TASMANIAN BEACH WEED STRATEGY

for

marram grass, sea spurge, sea wheatgrass, pyp grass & beach daisy

Tim Rudman

Nature Conservation Branch
Technical Report 03/2

Tasmania
DEPARTMENT of
PRIMARY INDUSTRIES,
WATER and ENVIRONMENT

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DPIWE
2003

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Front cover photographs:
Upper - native spinifex grassland on a gently sloping foredune at Beechford
Lower - marram grass

Acknowledgements
The assistance of Weed Management Branch (DPIWE), Parks & Wildlife Service, Coastcare facilitators, Turners Beach Coastcare, Greg Stewart, Priscilla Park and Dick Burns in the preparation of this strategy is gratefully acknowledged.

Published by: Nature Conservation Branch, Department of Primary Industries, Water and Environment, GPO Box 44, Hobart Tasmania 7001

ISSN: 1441-0680

Cite as: Rudman T. 2003. *Tasmanian Beach Weed Strategy for marram grass, sea spurge, sea wheatgrass, pyp grass & beach daisy*. Nature Conservation Report 03/2, Nature Conservation Branch, Department of Primary Industries, Water and Environment, Tasmania

Contents

EXECUTIVE SUMMARY

Tasmanian beach ecosystems are under threat from a suite of invasive beach weeds. This strategy identifies 5 significant weeds that are limited to the beach environment and may be contained or eradicated at a regional level. These are marram grass (*Ammophila arenaria*), sea spurge (*Euphorbia paralias*), sea wheatgrass (*Thinopyrum junceiforme*), pyp grass (*Ehrharta villosa*) and beach daisy (*Arctotheca populifolia*) hereafter referred to as beach weeds.

Beach weeds have wide ranging impacts on geodiversity and biodiversity and may also adversely affect aboriginal heritage and recreational amenity. Weed-induced sand stabilisation and dune formation can change beach and estuary landforms. Plant communities can be almost completely replaced by beach weeds with spinifex and coast fescue grasslands most at risk. Changes to beach landform and vegetation may also adversely affect shorebird nesting. Dense weed infestations and the toxicity of sea spurge affect the recreational use of beaches.

This Strategy recognises that the total eradication of most beach weeds from Tasmania is not feasible. However there is a window of opportunity for managing these weeds, as they have not yet spread throughout their potential range. Two conservation priorities are addressed. Firstly, containment of the weeds at the regional level and secondly protection of significant coastal assets at risk from beach weeds. Survey and monitoring is a major component of the Strategy. An education and training program is also recommended with an emphasis on local communities.

Summary of Goals and Objectives

Goal 1: To Contain the Distribution of Beach Weeds in Tasmania.

- Objective 1.1 Establish eradication zones for each beach weed.
- Objective 1.2 Establish a monitoring and control program.

Goal 2: To Minimise Adverse Impacts on Biodiversity and Geodiversity

- Objective 2.1 Identify priority sites for protection.
- Objective 2.2 Protect priority sites from invasion or adverse impact by beach weeds.

Goal 3: To Educate, Co-ordinate and Maintain Commitment

- Objective 3.1 Raise public awareness of beach weeds and their impacts.
- Objective 3.2 Involve the community in beach weed management.
- Objective 3.3 Co-ordinate beach weed management at State and regional levels.

Goal 4: To Develop Improved Control Techniques for Beach Weeds.

- Objective 4.1 Develop control options for sea spurge.

1 BEACH WEEDS

Introduction

There are over 1,850 kilometres of coastal and estuarine beaches in Tasmania. This amounts to about 30% of the state coastline. A significant proportion of these beaches has undergone gross environmental changes as a result of weed invasion, urbanisation and other disturbances. Maintaining the integrity of the remaining natural beaches is important for protecting wildlife and plant communities and to avoid inadvertently changing sand movements around the coast.

This Strategy aims to address some of the weeds that are affecting our beaches that cause significant impact and are limited in distribution or eradicable, lending themselves to a regional management program. These are:

- marram grass (*Ammophila arenaria*)
- sea spurge (*Euphorbia paralias*)
- sea wheatgrass (*Thinopyrum junceiforme*)
- pyp grass (*Ehrharta villosa*)
- beach daisy (*Arctotheca populifolia)*

Typically, ocean currents carry new beach weed invaders south from the mainland and rapidly across the north and down the western coastline of Tasmania. The east and southern coastlines are less rapidly invaded due to the influence of southerly currents for some of the year on those coasts. Sea spurge, sea wheatgrass and beach daisy all follow this pattern of establishment.

Those beaches most susceptible to ecosystem change have large dune systems or extensive unconsolidated sand above the high tide mark. Low energy shores, such as those that occur in the D'Entrecasteaux Channel where beaches lack dune systems or are immediately backed by inland plant communities, are less susceptible to beach weed problems.

Marram grass, sea spurge and sea wheatgrass are the three most devastating weeds found on Tasmanian beaches. Each is already widely distributed around the State resulting in widespread degradation of many beaches in Tasmania. While pyp grass and beach daisy both have the potential to become widespread beach weeds, particularly of major dune systems, they are currently restricted in distribution.

There are few ecosystems in Tasmania that may be infested statewide by a weed over such a short period of time. For instance sea spurge has infested around ½ the sandy coastline of Tasmania in just three decades. In the absence of intervention it is reasonable to expect that ultimately all beaches will be invaded with the consequent loss of native beach ecosystems. However, the slow rate of invasion of new weeds along the east and south coasts of Tasmania provides an opportunity for intervention to prevent their establishment.

