



# OUR DISAPPEARING NATURAL DUNELANDS

Pingao mantles the dunes of Sand Hill Point, Waitutu.

Photo: G. McSweeney

**By Shannel Courtney**  
Botanist and Society Member

Our natural dunelands support a small but fascinating range of native plants and animals. Like many of our remaining natural areas, natural dunelands are threatened as a result of past and present development. Despite this, they are inadequately represented in our reserve system.

"To our left was the open ocean. To our right, mile after mile of low, rounded sandhills ... stretched out as far as we could see ... fringed with *Spinifex*, *Desmoschoenus* and other common arenarian plants".

This is an extract from Thomas Cheeseman's account of the dunes of Northland's Aupouri Peninsula in 1896. New Zealand has over 100,000 hectares of dune country bordering its coastline and therefore extensive natural dunelands covered with an array of distinctive indigenous species would once have been a common sight throughout the country. But to many early settlers New Zealand's dune systems were regarded as sandy wastes — unproductive unless developed. Unfortunately, such attitudes persist even today, and reflect our disregard for the protection of our remaining natural dunelands. They have been reduced to a fraction of their former extent. Together with lowland forests, shrublands, wetlands and tussock grasslands, they join the list of our most threatened habitats.

## The dune environment

The dune environment is one of the most extreme and exacting habitats in New Zealand. This ecosystem supports a small group of highly specialized plants and animals.

These species must resist desiccation by unchecked onshore winds, and withstand the burning effects of salt spray. They must cope with large amounts of



At Mason Bay on Stewart Island's west coast prevailing westerly winds have formed 100 metre high dunes covered in rata hardwood forest. The more recent dunes in the distance support pingao, some marram and red tussock.

Photo: M. Byrnes



drifting sand and constantly struggle against burial and undermining. Plants and animals found here must also tolerate the sand's high temperatures, high reflectivity, low nutrient status and low capacity to hold water. If this is not enough, the plant species nearest the coast are periodically inundated by seawater during spring tides and storm surges.

## Dune zonation

A typical dune system has a landward sequence of zones which runs parallel to the coastline. The strand line just above the high tide mark is the first of these zones. It is characterized by a collection of washed up flotsam including driftwood and seaweed. Directly behind the strand is the foredune zone. Here active dune building is occurring. Behind this is a complex system of reardunes which may exceed 100 metres in height and extend up to 4-5 kilometres inland.

Interspaced throughout the reardune zone are numerous deflation hollows where sand has been removed down to the water table. Permanent lakelets may occur here.

On the more stable reardunes, vegetation may eventually be succeeded by coastal forest such as the dune podocarp forests of south Westland, the forests at the mouth of the Tahakopa river in the Catlins, and kauri forest on consolidated dunes in Waipoua State Forest.

A variety of habitats with their associated fauna and flora adjoin dune systems. These range from coastal turf meadows, estuaries and lagoons, to



A marram grass control programme is underway to protect the natural dunes of Fiordland National Park.

Photo: M. T. Sykes

swamps (eg Kaimaumau, Northland), red tussock grassland (eg Mason Bay, Stewart Island) and coastal scrub and forest.

## Native plants of the dunes

The most widespread and successful plants of our natural dunelands are pingao (*Desmoschoenus spiralis*) an endemic sedge and spinifex (*S. hirsutus*) a grass also native to Australia.

Pingao is found from North Cape to Stewart and Chatham Islands. It's tufted shoots of arched orange-green leaves makes it the most colourful plant of the dunes. Often it can be seen growing sinusously down a dune face.

Spinifex occurs throughout the North Island and across the top of the South Island. Its slender network of stems criss-cross the dunes, every so often throwing up a sward of silver-haired leaves. Its flowers develop into starlike clusters of ripe fruit which are often seen dispersing their seeds as they blow along the foreshore.

Both pingao and *Spinifex* are true sand binding and dune building plants. Airborne sand is trapped amongst their spreading shoots. They grow upwards so as not to be buried as sand gradually accumulates around them. By this process a dune eventually builds up.

