



DEAL ISLAND WEED PLAN



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Maintenance Weeding

In natural areas, successful weed management is achieved by the removal of the weeds and their replacement with native vegetation.

There will almost always be weed seeds left stored in the soil after an infestation has been removed and these will germinate to fill the space created by the removal of the parent plants – unless they are suppressed by other plants (natives) growing in their place.

There is no ‘quick fix’. Spraying with herbicides can lay larger areas bare, allowing more weed seeds from the soil to germinate than ever. The weed problem could multiply.

In many situations weed seeds will germinate and establish faster than the natives. It can take years of weeding before the seed stores of some weeds in the soil are used up and native vegetation is able to grow unmolested by weeds.

If, during that time, the weeds are allowed to seed again, the weed management program will be put back by years. Remember the saying

‘One year’s seeding makes seven years weeding.’

Weed management on Deal Island depends on all volunteers playing their part in the maintenance weeding program. Weeding maintenance may take one day a week.

Please contribute to the maintenance weeding as outlined in Appendix 1 and the laminated sheet entitled ‘Caretakers and the Weeding Program’ which is in the Weed Folder.

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ACKNOWLEDGEMENTS

This plan was written by Penny Tyson as the volunteer weed planner of the Wildcare Friends of Deal Island (FoDI) and at the request of the Furneaux Parks and Reserves Manager Wayne Dick, at the inaugural meeting of the group in May 2008. Many contributed or were consulted in the production of this document, including the following people.

Melinda Lambourne and Ahmet Bektas, the 2001 caretakers who wrote the first weed strategy and Dean Vincent who wrote one for horehound and ragwort after the December 2002 Wildcare working bee (organised by Friends of the Kent Group NP). Reviewers and contributors include, Matt Baker, Trish Bate, Glenn Brewer, Michael Comfort, Wayne Dick, Marco Duretto, Sandy Leighton, Tim Rudman, Bob Tyson and Karen Ziegler.

1. PURPOSE

This plan sets priorities and proposes strategies for the treatment of weeds on Deal Island.

A weed is defined in ‘Weed Plan, Tasmania’s Weed Management Strategy’ (2005) as:

‘A plant which has, or has the potential to have a detrimental effect on economic, social or conservation values.’

The presence of weeds can have considerable impact on the natural environment:

‘Weeds out-compete, overwhelm and displace native species in natural environments. They may harbour pests and diseases. Weeds can affect the structure and functions of entire ecosystems and so have large and often intractable impacts on local and regional biodiversity.’ (Weed Plan, 2005)

In the Kent Group Management Plan (2005), the stated vision for the park says in part:

‘A future visitor finds an intact and well-presented lightstation on Deal Island, healthy natural biodiversity free of exotic species (both flora and fauna), and viable populations of all indigenous species.’

Successful weed management, including provision for the replacement of weeds by healthy native vegetation, will play a big part towards achieving this vision, and the purpose of this plan is to provide guidelines to efficiently work towards it.

2. INTRODUCTION

Situated in northern Bass Strait, about half way between the north-west tip of Flinders Island and Wilsons Promontory, Deal Island is part of the Kent Group National Park. The Kent Group consists of five main islands – Deal, Erith, Dover, North East and South West Islands. Deal is a 1700ha rugged red granite island which rises nearly 300 metres out of Bass Strait. Much of its coastline is bounded by cliffs, but it also has three delightful sandy beaches. Mostly covered in native woodland and some grassland, the island supports an interesting range of flora and fauna. Built infrastructure includes a lighthouse and superintendent's residence built by convict labour in 1847, as well as a variety of more recent structures.

The light station was managed by the Commonwealth until it was demanned in 1992, the light being replaced by small automatic ones on nearby North East and South West Islands. In 1998, ownership of the island was transferred from the Commonwealth to the State Government, paving the way for the proclamation of the National Park, which occurred in 2001. In the order of 1000 visitors arrive by boat each year, mostly in the calmer summer and early autumn months.

2.1 Management of Deal Island

The light station is managed by a volunteer caretaker program organised and run by the Tasmanian Parks and Wildlife Service. The use of volunteer caretakers on the island began in 1998 by Australian Bush Heritage and was continued by the Tasmanian Parks and Wildlife Service when it took over the management of the island in 2000. There has also been a program of working bees held on the island manned by volunteers. Considerable progress has been made towards achieving conservation objectives for both the built and natural environments on the island, including weed management since the inception of the caretaker program.

Caretakers are usually couples, sometimes with families, and reside on the island for three month periods. The main objective of the program is to maintain a residential presence, but a wide range of tasks are successfully undertaken including visitor reception and interpretation, cyclic maintenance of heritage assets, weed control, flora and fauna surveys, and a host of other tasks. Caretakers are chosen for their ability to live independently for that period, and for any skills they may offer to help in the management of the island.

The Wildcare Friends of Deal Island group (FoDI) provides volunteer support to the Parks and Reserves Manager in the administration and planning of the works programs for the island. It also undertakes fund raising and applies for grants to assist with the funding of working bees and other programs to assist with management of both cultural and natural heritage on the island. The primary focus of the Friends of Deal group (as indicated by its name) is Deal Island. There may, however, be instances where it will

work on other islands in the Kent Group National Park– with the Erith Mob on weed control, for example - where a common interest may be served.

This plan is intended to provide guidelines for the management of weeds on Deal Island in the context of the management system described.

In doing that, it is proposed that in selecting caretakers for Deal Island, two couples per year be appointed, because of their knowledge, interest and skills in the management of weeds, as well as their other qualifications. Because of the time needed to meet and guide visitors who arrive in the (usually) calmer weather of summer and autumn, perhaps the best seasons for appointment of ‘weedy caretakers’ would be spring and winter.

Having set weed management priorities, all caretakers can play a vital part in the progress and success of weed management work on the island.

2.2 Benefits and Constraints of the Management System

Deal Island is part of Tasmania’s most remote national park. Access from mainland Tasmania is by air to Flinders Island, and then a four hour boat trip across a section of Bass Strait. Costs of travel and shipping equipment to the island are therefore high.

Another problem due to the volatility of the weather and seas in the Strait, is that access can be unreliable, and delays of a week to ten days are not unusual. This causes additional expense, and also obvious difficulties for volunteers with work or other commitments.

There are advantages and disadvantages in using volunteers in the management of the island.

An advantage of the rotation of volunteers having a variety of different skills is that a wider range of works can be addressed in any period than if a single person had been employed. Volunteer caretakers too are enthusiastic and usually put in long hours. The volunteer program has been very successful in producing results in conservation of both the built heritage, and the natural environment, including weed management.

The lack of continuity of personnel, can make effective management of weed projects difficult. The Park Manager may be the only person who visits the island regularly, and then only for short periods such as overnight changeovers. Thus an effective system of communication between successive caretakers is essential

2.3 Communication

One of the challenges of managing Deal Island with new caretakers every 3 months is adequately communicating works which need to be done, the most effective methods to use, and the most useful information to record about what has been done and how.