As natural processes are the major cause of the spread these of beach weeds, declaration under the *Weed Management Act* 1999 is not likely to be effective in managing the spread of these weeds. Preparation and implementation of a strategic plan will provide the best mechanism for managing beach weeds. Successful management of beaches threatened by beach weeds will still be dependant on the management of other significant weeds that may be present or otherwise invade a given beach (e.g. boxthorn).

Marram Grass

Marram grass description

Marram grass (*Ammophila arenaria*) is a rhizomatous perennial grass of beach and sand dune systems that forms dense tussock-like sandy hummocks. It produces extensive rhizomes both vertically and horizontally which give rise to daughter plants. Tussocks may be up to 120cm high with tightly rolled leaf blades about 60 cm long. The very large membranous ligule, up to 3 cm long, which often splits into two spikes, is a key diagnostic feature of marram grass. Flower heads may be up to 25cm long and are 1 to 2.5 cm in diameter.

Figure 1 Marram grass in flower

Marram grass was introduced from Europe over a century ago to stabilise mobile sand dunes. Subsequently dune stabilisation has occurred in many areas of the State and if marram grass is already established in an area, it may still be used where sand threatens roads and property. As such it serves a useful purpose in many locations and should not automatically be considered a weed that requires control. Rather, those areas where it has established of its own accord or where conservation values are being degraded, are where marram grass is considered a weed.

Marram grass has spread from dune stabilisation projects to invade other beaches around the State. For example, in a survey of southwest beaches, marram grass was found up to 110 kilometres south from the nearest planting of marram grass at Ocean Beach. In northern and eastern Tasmania, many beaches are now dominated by marram grass while many others have small infestations. It produces few viable seeds and most spread is accounted for by rapid vegetative growth.

Marram grass habitat and distribution

Marram grass is widespread in all bioregions with the exception of the west and southwest bioregions where it is localised. A number of significant areas remain free of marram on the north and east coasts such as Cape Portland and Friendly Beaches.

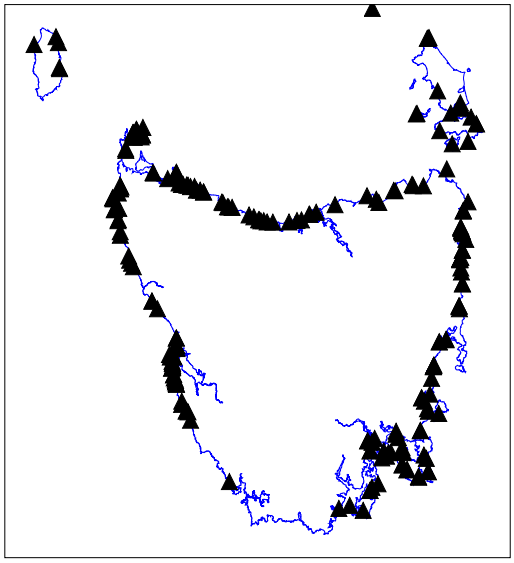

Figure 1. Distribution of marram grass in Tasmania (Tasmanian Herbarium and DPIWE records).

Predicted distribution of marram grass

Marram grass has established substantial healthy infestations in all bioregions of Tasmania over the last 100 years. No climatic factors limit its distribution in Tasmania. Establishment will be limited by presence of suitable sandy habitat. Beaches with little sand movement and well-established shrubby foreshore vegetation are resistant to development of large marram infestations. Beaches that are eroding are also less likely to be invaded and dominated by marram grass. However, many eroding beaches may still have areas of lower erosion such as at sheltered ends or river mouths where marram may establish.

Impacts of marram grass

Coastal processes are radically and permanently altered by the presence of marram grass. Marram tussocks very effectively trap wind blown sand causing dune building around plants. Large steep faced dunes are created that contrast with the lower angled foredunes that are associated with native vegetation (Heyligers 1985). These steep faced dunes are more prone to wave attack and erosion. Accumulation of sand within marram dune systems can also remove sand from beach, surf and inshore areas affecting sand movement and availability along the coast. Protection of mobile (transgressive)

dunefields from stabilisation by marram is important to retain this coastal ecosystem which has been substantially stabilised in many areas of the State..

Native sand binding grasses do not compete well against the rapid growth rates and sand accumulation capability of marram grass. Two native beach grass communities and five other coastal dune plant communities are replaced by marram grass (Kirkpatrick & Harris 1995). Marram grass can also grow in areas of sand not otherwise occupied by native vegetation. Marram grass is now so widespread that Kirkpatrick and Harris (1995) recognise three coastal plant communities dominated by marram grass. The inevitable conclusion is that native sand binding plant communities will steadily decline in extent if no action is taken to protect them from invasion by marram grass.

Native beach plants that may be reduced in extent as a result of marram invasion include:

- *Spinifex sericeus*
- *Austrofestuca littoralis*
- *Carex pumila*
- *Atriplex billardierei*

Animal habitat is also likely to be affected. Shore birds such as hooded plovers prefer open beach sands and spits for nesting sites. These sites are frequently overgrown by marram grass and it is possible that this process is contributing to the decline in hooded plover numbers around the State (Dr. Sally Bryant *pers. com*., Park 1994).