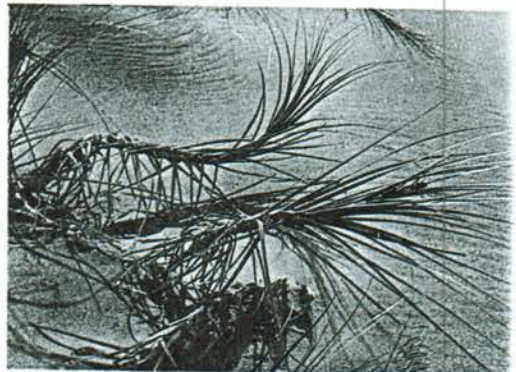
Sand sedge, *Carex pumila* creates dunes in a similar manner although not nearly as effectively. It spreads an open carpet over the moist sand of the strand zone and deflation hollows.

Sand convolvulus, *Calystegia solanella*, with its glossy heart-shaped leaves, and purple-pink trumpet flowers is found mainly on the foredune.

There are four other special plants of the foredune and strand line which, although widely scattered throughout New Zealand, have become quite rare. These are the shore milkweed, *Euphorbia glauca*, which has blue-green fleshy leaves and clusters of red flowers; *Pimelea arenaria*, the sand daphne; *Poa triodioides*, a sand tussock; and *Theleophyton billardieri*, a small mealy-leaved herb related to fathen.

Two ranunculi also occur on the sandy shore: *R. recens*, a small, hairy-leaved buttercup; and *R. acaulis*, which replants itself by turning the ripe fruit downwards into the sand.

One of the rarest plants in the world, *Gunnera hamiltonii*, of which there is one known wild specimen (a male) spread over



Pingao, *Desmoschoenus spiralis* traps drifting sand to form dunes — Manukau Heads, Auckland.

Photo: G. Loh



Sand convolvulus *Calystegia solanella* is a common native plant on the foredune — Anapai Beach, Abel Tasman National Park.

Photo: G. McSweeney

about 30 metres occurs at Mason Bay on Stewart Island at the interface of the reardunes and red tussock grassland and coastal forest.

Sand plants of the more stable rear dunes include the low growing, wiry-stemmed sand coprosma (*Coprosma acerosa*), the densely tangled pohuehue (*Meuhlenbeckia complexa*), and the heady smelling tauhinu (*Cassinia leptophylla*). A curious prostrate broom (*Carmichaelia appressa*) also occurs on semi-stable dunes, and is totally confined to Kaitorete Spit, near Lake Ellesmere, Canterbury.





These rear dune plants are less able to resist the advance of sand than true sand binders, but are able to produce the root systems necessary to ensure dune stability.

The more conspicuous plants of the moist sand hollows include jointed wire rush (*Leptocarpus similis*) which on its pedestal of roots and old leaf bases, may attain heights exceeding three metres; the northern pampas, (*Cortaderia splendens*), flax (*Phormium tenax*), knotted sedge (*Scirpus nodosus*), and the wire rush, *Eleocharis novae-zelandiae*.

## Native animals of the dunes

The most diverse group of animals found on our natural dunelands are insects and spiders. Perhaps the best known is the katipo (*Latrodectus katipo*), one of our most poisonous spiders. Katipo are retiring creatures and may be found in dry places amongst driftwood or the tufts of sandbinding plants. Only the female is poisonous, and produces venom when she is incubating or rearing her offspring.

The sand dune hopper with its peculiar sand digging leg paddles, and the sand beetle with multi-speckled coat, are common inhabitants of the strand zone and seaward facing foredunes. They are both likely prey of the carnivorous beach centipede. They may also fall prey to the large native littoral earwig which is particularly common beneath driftwood along the strand.

Another common sand dweller is the nocturnal sand scarab beetle. The larvae resemble oversized huhu grubs, and spend most of their time buried in moist sand feeding on rotten driftwood, and the roots of pingao and spinifex. The adults have shiny armoured wings and are clothed below in golden downy bristles. They are weak fliers due to their sheer bulk, and at dusk their plaintive droning can often be heard across the dunes.

Moths and butterflies are also commonly encountered amongst the dunes. Some species of moth are entirely restricted to the dune environment. Spinifex, pingao, tauhinu and poehue are important food sources for the larvae of both groups.

A number of native lizards range into sand dunes throughout the country, although none are restricted in distribution solely to dunes.

Our dunes support only a few native birds, unless they are adjacent to estuaries and lagoons and provide high tide roosts for a host of gulls and waders. The New Zealand pipit and banded dotterel often frequent the dunes, and can be seen racing along the strand line in search of sandhoppers and other morsels. The Australasian harrier is also a common dune resident and has been observed nesting amongst pingao. Dune country on spits and adjacent to river mouths, in Northland and Stewart Island, may sometimes support the rare New Zealand dotterel which breeds in this habitat.