With weed management, we are constantly looking for ways to improve communication. At present the information available to caretakers includes the following.

- A two page summary of priority weed work (mainly maintenance tasks) to be integrated as part of the works plan for caretakers. A copy of the current 'Deal Island Weed Maintenance' is included as Appendix 1.
- This Weed Management Plan to define the overall strategy.
- The Weed Folder (kept on the island) which has photos, maps, and text to help caretakers to recognise each weed and locate every known infestation; and recording sheets on which to keep a record of work done and any observations made.
- A herbarium (pressed plant collection and photos) for caretakers to use to help identify native and introduced plants.
- Weed infestations are marked (on ground) with numbered white topped stakes to help caretakers and others to find each weed patch. The position of these are marked on maps in the weed folder.
- Colour coded labels have been used to indicate the weed growing on the site.
- A collection of books and pamphlets – kept in the caretakers' house to provide further information.

It would be useful if feedback on weed observations made, and of works completed by caretakers was passed on to the volunteer weed planner through the Park Manager. Currently, this information is passed on through what is written in the caretakers' end of stint report, or by taking the weed folder off the island so that information can be transferred to a central base. There is an obvious problem with the latter!

Work done by caretakers is recorded in the Weed Folder as is current practice.

3 BACKGROUND

3.1 Flora

Being about half way between Flinders Island and Wilsons Promontory, the flora of the Kent Group is biogeographically significant, containing both Tasmanian and mainland elements.

Aboriginals would have passed by or over the island when sea levels were lower and Tasmania was connected to the mainland from 30 – 14 000 years ago. However, little if any evidence of their passing remains. From descriptions of passers-by such as Bass in 1798 it is believed the island was thickly wooded – looking very much like Dover Island as it is now.

The flora of Deal Island has been modified by human activity since the white settlement of Australia. Sealers were the first, also in the late 18th century, and George Robinson records the presence of a camp and gardens at Garden Cove in 1831. It is possible that some introduced species remain on the island from that early source.

From 1846, when construction of the light station began, changes occurred at a greater rate. There was the building of the light station itself. Associated with this was clearing and development of pasture for grazing animals. Fire also became more common. The result of this was an increase in the extent of grassland area, and the introduction of numerous exotic species which are more common in the areas converted to pasture, in the Poa grassland, and also around tracks and buildings. Light-station staff and their families supplemented their food by growing vegetables, and also developed flower gardens, activities which introduced more exotic species. Some of these plants remain on Deal as important elements of the historic landscape, and others have spread through the natural landscape, becoming environmental weeds.

Other exotic species have arrived on the island unconnected with gardens or with grazing animals (the last were removed in 1997), and there is the potential for others to arrive. Sea Spurge was first reported on Deal by Shirley Gray (the wife of the Head Light-keeper) in 1988. It would have arrived as either seed, or seed bearing plant/s carried by ocean currents from mainland Australia. There are a number of other exotic weeds on Erith Island – just one kilometre across Murray Passage – which could also turn up one day on Deal. Sea wheat grass (*Thinopyrum junceiforme*) is one of these, which could have great impact on the beaches of Deal Island. Seed of exotic plants could also be brought in by caretakers and other visitors to the island – on boots or other clothes, or as seed or plants for the vegetable garden.

Collections of the flora have been made by visitors since Brown in 1803. A vegetation survey conducted in 1995 by Steven Harris and Georgina Davis identified 13 plant communities occupying eight broad vegetation types. Of these, there are three which occupy more than 90% of the island:

- 47.5% Eucalyptus (Smithton peppermint) forest and shrubland. (Covered by *Eucalyptus nitida* formations including low open forest and two types of tall open shrubland.)
- 24.6% drooping sheoak woodland and forest. (Covered by *Allocasuarina verticillata* formations including low closed forest, low open forest and low open woodland.)
- 20% Tussock grassland (Two types: one dominated by *Poa poiformis* and the other by *Austrostipa stipoides*.)

The plant list for Deal Island included as Appendix 2 is based on Tasmanian Herbarium records and other sources. Of the 330 or so taxa listed, 30% of them are introduced. Five Tasmanian endemic plant taxa are recorded, *Allocasuarina monilifera*, *Brachyscome diversifolia* var. *maritima*, *Eucalyptus nitida*, *Plantago bellidioides* and *Centrolepis strigosa* subs. *pulvinata*.

3.2 Conservation Significance (Flora)

As quoted from the Kent Group Management Plan (2005):

‘The national park has biogeographic significance. The native flora of the Bass Strait Islands is uniquely transitional between mainland and Tasmanian floras, and contains many geographic outliers – species which are either at the northern or southern end of their range. As a result there are many species not normally found in association.’

Some plants of state conservation significance and found in the park, are scheduled under the *Threatened Species Protection Act 1995*. Those occurring on Deal Island are listed in the table which follows.

Common name	Name	significance
tiny arrow-grass	<i>Triglochin minutissimum</i>	r
slender cotula	<i>Cotula vulgaris</i> var. <i>australasica</i>	r
common cudweed	<i>Euchiton involucratus</i>	r
coast pomaderris	<i>Pomaderris paniculosa</i> subs. <i>paralia</i>	r
coast twinleaf	<i>Zygophyllum billardierei</i>	r
shade pellitory	<i>Parietaria debilis</i>	r
shade peppergrass	<i>Lepidium pseudotasmanicum</i>	r
broom wheel fruit	<i>Gyrostemon thesioides</i>	r
scarce centrolepis	<i>Centrolepis strigosa</i> subs. <i>pulvinata</i>	r
banded greenhood	<i>Pterostylis sanguinea</i>	r
orange tipped caladenia	<i>Caladenia aurantiaca</i>	e
long leaf fingers	<i>Caladenia prolata</i>	e
tiny fingers	<i>Caladenia pusilla</i>	r
many-flowered starwort	<i>Stellaria multiflora</i>	r
island purple grass	<i>Poa poiformis</i> var. <i>ramifer</i>	r
fringe-fruit pennywort	<i>Hydrocotyle comocarpa</i>	r
lichen	<i>Xanthoparmelia microphyllizans</i>	r

Table 1: Threatened plants on Deal Island (e = endangered, v = vulnerable, r = rare).

Table 1 was adapted from Table 2, Kent Group National Park Management Plan 2005 (on page 16). Two more rare plant species, *Hydrocotyle comocarpa* and *Caladenia prolata* were found in 2006, and specimens lodged at the Tasmanian Herbarium.

Three further species found on the island, are not scheduled, but because they have only a limited distribution in the state are of regional significance. These are island sea-celery (*Apium insulare*), sticky firebush (*Apalochlamys spectabilis*) and also coast ploverdaisy (*Leiocarpa supina*) which occurs only in eastern Bass Strait.