The habitat of the following beach nesting birds is degraded by marram grass invasion:

- Little Tern *Sterna albifrons sinensis* (Endangered, *Threatened Species Protection Act 1995*).
- Fairy Tern *Sterna nereis nereis* (Rare, *Threatened Species Protection Act 1995*).
- Caspian Tern *Sterna caspia* (Japan-Australia Migratory Birds Agreement, China-Australia Migratory Birds Agreement *Environment Protection and Biodiversity Conservation Act 1999*).
- Hooded Plover *Thinornis rubricollis.*
- Red capped Plover *Charadrius ruficapillus.*
- Pied Oystercatcher *Haematopus longirostris*.

Marram grass control methods

Beaches are sensitive environments in which to undertake control of weeds due to a range of issues such as aboriginal heritage, disturbance to nesting birds, off target impact of herbicides, erosion potential and public use. Careful assessment and management of the side effects of control actions are required. The manager of the beach (e.g. Parks and Wildlife Service or local council) must be consulted before undertaking any control action. It may also be appropriate to obtain advice from the Department of Primary Industries, Water and Environment on coastal management.

Where marram grass occurs ahead of the foredune on reworked beach sands manual control can be undertaken without risk to aboriginal heritage sites or dune stability. However, manual control is only effective for small infestations of a few square metres in area. Dig out all rhizomes to a depth of 50cm if possible and repeat every 3 or 4 weeks until the rhizomes stop growing through to the surface. Monitor periodically thereafter. The use of machinery can greatly increase the area that can be treated.

All requirements for herbicide application must be referred to the Parks and Wildlife Service that hold an off-label permit for chemical control of marram grass.

Sea Spurge

Description

Sea spurge (*Euphorbia paralias*) is native to the Mediterranean, Black Sea and central European shorelines. It was first recorded near Albany in the 1920's and may have been introduced accidentally in shipping ballast water (Heyligers 2002). Sea spurge has been present in the state since at least 1967 when Curtis described sea spurge as a rare coastal weed in the Students Flora of Tasmania. By 1980s it had established a broad distribution across the north and west of Tasmania. Sea spurge now is a dominant coastal weed of the northern and western coastlines.

Sea spurge is a perennial shrub up to a metre in height with multiple woody stems and a deep taproot. Its rather fleshy leaves densely clothe the stems and vary from oblong shaped at the base to almost circular at the flower heads. Tiny flowers are produced from October to May, cupped within green bracts. Larger plants may shed thousands of seeds each year. Each seed is about 5 mm in diameter, buoyant and readily dispersed by wind or water. Like all *Euphorbia* species it has a milky latex that oozes from broken stems. The latex is toxic, so care should be taken to avoid skin and eye contact as it can cause irritation.

Sea spurge habitat and distribution

Sea spurge occurs on free draining sandy soils on beaches, around estuaries through dune fields and other coastal environments. It does not grow well when heavily shaded by scrub. However it has successfully invaded many open coastal communities establishing dense infestations. Populations of sea spurge may reach thousands to tens of thousands where beach sands are free of other vegetation or have only a low level of natural plant cover. It may also grow along rocky shorelines in low numbers in sand-filled cracks between rocks.

Sea spurge populations are large and frequent on Bass Strait islands and along the north and northwest coasts. Infestations on the southwest and east coasts are primarily small and all subject to control programs.

Figure 2 Sea spurge

Predicted distribution of sea spurge

Sea spurge populations have established in all bioregions of the State, demonstrating a capacity to reproduce right around the coastline. Suitable coastal habitat rather than climate will limit its ultimate distribution. At present it has spread to roughly half of the potential habitat available to it around Tasmania.

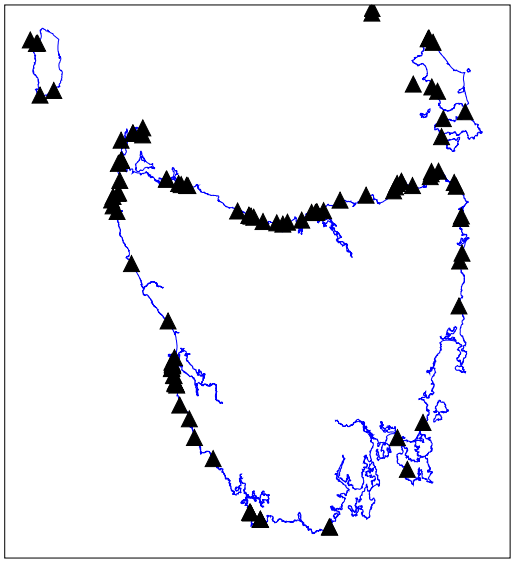

Figure 3 Distribution of sea spurge in Tasmania (Tasmanian Herbarium and DPIWE and records).

Impacts of sea spurge

Sea spurge creates quite different incipient foredunes to those created by native species. It also

creates dense infestations just above the high tide mark preventing natural sand movement inland.