## Threats to our natural duneland

### (a) Exotic conversion

When Europeans began colonizing New Zealand attempts were made to stock the more extensive dune country with sheep and cattle. The livestock grazed and

trampled the sparse vegetation cover. To control the resultant large scale dune erosion European marram grass was planted throughout the country, especially on the Manawatu and eastern South Island dunes. Eventually much duneland was stabilized by dense swards of marram and converted to pasture.

Extensive plantings of marram and tree lupin by the New Zealand Forest Service and private forestry companies have stabilized much natural duneland for pine plantations. Most of the Ninety Mile Beach dunes, dunes from Kaipara harbour to Muriwai, North Canterbury dunes and some of the Manawatu sand country have been stabilized and converted to exotics in this way.

Because of these plantings, marram has further spread both vegetatively and by seed to become the most widespread dune plant in New Zealand. It successfully competes with pingao and spinifex in most situations, and has supplanted much of the original vegetation.

Buffalo grass and kikuyu grass in the northern half of the North Island, gorse and lupin are also capable of stabilizing dunes and displacing the natural plant cover.

### (b) Sand mining

To date, over 35 mining and dredging operations are extracting dune sand on Crown owned land, from South Westland to Northland. Many are extracting sand from natural dune systems such as those on Kaitorete Spit, Lake Ellesmere and Kokota Spit bordering Northland's Parengarenga Harbour. Although many of these operations are small, they are able to modify and in some cases destroy these dune systems over a relatively short period.

(c) **Urban and recreational development**  
Most of the dune country close to major population centres has suffered from over-use. Reclamation of duneland for holiday houses, and damage incurred through horseriding, dune buggy and trail bike riding, have all contributed to the dunes demise.

Roading construction also poses a threat to some of our natural dunelands. The recent proposal to log Waitutu forest requires the construction of a coastal access road which would pass very close

**The best known new Zealand spider, the katipo, is seldom seen. This shy animal is commonly found amongst dune vegetation. This female with her egg case was photographed at Waikanae beach near Wellington.**



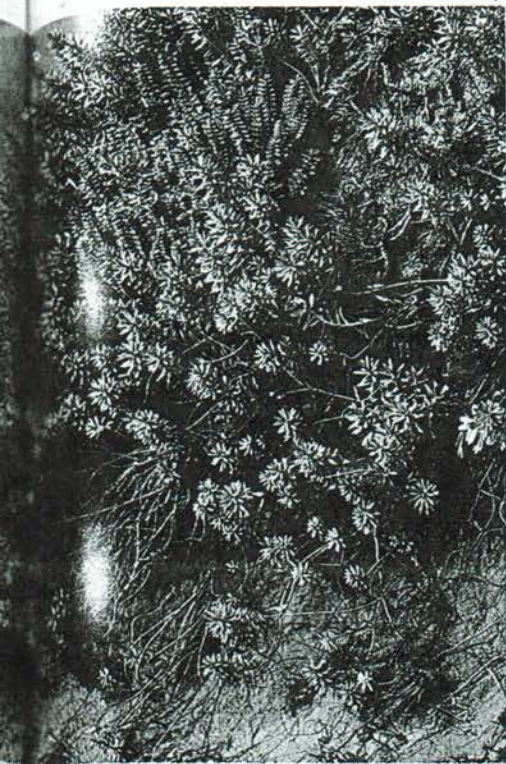
to the pristine dune country at Sandhill Point.

### (d) Introduced animals

Damage to our dunelands by stock has been largely unchecked. Even at Te Pahi Farm Park in the far north, which is managed by the Department of lands and Survey, cattle are allowed free access to otherwise unmodified dunescapes worthy of National Reserve status. At Spirits Bay cattle have almost eliminated the endangered Hibiscus (*H. diversifolius*) from the dunes — three plants now remain on these dunes.