3.3 Aims of flora conservation

The values of the flora on Deal Island, together with the rest of the Kent group, are reflected in the aims of flora conservation stated in the management plan (2005).

They are to:

- 'conserve and maintain natural diversity and natural ecosystems,
- conserve and protect threatened flora species,
- conserve and protect plant communities of high conservation value, and
- minimise harmful impacts on park vegetation.'

3.4 Conservation Significance (Cultural)

Deal Island is listed on the Register of the National Estate for its historic values, and on the Tasmanian Heritage Register, principally for the heritage values of the lightstation. In the Management Plan, one of the aims of historic heritage management is to:

'protect and conserve all remaining significant heritage fabric and features'

The plantings of garden plants in the residence compound represent one layer of that fabric, and should be preserved, along with others which can similarly be regarded as 'heritage plantings'.

Accordingly, one of the prescriptions for managing the light station says:

'Structures, buildings, tanks, fences and plantings in the residential precinct that were placed/constructed during the working life of the station are likely to be of historic interest in their ability to display the evolution of function. The removal of any layers requires clear justification.'

Some species such as jonquils had spread from their original locations in these planting and were removed. Others, such as agapanthus, although regarded as environmental weeds in other situations do not appear to be spreading significantly. Those which have spread beyond their original location should be removed, but the original plantings should be preserved – even maintained.

It would appear that the remaining original plantings in the residential compound are probably those within the garden fences and around the flag pole. Plantings around Baby's Grave and the child's grave overlooking Little Squally Cove are others on the island. There is what appears to be an old garden east of the upper reaches of Garden Cove Creek at GR 527775E 5631647N. In addition the wormwood (*Artemisia arborescens*) hedge around the fenced garden plot close to the dam at Garden Cove would fall into this category. To the present, (2015) the wormwood has not spread.

4. A WEED STRATEGY FOR DEAL ISLAND

Since the voluntary caretaker system was started in 1988, caretakers, the Friends of the Kent Group, which became Friends of Deal Island in 2008, and Parks and Wildlife staff have worked towards the development of an effective strategy for the management of weeds on Deal Island. There have been two strategies written in the past, which helped guide caretakers towards a more consistent approach to weed management. Descriptions of major weeds were provided. (This also prioritised weeds for treatment.) Treatments for each were suggested, and a system implemented for recording weed work done. All information and data was kept in a folder specified for the purpose. This current plan, and progress towards the establishment of an effective strategy, has built on the work of many others.

This strategy has been written to follow the prescriptions laid down in the Kent Group National Park (Terrestrial Portion) Management Plan (2005) to protect the values described in that plan, and the Tasmanian Reserve Management Code of Practice 2003. The objectives of this strategy are summarised as Table 2, which follows.

The Australian Weed Strategy (2007) provides the overarching framework for weed management at the national level. Weed Plan, Tasmania's Weed Management Strategy (2005) provides the framework and objectives of weed management in Tasmania. The Northern Tasmanian Weed Management Strategy – Northern NRM Region (2004) provides guidance at a regional level. The Tasmanian Beach Weed Strategy for marram grass, sea spurge, sea wheatgrass, pyp grass & beach daisy, Tim Rudman, Nature Conservation Branch (2003) is of particular relevance. The Deal Island Weed Management Plan is consistent with, and supports all of these strategic plans, with actions defined at the local level.

The aims of weed management, as stated in the Management Plan, are to:

- 'prevent, wherever possible, the arrival of new weed species;
- eradicate weeds where practical; and
- control and manage weeds where eradication is not possible'.

Provision for the replacement of eradicated weeds with native plants must be part of the eradication and control process for successful weed management, and weed treatments used must not adversely affect existing native vegetation.

Weed management should not however, interfere with historic plantings, even if in another context, the plants concerned are regarded as environmental weeds. However, if historical plantings are becoming naturalised in native vegetation, there should be liaison with the PWS Heritage Officer to establish the best option. Only in a worst case scenario, may it be best to document the plantings and remove not only the naturalised plants, but the original plantings.

4.1 Objectives and Actions for this Weed Strategy (Table 2)

Objective	Actions	Who	When / How?
1. Prevent new infestations	1.1 Monitor and survey to identify new infestations.	Caretakers, Park Manager, weed planner* and working bee participants.	Continuing from present.
	1.2 Introduce hygiene procedures to prevent arrival of introduced plants or disease organisms new to the island.	Park manager and caretakers.	As above.
2. Identify prioritise, and control weeds.	2.1 Survey, and identify introduced (including weedy) and native plant species to produce a species list for the island.	Caretakers and other volunteers as designated by Park Manager.	Completed, but further species may be discovered on the island.
	2.2 Locate, Map and Mark (on the ground) weed infestations. Infestations must be remapped regularly to show changes in distribution of the weeds.	Caretakers and other volunteers as designated by Park Manager	Basic mapping has been completed. Maps need to be up-dated regularly, triennially at least.
	2.3 Prioritise weedy species for treatment (for eradication or containment), including 'sleeper' species.	Weed planner and Park Manager.	Priorities have been set for each weed species. (See Section 5)
	2.4 Provide appropriate safety and control equipment for weed control procedures.	PWS via Park Manager and weed planner	Equipment is on the island, but needs review on an annual basis.
	2.5 Control weeds without adversely affecting native vegetation.	Working bee volunteers, backed up with maintenance by caretakers.	Time scale depends on weed in question. (See Section 5.)
	2.6 Appropriate methods are used for the disposal of weed material without causing new infestations (another hygiene aspect).	All involved in weed management.	Per section 5 for each weed species.

*The weed planner is a member of FoDI delegated by and working with the Park Manager to coordinate weed management activities by volunteers.

4.2 Hygiene and Prevention

The first aim of weed management is to prevent the arrival and establishment of new weed species. Although weeds can arrive naturally (sea spurge was carried to Deal Island by ocean currents) visitors to the island could accidentally introduce new weeds, or diseases such as the root rot fungus *Phytophthora cinnamomi*. Accordingly, the management plan prescribes quarantine measures.

Prescription 3.3.1 states that *'quarantine measures be adopted to assist prevent the arrival of new species, including:*

- *ensuring that materials and machinery brought to the park for any works are weed free;*
- *ensuring that all clothing, personal gear and equipment is weed (and disease) free; and*
- *only permitting landing of any plant materials in the park with the written approval of the management authority, and*
- *where the weed free status of any growing medium is assured.'*

Some plants brought in for the gardens can be potential new weeds. Vegetable plants like lettuce, radish and rocket seed readily, and could become a problem in the future. In that case, their import should be prevented.

Soil borne diseases may also arrive in the potting mix in punnets of seedlings or be carried in clothing and on boots. (The island is currently free of the root rot fungus.) A foot bath should be used to decontaminate footwear on arrival and visitors and others should follow measures listed below.