Sea spurge invades a number of different habitats from the strandline to coastal herbfields, grasslands, and shrublands. There is a lack of adequate information on the impact of sea spurge on individual species. However, the potential for adverse impact is evident in observations of aggressive invasion of coastal communities (Harris & Kirkpatrick 1996). It occurs in very high densities in the strandline habitat of the saltbush *Atriplex billardierei* and the sedge *Carex pumila.* Sea spurge has been recorded as invading the following littoral plant communities (characterised by their dominant species) (after Kirkpatrick & Harris 1995):

Grasslands;

- *Austrofestuca littoralis*,
- *Austrofestuca littoralis-Calocephalus brownii*,
- *Spinifex sericeus-Austrofestuca littoralis,*
- *Austrostipa stipoides-Leucopogon parviflorus,*
- *Spinifex sericeus-Leucopogon parviflorus.*
-

Shrublands;

- *Atriplex cinerea*,
- *Leucopogon parviflorus-Rhagodia candolleana,*
- *Acacia longifolia-Ozothamnus turbinatus*,
- *Leucopogon parviflorus-Lomandra longifolia-Pteridium esculentum,*
- *Leucopogon parviflorus-Lobelia alata-Isolepis nodosa.*

Heath;

- *Correa backhouseana- Leucopogon parviflorus-Pteridium esculentum.*

Animal habitat is also likely to be affected. Shore birds such as hooded plovers prefer open beach sands and spits for nesting sites. These sites are frequently overgrown by sea spurge. Beach nesting birds potentially affected include:

- Little Tern *Sterna albifrons sinensis* (Endangered, *Threatened Species Protection Act 1995*).
- Fairy Tern *Sterna nereis nereis* (Rare, *Threatened Species Protection Act 1995*).
- Caspian Tern *Sterna caspia* (Japan-Australia Migratory Birds Agreement, China-Australia Migratory Birds Agreement *Environment Protection and Biodiversity Conservation Act 1999*).
- Hooded Plover *Thinornis rubricollis.*
- Red capped Plover *Charadrius ruficapillus.*
- Pied Oystercatcher *Haematopus longirostris*.

Sea spurge control methods

The manager of the beach (e.g. Parks and Wildlife Service or local council) must be consulted before undertaking any control action. In particular, aboriginal heritage sites affected by sea spurge are vulnerable to damage during control action and must be protected. Activity on beaches during the shorebird nesting season can also affect chick survival.

Small sea spurge infestations can be eradicated by physically removing the plants. Small plants hand pull easily but large plants will need to be dug out. Seedlings may be present in large numbers. These are best left until large enough to pull, but before flowering or they may be raked or buried. Protective clothing must be worn to protect skin and eyes from the milky sap, which is toxic.

Follow-up will be required to address subsequent seed germination or re-sprouting from broken taproots. Substantial declines in density of sea spurge can be achieved by this method but it may take 3 or 4 years of concerted effort. Occasional seedlings may reappear for up to ten years.

An effective herbicide treatment is available where disturbance from hand pulling is unacceptable. Consult land manager and DPIWE if contemplating herbicide use.

Sea Wheatgrass

Description

Sea wheatgrass (*Thinopyrum junceiforme*) is a perennial beach grass native to the Baltic and Atlantic coasts of Europe. It was first recorded in Australia at Port Philip Bay in 1933 (Heyligers 1985). It has been used in dune stabilisation on the mainland and may have been deliberately introduced to some areas in the northwest of Tasmania. The first Tasmanian record of sea wheatgrass comes from Stanley in 1986.

Sea wheatgrass is a rhizomatous grass that forms a low but sometimes very dense sward on beaches. At favourable sites it can reach 50cm in height, however, it may be reduced to 10-20 cm high when growing on foredunes. The leaves are bluish green, widely spreading and may be up to 30cm in length and 5 mm broad. Flowers are carried on erect stems and are arranged alternately in one plane like a rye grass. Flowering occurs over December and January but the brittle seed heads do not persist for long on the plant. Sea wheatgrass spreads by lateral extension of rhizomes that break the surface of the sand forming daughter plants and by seed dispersal. It may also regenerate from fragmented rhizomes.

Figure 4 Sea wheatgrass sward growing at foot of foredune, Greens Beach.

Sea wheatgrass distribution

Sea wheatgrass mostly grows between the strand line and the foredune of beaches or along the sandy banks of estuaries. It favours sites with brackish groundwater and can tolerate occasional sea water inundation (Heyligers 1985). Dense swards of sea wheat-grass have developed along some beaches in Tasmania creating a berm or slope in front of the foredune. Its vigour is reduced where it grows at elevation on foredunes, often growing as a sparse short sward among other beach grasses.

Sea wheatgrass is widespread along the north coast from Marrawah to Cape Portland. Infestations extend into the Tamar River and Brid River estuaries and it may be present in more estuaries along this section of coast. A few plants have also been recorded at Pats River mouth on Flinders Island and further survey work is required to ascertain its distribution on the Bass Strait Islands. Surveys immediately east of Cape Portland and on the East Coast suggest that Cape Portland is likely to be the eastern most point of its distribution. Further survey work is required to ascertain its distribution on the West Coast.

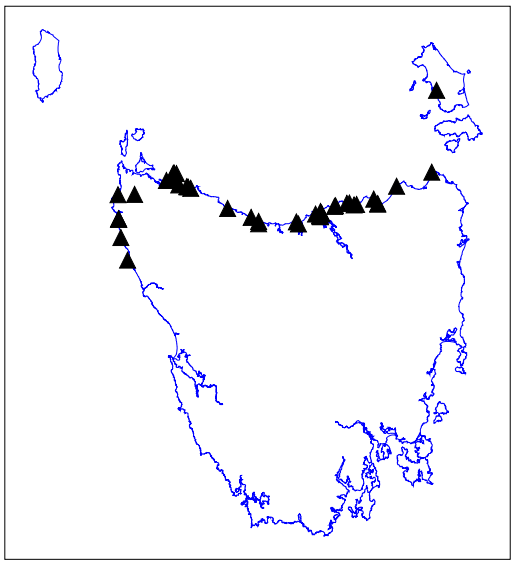

Figure 5. Distribution of sea wheatgrass in Tasmania (Tasmanian Herbarium and DPIWE records).