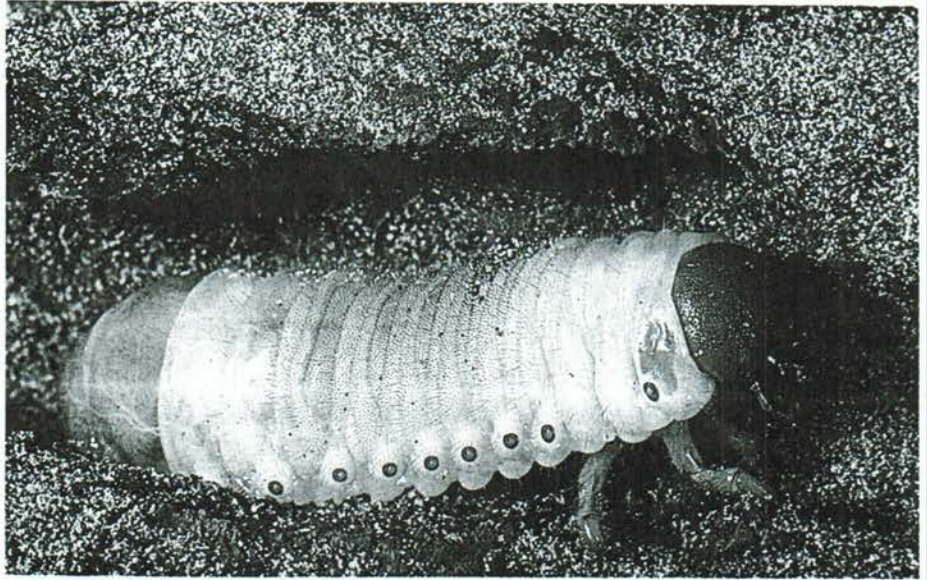
Rabbits and hares are also frequent browsers of our duneland plants. Although much of the foliage of adult sandbinders is unpalatable to them, they create their own special problem in that they browse seedlings instead. Browsing pressure can be so high that seedlings never establish and sandbinders must rely on less effective vegetative spread.





Native sand spurge, *Euphorbia glauca* at Sand Hill Point, Waitutu. DSIR studies in Southland found that this species survives today on only two of 25 Southland beaches.

Sand scarab beetle larvae. The large grubs spend much of their time buried in moist sand feeding on rotten driftwood and the plant roots.



Native shore earwigs can frequently be found beneath driftwood on the seashore.

### Natural duneland distribution today

Our remaining natural dunelands are concentrated in Northland, the Cascade-Martin's Bay area, Fiordland and Stewart Island. Other areas of importance are Farewell and Kaitorete Spits, and parts of eastern Coromandel Peninsula, Manawatu and South Westland.

Of dune systems that have been highly modified, the most notable are along the coastlines of the Bay of Plenty, Manawatu-Wanganui, north Gisborne, Chatham Islands and the dune country along most of the east coast of the South Island. One may walk along many miles of these coastlines without encountering a single native plant.

Factors responsible for the decline in natural dunelands continue to operate and our natural dunelands are poorly represented in reserves. The few reserves that do support natural duneland are usually too small and often do not provide adequate protection. For example, the Kaitorete Spit Scientific Reserve, which was created to protect the Spit's dune system encompasses but a fraction of it

and does not include the important coastal parts of the dune sequence including most of the pingao communities. Some dune systems are protected by sheer chance, such as those within the Farewell Spit Nature Reserve and Fiordland National park, where the main reasons for protection have been to conserve other natural values.

Fortunately most of our remaining natural dunelands are on Crown owned land and could be given protective status by the stroke of a pen. However, it will also be necessary to devise management strategies to remove stock, to control introduced animals, control mining and in appropriate circumstances control the further spread of exotic weeds.

Our natural dunelands have not been acknowledged as an ecosystem with conservation values equal to those of other natural areas. Steps should now be urgently taken to ensure the protection of the natural dunelands, that remain. Unless this is done we will eventually lose another part of our native heritage which contributes to New Zealand's distinctive character.

### References

- Cheeseman, T. F. (1986): On the flora of the North Cape District. Transactions of the New Zealand Institute, 29:333.
- Courtney, S. P. (1983); Aspects of the Ecology of *Demoschoenus spiralis*. Unpublished M.Sc. thesis, Canterbury University.
- Tortell, P(ed) (1981): New Zealand Atlas of Coastal Resources. 60p and maps, Government Printer, Wellington.

### Cultivation and Use of Pingao

Pingao (*Desmoschoenus spiralis*) was widely used by the early Maori as a weaving material. The long, narrow leaves turn bright golden yellow when dry which provided contrast to red and black dyed fibres used in tukutuku panelling. With the recent resurgence in Maori crafts there is an increasing demand for pingao as a raw material. But it is no longer plentiful and has become locally extinct in many parts of the country.