Another prescription (3.3.3) is to monitor, especially shorelines, for new weed infestations whose arrival has not been aided by human activity, but carried by air or sea currents, or carried by animals. Any new infestation is easier treated before it develops into a major problem. Caretakers and other managers need to be vigilant in both hygiene practices, and in watching out for new arrivals. Photographs of some potential new arrivals are provided in the Weed Folder, along with guidelines about what to do if a suspicious, possibly weedy plant is found.

Hygiene Measures for Visitors: Before landing on Deal Island, the following measures should be taken to reduce the chance of introducing weeds or diseases.

- *Vacuum pockets and cuffs of clothing, packs etc.
- *Clean all Velcro on gaiters, packs, rain gear and other garments.
- *Clean footwear, tent pegs and poles and other equipment which may be carrying soil borne diseases. Bleach and/or detergent will help decontamination.
- *To avoid spread of water borne disease, anything which has been in contact with water previously – such as wetsuits and fishing gear must be properly dry for at least two days before being taken to the island.

4.3 Surveys

Extensive surveys of the flora including both native and exotic species have been conducted, and specimens lodged in the Tasmanian Herbarium. A herbarium of specimens was also prepared and left on the island for reference by caretakers and other visitors.

A species list has been prepared with exotic species and weedy ones identified.

4.4 Mapping and Marking (on ground) Weed Sites

Known infestations of the major weeds have been located by GPS and mapped. The sites marked with white topped stakes. Permanent stakes are numbered and have colour coded labels, the colour indicating the weed species present. They should stay in place for perhaps at least 2 years after the last weed plants have been removed, as weeds can germinate from soil stored seeds or other reproductive structures years after weeding. White topped bush stakes are used as temporary markers.

Smaller markers may be used for marking individual plants or clumps in localised areas - such as arums – which are more difficult to locate when treatment has progressed to the point that only small plants are appearing.

An easy to use GPS unit needs to be kept on the island to allow for more frequent updating of records of the weed infestations. Positions of weed sites should be re-GPS'ed and maps up-dated at least every two years. This is needed to show progress, and also to include new sites which have been discovered in the interim.

4.5 Prioritise Weeds for Treatment

The weeds on Deal Island have been prioritised for treatment on the basis of the degree of impact each weed species is observed as having on the native vegetation and other wildlife, its potential to spread beyond its current range, the likelihood of successfully controlling or eradicating that weed, and the amount of effort which has already been spent on its treatment. Priorities assigned to each weed are included in the next section.

4.6 Use appropriate safety and control equipment

Appropriate equipment for use in controlling weeds by the prescribed manual and limited chemical means is kept on the island. These include garden implements such as hoes, forks, secateurs; a weed wand, weed wiper, drippers and dabbers, back-pack sprayers.

Safety equipment appropriate for these tasks (barrier cream, nitrile and timber workers gloves, eye protection, equipment for safe mixing etc.) are also kept on the island, and replenished after the stocktake which follows each working bee, or caretaker change over.

All weeding materials and equipment should be checked for 'use by dates' annually and supplies up-dated. Materials and equipment not specified in the prescriptions should be removed.

Chemical spill management: Supplies of 'kitty litter' to soak up spills of chemicals including herbicides, together with heavy duty plastic bags to hold contaminated litter are held on the island.

4.7 Appropriate Disposal of Weed Waste

Waste from weed management work must be disposed of thoughtfully to reduce the risk of creating further weed problems.

Non-fertile weed material can be left to rot on site.

In the case of sea spurge, because very large volumes of waste were being generated early in the program, and as the seed is only viable in the soil for a relatively short time, the most efficient method was to drop the plant material on the ground from where it came from, then left to rot, seeds and all. Now that the main clearing is complete, seedy material should be bagged, brought back to base and composted— either in the 200L drum, or in the water tank on the tip.

However, for weeds like horehound and mullein which have seed that remains viable in the soil for a longer time, it is better to bag seedy material, take it to the incinerator and burn it.

Special care must be taken with seeds of the daisy family which have 'parachutes' to help them spread in the wind (ragwort, thistles). Bag seedy material then bring back to base to compost.

For thistles, compost the whole plant – immediately - as those pulled up, even single, unattached flower buds - have an amazing capacity to produce fertile seed.

For plants reproducing by bulbs or tubers (arums, jonquils) these should be bagged and removed from the island.

What sort of bags should be used? Two types of bag are in use - garbags, made of sheet plastic, and woven feed type bags. These can be used singly or in combination. Garbage type bags are good in that when they are emptied, everything, including light seed slides out. But they are easily holed by sticks and sharp bits in scrub. Woven type bags are stronger, but seeds, particularly of the daisy type tend to stick in the weave, and then escape to grow a few more weeds. A combination of the two may be better.

4.8 Weed Management and the Recording System

The Weed Folder which provides a framework for weed management was developed in 2005. It includes:

- descriptions of the major weeds including photographs prepared as laminated sheets which can be taken into the field for reference;
- photographs of weed species which occur on Erith Island, and which potentially could become new weedy arrivals on Deal Island;
- maps showing the position and extent of infestations of each weed;
- prescriptions for their treatment;
- a range of reference material about the weeds; and
- a system of weed record sheets.

There is a record sheet for each known weed site. The sheet includes a description of the infestation and the site concerned, and also guidelines for work to be done, and space for caretakers, and others managing weeds to record work done. A sheet has been included as Appendix 4. New weed sites found are also recorded and integrated into the weed management system.

Progress or otherwise, in the management of the weeds can be assessed from the information recorded in the weed folder by caretakers and others. A summary of the work done should be included in their reports to the Park Manager. This data will be passed on to the weed planner from FoDI for assessment and review.

(Setting up a spreadsheet on a computer on the island, to which all could add their data, and then emailing the data at the end of each caretaker shift is a possibility which was considered. However, communications by email from the island is unreliable, and not all caretakers have adequate computer skills for this purpose.)

4.9 Evaluation of Weed Management

Information recorded in the Weed Folder by weeders, together with maps of weed sites which are regularly up-dated and photographic evidence provide means by which weed management can be assessed progressively. If the area and density of an infestation is not decreasing, revision of prescriptions for its treatment may be considered. Ideally, this reassessment should occur annually

4.10 Training

Volunteers working on the weeds will generally be using mechanical means, or applying glyphosate with dabbers, dripper bottles, a weed wand, or weed brush. Volunteers who hold current and appropriate chemical handling qualifications, and who have appropriate experience in weed identification and management, may use other chemicals and equipment for specific weed management tasks. Arrangements for this will have to be made with the Parks and Reserves Manager before going to the island.

4.11 Wildfire and Weed Management

In the context of weed management, a wildfire can have positive or negative effects on both native vegetation, and weed problems on the island. Fires have occurred on Deal fairly frequently because of its dryness and the flammability of the vegetation. Plans must be in place to cover that possibility so that the effects of wildfire on weeds can be responded to effectively. (Prescription 3.3.9 of the management plan refers to this.)