Predicted distribution of sea wheatgrass

In Europe, sea wheatgrass grows as far south as the Cadiz region of Spain to Finland in northern Europe. This encompasses low rainfall Mediterranean to cool temperate climates. It also occurs on the West Coast of the USA. It is unlikely that climate will limit sea wheatgrass establishment around the Tasmanian coastline.

Impact of sea wheatgrass

Sea wheatgrass traps and stabilises sands where native vegetation does not generally occur, thereby altering the natural beach landforms and preventing the movement of sand. It builds low wide foredunes in low wind situations or areas of prograding shoreline while hummocky dune fields develop in high wind environments (Heyligers 1985). Both these landforms are evident in Tasmania. Low dunes occur in some sites such as Weymouth, while a hummock dune field has developed on the spit at Peggs Beach.

There is the potential for estuary landforms to be affected where sea wheatgrass has bound sand, such as

in the Brid River where it lines the shoreline and rings small islands of saltmarsh grass (*Puccinellia stricta*).

No native plants or plant communities are currently recognised as under threat because of sea wheatgrass. However, threatened shore bird species are potentially at risk from encroachment by sea wheatgrass. These shore birds prefer vegetation free sand for nesting (Dr. Sally. Bryant *pers. com*.).

Beach nesting birds potentially affected include:

- Little Tern *Sterna albifrons sinensis* (Endangered, *Threatened Species Protection Act 1995*).
- Fairy Tern *Sterna nereis nereis* (Rare, *Threatened Species Protection Act 1995*).
- Caspian Tern *Sterna caspia* (Japan-Australia Migratory Birds Agreement, China-Australia Migratory Birds Agreement *Environment Protection and Biodiversity Conservation Act 1999*).
- Hooded Plover *Thinornis rubricollis.*
- Red capped Plover *Charadrius ruficapillus.*
- Pied Oystercatcher *Haematopus longirostris*.

Only a few native beach plants occupy the same habitat as sea wheat-grass. The two native plants most likely to be affected are:

- *Carex pumila*
- *Atriplex billardierei*

C. pumila is known to co-occur with sea wheatgrass in the northwest. A. *billardierei* is infrequent but widely distributed with a stronghold in the west of the State. Spinifex appears to maintain its dominance on foredunes in the presence of sparse sea wheatgrass infestations such as found at Beechford.

Sea wheatgrass control methods

The manager of the beach (e.g. Parks and Wildlife Service or local council) must be consulted before undertaking any control action. Digging out the rhizomes can control small areas of sea wheatgrass. Care must be taken to remove as much as possible and monitor regularly for re-emerging plants. Effective aquatic registered herbicides are available for use on sea wheatgrass. Areas where control has been undertaken should be monitored annually for germinating seedlings until no further plants are found for a few years running.

Pyp Grass

Description

Pyp grass (*Ehrharta villosa*) was introduced from South Africa for dune stabilisation. It tolerates drought and can stabilise sparsely vegetated sands. While it has become a significant coastal weed on the mainland in places such as the Sir Richard Peninsula S.A., it has been introduced to only a few sites in Tasmania. On King Island it has spread from where it has been planted while in northwest Tasmania it has not spread from where it was planted.

Pyp grass (*Ehrharta villosa*) is a perennial rhizomatous beach grass, which is notable for reaching up to 2 metres in height. Culms may twine through and over-top other vegetation. Leaf blades are generally flat and up to 20cm long with wavy margins. Pyp grass takes its scientific name from the long soft hairs (villous) that cover the flowers. The flowers also have a purplish tinge and cluster in heads up to 20cm long.

Infestations of pyp grass spread with lateral growth of rhizomes and dispersal of seed.

Figure 6 Pyp grass seed heads

Pyp grass distribution

Both planted and wild populations of pyp grass occur on King Island, while only planted populations are known from mainland Tasmania. Pyp grass was planted in conjunction with marram grass in the Arthur Pieman area where only a few small populations persist. Marram grass appears to out-compete pyp grass where they co-occur. Pyp grass populations in the Arthur Pieman area are serving no useful sand stabilisation purpose and would be feasible to eradicate. On King Island the distribution needs further survey.

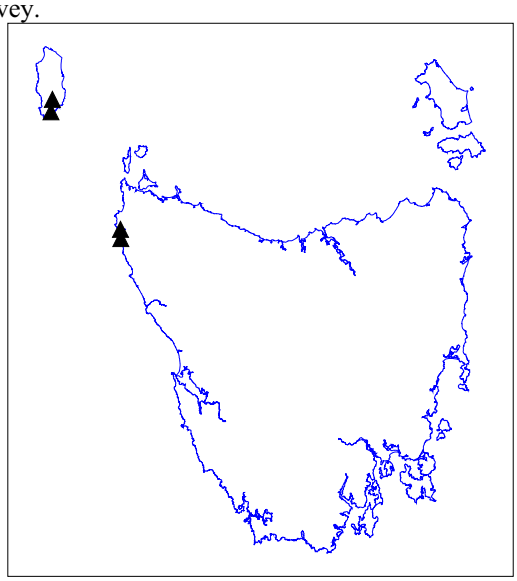

Figure 7 Distribution of pyp grass in Tasmania (Tasmanian Herbarium and DPIWE records).