It is possible that the demand for pingao can be met by supplementary planting or re-establishment on modified dunelands.

Pingao is extremely difficult to raise from seed, but has been grown with some success by transplanting young healthy shoots.

These shoots are transplanted in late winter before the new season's growth begins. They must be planted so their growing tips are well within the moist sand zone and below the dry surface layer. Often this means burying the tufts so only the top quarter of their leaves are emergent. Pingao thrives best on unconsolidated sand which is free from marram grass.

Transplanting and artificial cultivation of pingao could provide a sustainable resource and would lessen the need to harvest from the dwindling natural populations.



## Contents

Articles	
2	Our disappearing natural dunelands
6	Kaitorete Spit
10	Making the most of outdoor trips
14	What future for kauri?
18	Why the Coromandel should not be mined
21	The Presidential changeover
23	Conserving the Kakirori
Departments	
22	Conservation Update
26	Junior Section
29	The Bulletin
31	Society Officers
32	Society Lodges

Cover: Few dunes covered in native vegetation remain today. Pingao (*Desmoschoenus spiralis*) covered dunes once dominated Tautuku beach, South East Otago shown here, but pingao has now been ousted by introduced marram grass.

Photograph: A. F. Mark

Journal of the Royal Forest & Bird  
Protection Society of New Zealand Inc.  
ISSN 0015—7384

*Forest & Bird* is published quarterly by the  
Royal Forest & Bird Protection Society of  
New Zealand Inc.

Head Office: Seventh Floor, Central House,  
26 Brandon Street, Wellington.

Postal address: P. O. Box 631, Wellington.

Editor: David G. Collingwood.

Recommended price \$4.00

Registered at P.O. Headquarters, Wellington as a magazine.

Design and typesetting by Bryce Francis Ltd and printed in  
association with Commercial Print Ltd.



## Saving our heritage!

I write my first editorial as President of the Society in the midst of a general election campaign. By the time you read this there will be a new administration and possibly a change of Government. For the incoming Government there are significant nature conservation priorities.

Firstly they should recognize that preservation of our natural environment is not a selfish or narrow objective. By preserving nature we are protecting the key features of our country that distinguish us from the rest of the world. Our kauri forests, coastlines, forests, tussock grasslands, lakes and rivers occur nowhere else in the world. They deserve protection in their own right and are also a major attraction for visitors to this country who will leave behind nearly \$600 million in foreign exchange this year.

Preservation of a representative network of natural areas throughout the country is one of the highest priorities for nature conservation today. The scientific methodology for the programme has been developed by the DSIR's Biological Resource Centre and needs an adequate funding base. The test of the programme's effectiveness, however, must be whether reserve recommendations are implemented in the face of rapid change of natural ecosystems throughout the country by the expansion of forestry and agriculture.

The present imbalance in our reserve system urgently needs correction. Lowland forest areas are inadequately protected — Punakaiki, Waitutu, Karamea forests, South Westland's kahikatea and Whirinaki are all areas of importance. Wetland protection is essential. Our wetlands of national and international importance

need permanent protection and the Government should adopt a wetlands policy as soon as possible.

Government funding which is accelerating the clearance of native forest and the drainage of wetlands on private land through Rural Bank loans and Forestry Encouragement Grants must be subject to environmental controls.

Non forested ecosystems including shrublands, tussock grasslands and natural dunelands are very poorly represented in our present reserves. The major responsibility to secure protection for all these areas rests with the Government. Crown lands encompass many of the threatened and poorly represented natural areas left in New Zealand. This issue of "Forest and Bird" focuses on some of the Crown owned areas that deserve protection. Protection of these areas could occur at little cost to the taxpayer yet with major benefits for nature conservation, recreation and tourism.

Nature conservation and protection on private land is also important and involves careful negotiation and consultation. The ultimate decision to reserve must always rest with the private land-owner. Crown purchase of all privately owned natural areas is unrealistic except for a few of the most important sites. However, incentives should be offered to make it attractive to private landowners to retain natural areas. Our Society will continue to encourage the protection of natural areas on private land through covenants such as the Queen Elizabeth II Trust open space, and through the provisions of the Reserves Act and by local authority planning procedures.

Dr A. S. Edmonds, President

Contributors to *Forest & Bird* may express their opinions on contentious issues. Those opinions are not necessarily the prevailing opinion of the Royal Forest & Bird Protection Society.