Removal of existing vegetation by wildfire would provide the chance to treat weed infestations such as the ragwort on Deal which is growing through such thick native vegetation. Fire in such an area would also provide the opportunity to identify and treat previously un-noticed weed problems.

Great numbers of stored weed seeds in the soil will be able to germinate after the removal of overlying vegetation by the fire. (Horehound, mullein and sea spurge all appear to have large seed banks in soils around the island.) Treatment / removal of the majority of weed seedlings arising from a mass germination after disturbance such as fire will dramatically reduce the quantity of seed stored in the soil which will improve weed problems in seasons to come. Conversely, if not treated, fire can exacerbate weed problems.

Whatever the case, a timely response in treatment of weeds after a fire must be planned for. Post fire, once seedlings have had the chance to develop to an identifiable stage, affected areas must be surveyed to establish which parts need treatment, and how best to treat them. (Caretakers on the island can observe germination and regeneration after the fire to help define when to survey.) Treatment should then follow as soon as possible, and before new weed plants are able to set seed. This is one of the few occasions in managing weeds in natural areas, when spraying or brushing with herbicide can be a good option for treatment. (For some weed species, and depending on the season, treatment should be within six months.)

5. WEEDS OF DEAL ISLAND – Priorities and Prescriptions for Management

Weed management is critical to successful flora management. Of the large number of introduced plants on Deal, some have become weeds and are spreading into the native vegetation. Others are ‘sleepers’ which currently have little impact, but may become a problem sometime in the future in response to environmental change. The ones which are observed actively invading and changing native vegetation communities are regarded as being of the highest priority for treatment. Map 1 shows the extent of the major weed infestations.



Map 1: Weed locations on Deal Island (2015).

North ↑

A number of the more significant weeds on Deal are discussed in the following. None are listed as Weeds of National Significance. Three are declared weeds under the *Tasmanian Weed Management Act 1999*, namely horehound, ragwort and slender thistles.

Deal Island is part of the Flinders Island Municipality, and is zoned the same way regarding the legal requirements for the treatment of declared weeds under the *Tasmanian Weed Management Act 1999*. As there are only limited occurrences of ragwort in the municipality, Deal is listed as Zone A (requiring eradication of the weed). It is listed as Zone B (requiring containment of) for horehound and slender thistle.

As many of the weeds on Deal date back to its pastoral period when much of it was used for grazing, there is a huge bank of weed seed in soils over much of the island. The island's history of sea spurge is shorter, but there is also a considerable bank of its seed in affected areas. The seed of many weed species is viable for a long time – decades in some cases. The existing vegetation suppresses the germination of much of this bank of weed seeds. The recommended treatment for the weeds is therefore designed to have as little as possible impact on the surrounding non-weedy, or less weedy vegetation. Physical removal or application of herbicide with drippers or dabbers rather than by spraying is generally prescribed.

5.1 Arum Lily (*Zantedeschia aethiopica*)

Environmental Weed

(Sites marked with white topped stakes.)

Priority: High

The treatment of arums is of high priority because of the impact they had on the native vegetation and wildlife (mainly nesting fairy penguins). A lot of effort has been put into the management of this weed and great progress has been made; the arum population has significantly reduced. Small plants remain though and it would only take a couple of years for it to begin to spread again. Efforts against this weed must be continuous to result in its eradication from the island.

Expected Outcome: Near eradication

Time scale: 5 years

Source

Arums arrived on the island, brought by the lightkeepers as garden plants, but have since become garden escapes and spread well beyond their original locations. So much so that they became a feature of East Cove, the arrival point of the island.

Dispersal

There are two main methods of dispersal - by seed and by tuber division. Although seed is short-lived, it is attractive to birds. As a result, many infestations have been found along fences, and under fallen dead trees – convenient perching places. Arums also produce a great many small tubers from the parent which can be spread by soil disturbance and grow into new plants. Small tubers and seed may be carried by water and gravity down creek and drainage lines which accounts for the spread of the plant down the slopes of East Cove and along roadside drains in the half way house area.

Distribution: pre - management

The most obvious infestation of arums was on the slopes down to East Cove, from the old airstrip down to the shoreline, and from the point on which the cormorants sit to the east, across

to the bluff above the western end of the beach. They have also been found along roadside ditches, around the ruins of light keepers' houses in the vicinity of the lighthouse, and in the half way house area. In addition, infestations were dotted around the *Poa* tussock grassland in the vicinity of the residence compound, and into *Allocasuarina* woodland. Penguins nested in the big infestation of the slopes of East Cove and were another factor to consider whilst treating it. Maps 2 and 3 show the distribution of arums in 2004. These same areas are checked frequently as some arum plants are still being found.



Map 2: Arum lilies at East Cove. (2004)



White dots – where arums have been found in the past

Distribution: current situation

Around East Cove the large clumps of arums have been replaced by healthy tussock and other vegetation, in which penguins now nest. The few remaining plants must be found and removed.