Predicted distribution of pyp grass

Pyp grass is most likely capable of growing within the full climatic range of the Tasmanian coastline. Suitable sandy habitat and seed dispersal will more likely control establishment.

Impact of pyp grass

Pyp grass has a history of dominating beach dune systems (e.g. South Australia) and replacement of native vegetation by pyp grass has been documented in New Zealand (Hilton & Harvey 2002). The current distribution in Tasmania is not known to cause any immediate threat to native plant species. However, there is potential for adverse impacts if pyp grass is translocated to more sensitive locations.

Pyp grass control methods

The manager of the beach (e.g. Parks and Wildlife Service or local council) must be consulted before undertaking any control action. Digging out the rhizomes can control small areas of pyp grass. Take care to remove as much as possible and return to dig up any re-emerging plants. Effective herbicides are available for use on pyp grass. Areas where control has been undertaken should be monitored annually for seedlings until no further plants are found for a few years running.

Beach Daisy

Description

Beach daisy (*Arctotheca populifolia)* is a low growing light grey-green herb that forms small clumps on the beach. It has broad soft fleecy leaves that are up to 4 cm long and bright yellow daisy flowers that are about 5 cm in diameter. Its fleecy leaves distinguish it from other native beach daisies.

Beach daisy habitat and distribution

Beach daisy is a pioneer plant capable of establishing in unconsolidated sands. It grows between the sand ridges in dune systems and on beaches. Flinders Island has the only known infestation in Tasmania. It is likely that it is in the early stages of establishment and could be eradicated from Tasmania with little effort.

Predicted distribution of beach daisy

Beach Daisy grows around the southern coast of Africa in environmental conditions analogous to Tasmania's coastal environment. It is quite capable of growing within the climatic range present around the coast of Tasmania. It should be assumed at this stage that all bioregions in Tasmanian are susceptible to beach daisy invasion.

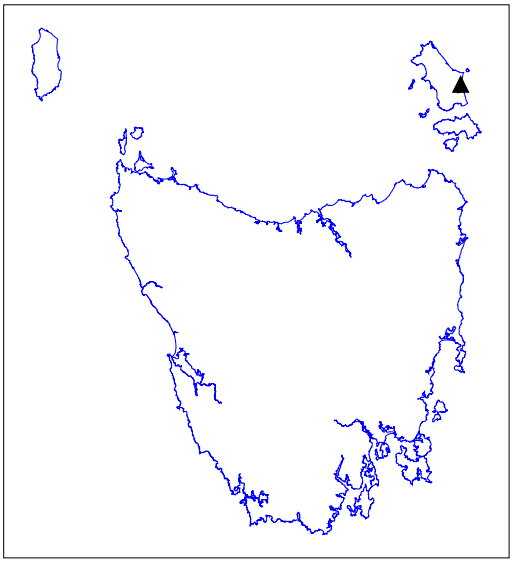

Figure 8 Distribution of beach daisy in Tasmania January 2002. Tasmanian Herbarium and DPIWE records.

Impacts of beach daisy

Beach daisy invasion of Tasmania is in its infancy. With time beach daisy will increase the vegetation on beaches between the strandline and the foredune where few native plants grow. This may threaten shorebird nesting habitat and alter beach landform and affects public amenity.

Beach daisy control methods

Small infestations of beach daisy can be controlled by physical removal. Areas where control has been undertaken should be monitored for seedlings annually until no further plants are found.

2 VISION, CHALLENGES & STAKEHOLDERS

The Vision

The vision of the beach weed management strategy is:

The government working in partnership with community has contained the spread of beach weeds and minimised the impact on significant sites for conservation.

Major challenges

Public Awareness

The community has little prior knowledge of the presence and impact of weeds on beaches. Raising community awareness and maintaining ongoing interest and motivation to participate in management partnerships will require substantial effort.

Co-ordination

Adoption of the Strategy within Natural Resource Management Strategies will be a critical step in achieving co-ordination at both the State and regional level. At the local level, co-ordination between the community and land managers has been reliant to date on the Coastcare or Regional Weed Management Strategy Group Co-ordinators. The ongoing presence and involvement of these community facilitation programs will be important for the success of this Strategy.

Resources

Success with any weed program is dependent on the sustained commitment of resources beyond short term funding cycles. Resources for beach weed management will have to be increased by Councils, Parks and Wildlife Service and other coastal managers. An ongoing commitment will be required to control beach weeds.

Integrated control

More effective long-term solutions need to be developed for the management of infested sites to reduce impacts, spread rates and improve beach grassland rehabilitation techniques. The most urgent need is to develop controls to reduce the vigour and reproductive capacity of sea spurge.

Stakeholders

The Parks and Wildlife Service has land management responsibility for the majority of beaches around the State while councils are commonly responsible for beaches in urban areas. Freehold title extends to the high tide mark in some areas with individuals or organisations such as the Tasmanian Aboriginal Land Council responsible for beach weeds. Though the key responsibility lies with the land manager, the widespread use of beaches by the community results in a very broad spectrum of stakeholders including groups with a specific management orientation such as Coastcare groups and the Marine and Coastal Community Network.

