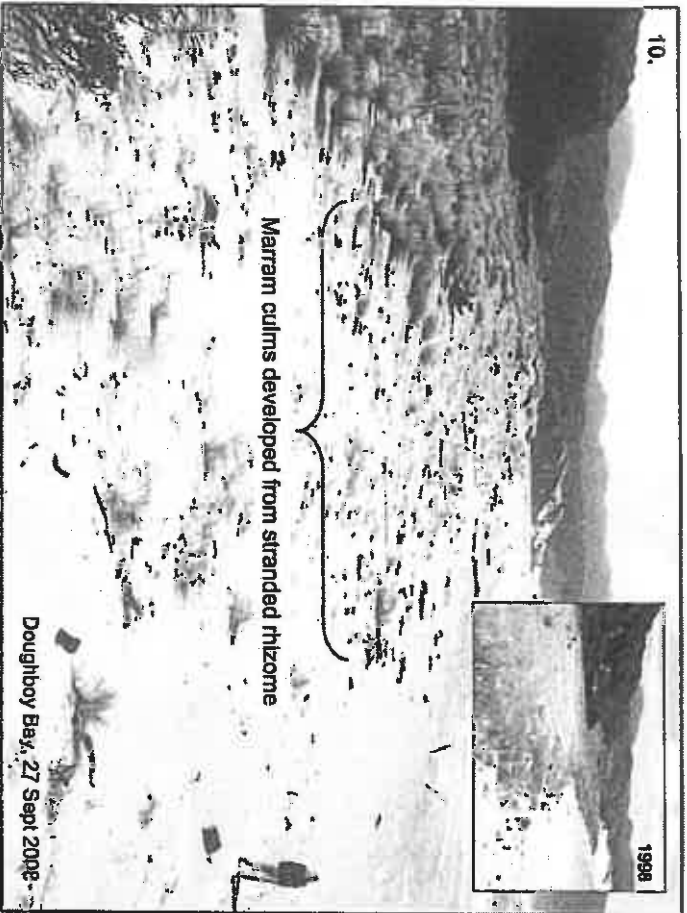
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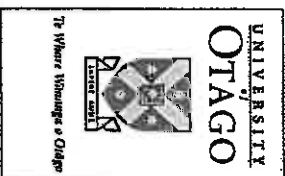
9. Change in plant cover, Doughboy Bay, 1999 - 2007



10.



① Rec'd 2/11/08



16 November 2008

Judge Shonagh Kenderdine
Chair, Board of Inquiry into the
Proposed New Zealand Coastal Policy Statement 2008
Administration Office of the Board of Inquiry
Proposed New Zealand Coastal Policy Statement 2008
PO Box 10-420
Wellington

Dear Judge Kenderdine & Board Members

**LIST OF COASTAL DUNES OF NATIONAL CONSERVATION
SIGNIFICANCE**

I undertook to prepare a list of dune systems of national conservation significance, which might form an appendix to the NZCP Statement. I earlier proposed a policy for inclusion in the Statement that referred to this appendix. The purpose of this statement would be to promote the sustainable management and preservation of remaining 'active' dune systems.

The attached document contains a list of dune systems, sorted by region. The list was compiled from the experience of the Dune Research Group at the University of Otago, from published works and through consultation since I presented my evidence. No list of this nature is complete, but I believe the list contains the major dune systems. Certainly the list includes all the larger sites that are likely to represent multiple values, including flora and fauna, cultural and geomorphic.

We have undertaken an exhaustive search of literature but we are still uncertain whether we have identified all the major sites in the Waikato (west coast), Taranaki, East Coast and Hawkes Bay. Coincidentally, we depart tomorrow on a 20-day survey of these dune systems. Perhaps I will have the opportunity to add to the list before the end of December? At this time I could also add notes on the particular values of each dune system. Thank you again for the opportunity to advance this issue.

Kind regards

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Active Dune Systems of National Conservation Value

Northland

East Coast (north to south)

Waikuku Beach
Ponaki Beach
Ngamaru Point
Kokota Spit
Taeore – Paxton Point
Rawawa Beach
Henderson Bay
East Beach
Pukeke Beach
Karikari Beach
Ngunguru Spit
Ocean Beach
Mangawhai Spit

West Coast (north to south)

Tom Bowling Bay
Spirits Bay
Te Werahi Beach
Twilight Beach
Te Paki
Kawerua – Maungani Bluff
Black Rocks -- North Head (North Kaipara Peninsula)

Auckland

East Coast

Pakiri Beach
Omaha Beach
Tawharanui Peninsula (northern beaches)

West Coast

Papakauai Spit -- South Kaipara Head
Te Henga
Whatipu Beach

Waikato

East Coast

Waikawau Beach
Matarangi Beach
Otama Beach

Hot Water Beach
Opoutere Beach

West Coast*

Bay of Plenty*

Ohiwa Spit

Manawatu – Wanganui*

South of Hokiio Beach
Foxton - Himatangi Beach
Rangitikei river to Himatangi beach
Tangimoana
Whangaeahu River - Kaitoke stream
Wairimu Beach (Nukumarua recreation reserve)

Taranaki*

Waitotara to Waverly Beach
Waverly Beach/Waipipi Beach
Kina Road and Oaonui beach
Waipingau Stream

Gisborne*

Waiomoko River

Hawkes Bay*

Rangaiika Beach
Whakaki Beach

Wellington

Wairarapa
Ocean Beach
Te Humeunga Pt
Porangahau South
West of Cape Palliser
Uruti Point
Castlepoint

Wellington (contd.)**South Coast**

Te Kawakawa
 South of Otakaha stream
 Te Humenga Pt
 Whatarangi

Nelson – Marlborough***Farewell Spit****Canterbury****Kaitorete Spit****Otago**

Tahakopa Bay
 Tokomaitiro River Mouth (south)
 Waipati Beach
 Longbeach and Dummys Beach

Westland

Three Mile Beach
 Five Mile Beach
 Gillespies Beach
 Ohinemaka River
 Shipcreek – Waita River
 Cascade River
 Barn Bay

Southland**Fiordland**

Big Bay
 Martins Bay
 Transit Beach
 Poison Bay
 Sutherland Sound
 Catseye Bay
 Pandora River
 Coal River
 Te Whara Beach

Southland (contd.)**Eastern Southland**

Toetoes Harbour Beach / Fortrose Spit
Three Sisters
Sandhill Point

Stewart Island & Codfish Island

Smokey Beach
Three-legged Wooden Bay
Doughboy Bay
Mason Bay
Little Hellfire
Big Hellfire
Sealers Bay (Codfish Island)
West Ruggedy
East Ruggedy
Murray Beach

* further survey is required