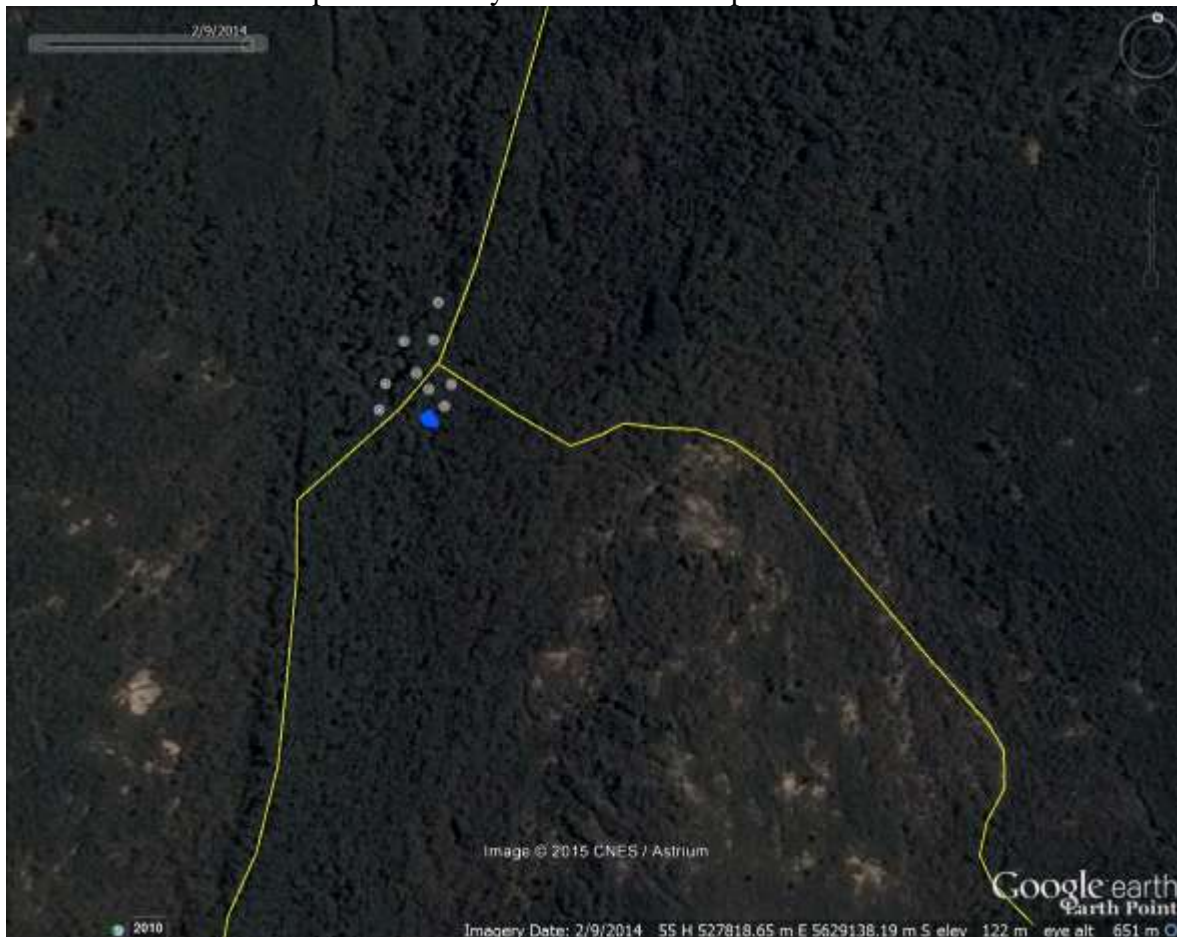
Management History

Since the start of the caretaker program, volunteers have been working to control the arums. A variety of methods have been used. Known infestations were mapped and marked. Flowers were cut off to prevent seed production.

From 2001 – 03 there was an intermittent herbicide spraying program, but progress was slow. In spring of 2004 direct injection of a measured dose of 3ml glyphosate into the crowns was tried. This was applied with a syringe designed for farm animal use. It resulted in the death of the main tuber - but then many tiny (some smaller than a grain of rice) daughter tubers sprang into life, each bearing small leaves. All of these had to be dug up to prevent new infestations.

Prescriptions

Now that only relatively few plants remain, treatment involves seeking them out and removing them before they flower and seed. Fertile material is taken off the island. The site of every plant removed must be marked with a dated white topped stake to aid checks for emerging new plants. Stakes should be left in place for two years after the last plant was removed from the site..



Map 3: Arum lilies at Halfway House site (current situation).

Blue patch - waterhole. White dots - arums.



5.2 Marram Grass (*Ammophila arenaria*)

Environmental Weed

Priority: High

This infestation probably originated from a segment/s of water borne rhizome which arrived from perhaps the mainland, or another island in Bass Strait. It was first noted in 1990.

Treatment was given high priority as marram has the potential to have major impact on native vegetation and the structure of dune systems of all three sandy beaches. A few small patches at Winter Cove were eradicated.

Marram can reproduce via seed, or from fragments of rhizomes washed in by the sea which readily re-root on a new site. Watch out for new infestations!

Outcome: Total Eradication.

Time Scale: Completed

Management History and Prescriptions:

Treatment commenced in 2004 with digging to remove as much of the above and below ground portions of the plant as possible. Waste was burnt. Leaves which emerged after this were painted on both sides with pure glyphosate. By 2006 just a few leaves remained, and (as of June 2015) none has been seen since 2010.

As it is a difficult weed to recognise, suspected marram should only be dealt with by people experienced in its recognition and treatment. (There are photographs in the weed folder to aid recognition.) Vigilance will be required to ensure that no new infestation occurs. Watch for it whilst patrolling the coast for new spurge arrivals.

5.3 Sea Spurge (*Euphorbia paralias*)

Environmental Weed

(Weed stakes have white tags.)

Priority: High

This weed was judged high priority for treatment because of its great potential to spread through and suppress native vegetation over a significant portion of the island. If it spreads as far as some mainland infestations (1 – 2km in from the shoreline) and based on its spread so far on Deal Island (outliers are found 3 - 400 metres inland, and at 70 – 80 metres altitude); it could spread throughout most of the area currently occupied by tussock vegetation.

On beaches, spurge causes sand to build up, changing the shape of dunes, and the beach itself. This is often to the detriment of beach nesting and burrowing birds. On the banks above East Cove, spurge is growing through areas occupied by the rare plant coast twinleaf (*Zygophyllum billardierei*) and suppressing its growth.



Source and History:

Sea spurge is native to coastal dunes of the northern Atlantic Ocean, the Mediterranean Sea and the Black Sea. It was first found in Australia in Albany in 1927, and is thought to have been accidentally introduced to Australia by shipping, possibly in ballast water. It spread along the Bight and reached the west coast of Wilsons Promontory by 1974. Then was reported on Deal Island at East Cove by Shirley Gray in 1988, and was noted at Garden Cove soon after. From 1988, spurge spread dramatically on Deal Island, with large infestations developing around both beaches.

Since then its spread on the mainland has continued - it is now reaching along the southern NSW coast.

In the past it was used in places in Australia to stabilise dunes, a practice that aided its spread.

Dispersal:

Sea spurge disperses by producing large quantities of seed - up to 20,000 from a very vigorous plant - which is explosively released. (Conversely, severely stressed plants produce very little seed.) The explosive release only throws the seed a couple of metres – enough to prevent seedlings from competing with the parent plant.

However the seed is light and buoyant – is easily carried by wind, and floats in sea water where it can remain viable for two years or more. This obviously gives great capacity for spread of the plant by ocean currents. The seed also remains viable in the soil for at least six years, (Petrus C Heyligers, *The spread of the introduced Euphorbia paralias along the mainland coast of south-eastern Australia* in *Cunninghamia* Vol 7 (3) 2002).

We quickly discovered that spurge on Deal could produce seed within six months of germination (this contrasts with our experience on the West Coast of Tasmanian mainland, where it took 12 months). To prevent new seed from being added to the store in the soil, working bees had to be held 6 monthly.

Management History:

The large infestations at East Cove and Garden Cove have both been treated, and follow-up weeding is conducted twice yearly.



Map 5: Sea spurge at Garden Cove with outliers

Yellow lines – roads

Green lines – fences

Pale area – original extent of sea spurge in 2005.

White dots – outliers



Management at both sites started with clearing the boundaries of the infestation and then moving inwards, leaving the dense ‘core’ infestation to be treated last. (Maps 4 and 5.)

Garden Cove was addressed first as it was an easier site. The native vegetation there consists mainly of monocots and there were no rare or endangered species present. The core was sprayed with herbicide – Brush Off – in 2010 and maintenance weeding conducted biannually ever since.

At *East Cove*, native vegetation contained a higher proportion of dicots, which included the rare coast twinleaf (*Zygophyllum billardierei*) and a different approach was needed. Here larger spurge plants were treated by cutting and pasting with glyphosate and smaller plants pulled.