The public has a particular role to play in monitoring and assisting weed control in partnership with the land manager. To facilitate this, community co-ordinators are important stakeholders who can engender public awareness and commitment to the Strategy. Scientists have a key role in introducing new control techniques such as biological control and assisting with the identification of priority sites for management.

3 GOALS, OBJECTIVES AND ACTIONS

Four goals are identified for the management of the listed beach weeds, under which a series of objectives and actions are presented. Acronyms are given at the end of the section.

Goal 1: To Contain the Distribution of Beach Weeds in Tasmania.

Objective 1.1 Establish eradication zones for each beach weed.

Actions	Key Responsibility	Partners
Eradicate marram grass from Discovery Beach (Cape Sorell) to Cockle Creek.	Parks & Wildlife Service and other land managers	BT, RWMS, Coastcare, MCCN, Councils, DPIWE
Eradicate sea spurge on southern and eastern coasts from Birthday Bay to Great Musselroe Bay	Parks & Wildlife Service and other land managers	BT, RWMS, Coastcare, MCCN, Councils, DPIWE
Eradicate sea wheatgrass on the West, South and East Coasts from Cape Grim to Cape Portland	Parks & Wildlife Service and other land managers	BT, RWMS, Coastcare, MCCN, Councils, DPIWE
Eradicate pyp grass from mainland Tasmania and contain distribution to planted areas on King Island	Parks & Wildlife Service and other land managers	RWMS, Coastcare, MCCN, DPIWE
No further planting of pyp grass	Land managers	NRMRC, Coastcare, MCCN
Eradicate beach daisy from Tasmania	Parks & Wildlife Service	
No further planting of marram grass except where agreed by Parks and Wildlife Service for re-establishment of dune stability in areas already planted with marram, where assets are at risk.	Parks & Wildlife Service and other land managers	NRMRC, Coastcare, MCCN

Performance indicators

- Eradication programs underway for known populations of each weed occurring in an eradication zone by 2004 or within one year of reporting new infestations
- No further plantings of pyp grass occur
- Marram grass is not planted without due cause and only within already infested areas

Objective 1.2 Establish a monitoring and control program

Actions	Key Responsibility	Partners
Maintain a central register of the distribution of each beach weed	PWS & DPIWE	Community
Establish a co-operative monitoring and reporting program	PWS and DPIWE	Community
Provide management advice	DPIWE	MCCN, PWS, RWMS
Within the eradication zone, initiate control within 1 year of new beach weed reports	PWS, Councils and other land managers	Community.

Performance Indicators

- Beach weed database available on PWS Maplink and duplicated on GTSpot
- Reporting and response protocols promulgated
- Parks and Wildlife Service and land managers have monitoring programs in place
- Control program in place for each infestation with an eradication zone

Goal 2: To Minimise Adverse Impacts on Biodiversity and Geodiversity

Objective 2.1 Identify priority sites for protection.

Actions	Key responsibility	Partners
Identify native beach grasslands that are free of the target weeds	DPIWE	PWS, RWMS
Identify sites with geoconservation significance.	DPIWE	PWS
Identify sites with threatened beach flora or significant flora values	DPIWE	PWS, Coastcare
Identify sites with threatened beach fauna or significant fauna values	DPIWE	PWS, Coastcare, Birds Tasmania
Maintain a register of beach weed control sites	PWS	DPIWE, Councils, landholders

Performance Indicators

- Values recorded on PWS maplink beach layer
- Priority sites for monitoring and control identified and recorded in PWS District weed management plans

Objective 2.2 Protect priority sites from invasion or adverse impact by beach weeds.

Actions	Key responsibility	Partners
Implement monitoring programs for beaches with significant conservation values	PWS	Community
Prepare plans and eradicate or reduce weed impact at significant beaches	PWS	DPIWE and Community

Performance Indicators
- Number of significant beaches with monitoring partnerships in place
- Number of significant beaches with beach weed infestations that are under control programs

Goal 3: To Educate, Co-ordinate and Maintain Commitment

Objective 3.1 Raise public awareness of beach weeds and their impacts.

Actions	Key Responsibility	Partners
Raise public awareness of the beach weed threat	DPIWE	RWMS, MCCN, Councils, Coastcare, PWS

Performance Indicators
- Distribution of sea spurge pamphlet
- Inclusion of beach weeds in coastal weed guides
- Inclusion of beach weed management in coastal management courses
- Number of media events

Objective 3.2 Involve the community in beach weed management.

Actions	Key Responsibility	Partners
Encourage community participation in the management of beach weeds through the Beach Weed Watch program	DPIWE	Coastcare, MCCN, PWS, RWMS
Develop opportunities for weed control partnerships	All	

Performance Indicators
- Number of community groups/ individuals involved in Beach Weed Watch program
- Number of community beach weed partnerships and projects undertaken

Objective 3.3 Co-ordinate beach weed management at State and regional levels

Actions	Key Responsibility	Partners
Integrate this Strategy into NRM strategies	Regional NRM	
Integrate this Strategy into regional weed management strategies and programs	RWMS Groups	
Integrate this Strategy into PWS weed control programs	PWS	

Performance Indicators
- Strategy priorities adopted with NRM program
- Strategy priorities adopted within PWS weed control program

Goal 4: To Develop Improved Control Techniques for Beach Weeds.

Objective 4.1 Develop control options for sea spurge.

Actions	Key Responsibility	Partners
Investigate the potential for developing a biological control for sea spurge	DPIWE	TIAR, CRC Aust. Weed Management University of Tasmania
Submit application for sea spurge to be adopted as a target for biological control if potential bio-control agents can be identified.	DPIWE	
Develop herbicide control prescriptions	DPIWE	PWS

Performance Indicators
- Prescriptions for chemical control of seas spurge developed and environmental impact assessed
- Research into differences in reproductive success and vigour between natural and introduced populations of sea spurge undertaken
- Potential for biological control of sea spurge assessed and application as target weed submitted if appropriate

4 PLAN REVIEW

The plan will be subject to review in 5 years. The review will be conducted by the DPIWE in consultation with the community.

The schedules attached to this plan are dynamic documents, which will be continually updated during the implementation of this plan. Such changes must however be consistent with the priorities outlined in this plan.

FURTHER READING

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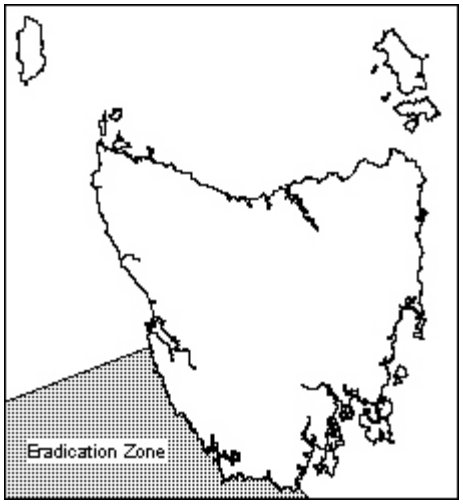
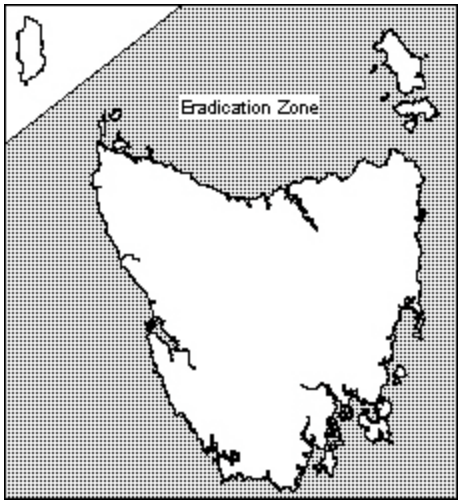
Acronyms

BT	Birds Tasmania
CC	Coastcare groups
DPIWE	Nature Conservation Branch, Department of Primary Industries water & Environment
MCCN	Marine and Coastal Community Network
PWS	Parks and Wildlife Service, Department of Tourism, Parks, Heritage and the Arts
RWMS	Regional Weed Management Strategies
TIAR	Tasmanian Institute of Agricultural Research
NRMRC	Natural Resource Management Regional Committee

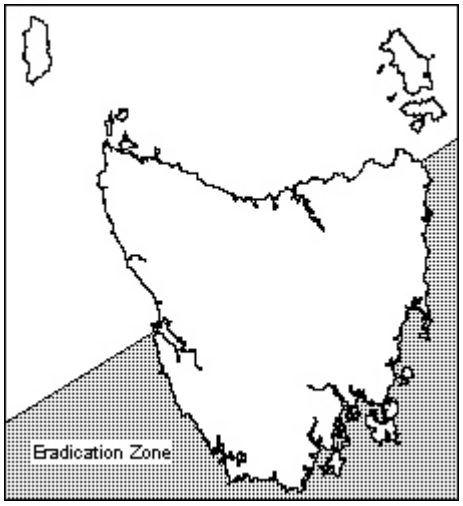
APPENDIX 1



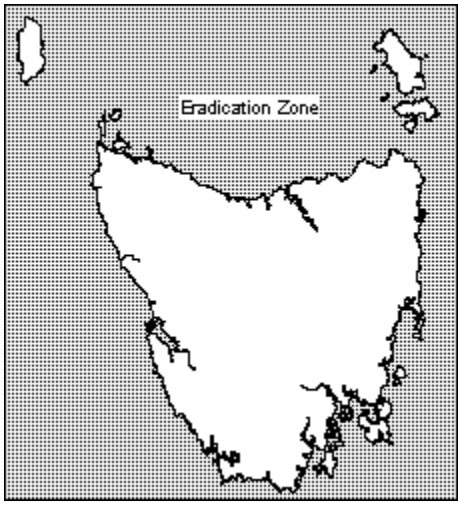
Marram grass



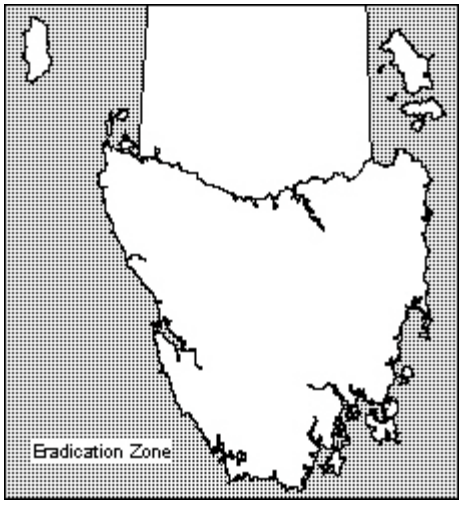
Pyp grass



Sea spurge



Beach daisy



Sea wheatgrass