At *Winter Cove*, patrols by volunteers have prevented the establishment of another infestation of spurge. Seed appears to arrive fairly constantly, with less than 10, usually small, plants being removed on each monthly inspection. (There was however, a big influx of seed in Spring 2012 with 350 or more small plants being removed.)

The remainder of the coastline has been kept clear by regular patrols and the removal of any spurge found. Occasional plants have been found at both sides of Squally Cove, Little Squally Cove, Pulpit Rock and the cove to the SW of East Cove.

Eventual Expected Outcome: Control

If the treatment regime is continuous, ‘the dream’ is that the main infestations can be removed, and that any new infestations of the weed can be managed by caretakers in the same way that Winter Cove is currently kept clear of sea spurge. A more probable outcome is that small pockets of the weed will pop up here and there, which caretakers will manage to prevent further spread.

Time Scale: 5+ years then continuous

With primary weeding at both sites completed, maintenance weeding continues. As of June 2015, Garden Cove has been re-weeded nine times, and a third sweep completed at East Cove.

Some sea spurge is on the fore dunes of West Cove, and Wallabi Cove on Erith Island, and removed annually by the Erith Mob. Caretakers who visit these areas are asked to also remove any plants that they see.

Treatment

To complete the job a thorough ‘seek and destroy’ program must continue until all seed stored in the soil is used up. The whole of each area must be patrolled, and (hopefully) every plant removed before it seeds.

Take particular care to be thorough when checking the creek at Garden Cove. Two people should work along the banks cooperatively with one person on each bank directing each other to spurge plants on the opposite bank. The job should be finished by one hardy person who wades up the creek to do the final check. (The creek is about waist deep, and is the home to a few nonaggressive eels.)

Weeding the outlying patches (mainly around Garden Cove) must also continue. These have been mapped and marked with white tagged weed stakes; buoys added for visibility. Seedy material which was dropped and left in situ to rot earlier in the program should now be taken back to base and composted.

Every so often, big swarms of plants will appear along the shorelines – the result of large amounts of seed being washed in, particularly after stormy weather. Small seedlings will germinate on bare sand, and also in fringes of shoreline vegetation.

- Record the event in the Weed Folder and inform the Park Manager or Volunteer weed planner
- Rake the ones on bare sand (use your fingers for small areas). The disturbance will kill most of them.
- Spray with an appropriate broad leaf specific herbicide if there are many amongst the native grasses.
- And work through the rest of the fringing vegetation to pull out the rest.

The Effects of Wallabies

There is a very high population of Bennett's Wallabies on Deal (also pademelons on nearby Erith Island). History can't quite tell us if they are there naturally or were introduced early in the 19th Century. Whatever the case, they browse the native vegetation around East Cove very heavily and also do a lot of damage as they move across the fragile eroding slopes. They have now been fenced out of the most sensitive areas.

5.4 Horehound (*Marrubium vulgare*) (Weed stakes have blue tags.)

Declared Weed

This is a Declared Weed. Flinders Municipality is zoned B, and the legal requirement is to contain the infestation. In particular, the weed should not be allowed to adversely affect any community, plant or animal species listed as threatened by Commonwealth or State legislation. See page 7.

Priority: High

Horehound has high priority for treatment because it can appear throughout the grasslands of the island and also spreads into some of the less dense forest and shrubland.

Expected Outcome: Control

Time Scale: continuous

Source and History:

Seed of this plant is likely to have arrived as a contaminant of stock food or pasture seed. It was also grown by some people for medical use, and may have spread from gardens as well.

Early photographs show dense infestations of horehound in pasture near buildings in the residential compound. It has appeared in grasslands and coastal vegetation around the island, and there seems to be quite a seed bank in the soil. If the surrounding vegetation was disturbed – by fire, for example – more horehound patches would appear.

The main effort is in treating what was a dense infestation on the southern end of East Cove, which was treated chemically in 2004. Emerging seedlings have been weeded out by caretakers ever since, and still quite a few seeds germinate after significant rainfall. The whole area needs checking – from the fence across to the stakes behind the dark green common boobialla tree (*Myoporum insulare*); and from the shoreline vegetation right up to the top of the bluff. (Map 6.)



Map 6: Horehound at East Cove – areas currently checked.



Blue patch near jetty is main site. Blue dots - Small sites

Another largish but diffuse patch was centred near the navigation marker higher up the slope above the Cove and needs to be checked. Elsewhere around the island isolated or smallish groups of plants occur between the *Poa* tussocks. Despite regular patrols and removal by caretakers, a few seed bearing plants and juveniles still appear. All known patches of the weed are mapped, marked with stakes, and checked and weeded regularly.

Dispersal and Distribution

Seeds are borne in hooked fruits which readily attach to clothing of passing humans or the coats of other mammals, thus spreading the actual seed. Successful control requires removal of plants before flowering and fruit development. Seed is viable in the soil for 7 – 10 years, and the plant prefers alkaline areas, which explains its frequency in the alkaline soils of the slopes of East Cove. Horehound has been found at many sites through the tussock grassland across the island.

Prescriptions:

Known patches are marked with blue tagged stakes, and their positions written into the Weed Folder. Caretakers are asked to check and weed sites monthly in spring, and three monthly otherwise. (Easiest to weed when 2-5 cm tall.) Seedy plants should be securely bagged for transport to incinerators in the residence compound and burnt. Non seedy material left to rot.

5.5 Ragwort (*Senecio jacobaea*)

Declared Weed

(Stakes tagged with orange.)

As a declared weed, and the legal requirement under the *Tasmanian Weed Management Act 1999* is to eradicate it, and prevent future infestations. Ragwort was also ranked the fifth worst weed by the Tasmanian land holders in a survey conducted by the CRC in 2006. Eradication is a performance indicator listed in the management plan.

Priority: High

Priority for treatment of this weed in the past was limited because of the resources (mainly labour) available, and the difficulty in adequately accessing and treating the infestation. The Spring 08 discovery of a previously unrecorded population of the endangered orchid *Caladenia aurantiaca* near the southern boundary of the infestation increased its priority.

Expected Outcome: Eradication

Time Scale: 5 years
(if access problems overcome)

Source and History

Ragwort probably arrived as a contaminant in stock feed or pasture seed.

Dispersal:

It is a biennial flowering plant of the daisy family. The first year of its life is spent as a flat rosette type of plant. In the second year, it produces a flowering spike from which it can produce vast quantities of seed (up to 250 000 from one large plant per year). There are two types of seed – one which is heavy and drops near the parent and the other has the typical daisy ‘parachute’ and it is designed to be carried by wind - but (compared with some of the thistles) the seed is not particularly mobile. However, the seed does remain viable in the soil for 10 -16 years, and ragwort is spreading rapidly.

Distribution

A large infestation (now more than 20 hectares) has been known for some years and it has been growing. It appeared to have doubled in size between 2002 when first mapped by Dean Vincent, and 2005 when mapped next and it has continued to expand. It lies in the saddle between Pegleg Bay and the more northern of the creeks which cross the beach at Winter Cove. There are also patches in that creek valley, almost down to sea level and others elsewhere on the island.

The affected area in the saddle is densest at the northern end and it has spread into the drainage area of the creek which drains into Garden Cove; down the slope towards Pegleg Bay; uphill to

the east; and also southwards and into the creek which runs into Winter Cove, and almost to the tree line to the south.

Native vegetation in the saddle area is very thick and tall, with the largest plants being *Poa poiformis* tussock, *Carex appressa* (a cutting grass), and tall, dense bracken. Not only is this vegetation difficult to move through, but the ragwort readily grows under these plants and is very difficult to detect except when flowering; and therefore exceedingly difficult to treat by chemical or mechanical means. Fire weed (*Senecio linearifolia*) a native which like ragwort has yellow flowers, is also in the area and can be a confusing species.

In other areas single or a few plants have appeared here and there around the island. These and their progeny are weeded, and sites marked with stakes for future checking.



Map 7: Ragwort on Deal Island (2015).

Orange area - main areas of infestations; orange dots – smaller sites



Management History and Prescriptions:

Various caretakers have worked on the infestation, particularly on the southern end, digging up rosette plants, and pulling and burning flowering plants.

A team from the May '05 working bee treated part of the infestation with Brushoff, but found the going through the dense vegetation very difficult, and there was not the opportunity for follow-up. The biggest problem was actually being able to see the ragwort plants in order to be able to treat them.

Tordon, with a measured dose being dispensed with the 'Tordon Stick' was used successfully to treat outliers in the vicinity of Winter Cove Creek. However this chemical is known to be residual in the environment and we no longer use it.

Ragwort Plume Moth was released 2007. Unfortunately no obvious effect of this release has been observed. Advice from Sandy Leighton (at that time, Project Manager Southern Tasmania Weed Strategy) suggested that a three pronged attack, using the Ragwort Flea Beetle and the Leaf and Crown Boring Moth in conjunction with the Plume Moths may be more successful and this is one avenue that we are following.

In more open areas on the Tasmanian mainland, mechanical removal (pulling them up with the help of a fork) has proved successful in managing it. Removal and destruction of all flowering plants by whatever means will do much to break the cycle of this weed. (Caretakers have been asked to pull, bag and compost as many flowering plants as possible.)

It is the dense overlying vegetation which makes treatment of this infestation so difficult. If this could be removed, the weed could be treated in a relatively short time. Mowing is not possible. Further professional advice is being sought to establish the best ways to approach this problem. As an interim line of management, the approach will be something like the following:

1. Conduct a thorough survey of affected areas, using a GPS generated grid, and produce an accurate map of the infestations.
2. Mark the grid on ground – or sufficient points to aid efficacy of treatment
3. Plan to introduce bio agents –
 - a. 3 pronged attack if possible
 - b. Release of the bio agents in denser areas of infestation would be the best option to ensure bio agents have enough food to establish populations viable for the life of the infestation
 - c. Removal of the flowering spikes, leaving the lower part of the plant for the biobugs to feed on
4. Smaller areas of high or moderate density weed should be sprayed – the herbicide Lontrel has been suggested for this, as it is effective on ragwort at a variety of stages of growth.

5. Help to break the cycle of seed production by pulling out flowering plants in areas not inhabited by the bio agents.
6. Plants in less dense parts of the infestation can be dug out. This could be as part of the mopping up process following use of one of the other treatments.
7. Treat outlying infestations as priority, removing all plants seen and covering disturbed ground.
8. Pull\dig out as many of the flowering plants as possible from the main infestation, and destroy the buds, flowers and seed. (Use a garden fork to loosen the plant if necessary, and cover disturbed soil.)

Additional specialist advice is being sought regarding further biological or other forms of control.

5.6 Slender Thistles (*Carduus tenuiflorus* + *pycnoccephalus*) **Declared Weed** (Not staked.)

Slender thistles are declared weeds. The legal requirement under the *Tasmanian Weed Management Act 1999* is to contain any infestation, and prevent the weed from adversely affecting threatened species or communities. It was ranked weed number 5 by Tasmanian landholders in the 2006 CRC survey of weeds of major importance.

Priority: High

Expected Outcome: control
manpower

Time scale: Depends on

The heaviest infestation of the slender thistles is on the upper slopes above East Cove and the small cove to its west where it grows amongst and must suppress the rare coast twinleaf. Seed from this site blows up into the residence compound and beyond. If the slender thistles can be controlled on these slopes, then it would be likely that there would be fewer of them on the rest of the island.

Other Thistles – and relatives:

There are also many other thistles and their relatives around the island – a reflection of its pastoral history. Variegated thistle (*Silybum marianum*), spear thistle (*Cirsium vulgare*), sow thistles (*Sonchus oleraceus*) and cat's ears (*Hypochoeris* sp.) are all there, and can be treated at the same time as the slender thistles.

Spear thistle was the top ranked agricultural weed in 2006 by Tasmanian landholders.

Watch out for the native coast sowthistle (*Actites megalocarpa*). It belongs here and should be avoided during weeding operations. A photograph is in the Weed Folder.

Prescriptions:

In the agricultural situation, thistles and their allies are best spot sprayed with herbicide when they are in the flat rosette stage, and before they send up flowering spikes. Early spring is best for this, but because of weather constraints, is earlier than we usually arrive on the island to conduct working bee. An alternative to spraying would be to place a drop of pure glyphosate onto the centre of each rosette.

Treatment began in 2010 and has continued every spring with thistles being pulled at the same time as spurge. Most plants had developed flowering spikes by then which made them easier to pull. Older plants can be levered out of the soil using a two pronged tool, or removed by twisting and pulling.

If thistle plants have developed flowering spikes before they are killed (by any means) their flowers will still develop and produce viable seeds. The plants must therefore be composted. Seed will otherwise mature and spread the weed further.

Disturbance is likely to cause germination of thistle seeds. Any works should be monitored for germination of thistle, especially following rains. Treat appropriately to scale by hand-pulling or use of herbicide.

Patches of spear thistles appear here and there around the island. There is one at the eastern end of Squally Bay which should be treated as soon as the opportunity arises.

5.7 European N Nettles (*Urtica urens*)

Environmental Weed

Priority: Medium

This weed is found in fairly restricted areas and doesn't show signs of spreading very widely. However, if plants are continually removed before seeding, this species could be eradicated in a relatively short time – and it is this which elevates its priority for treatment from Low to Medium.

Expected Outcome: Eradication

Time Scale: 5 years

Source and History

European nettles would have arrived on the island in soil with garden plants, or as a contaminant in stock feed or pasture seed. There are actually two nettle species on Deal, one native (*Urtica incisor*) and the other introduced (*Urtica urens*). Both tend to take advantage of disturbed areas, and both sting. European nettle has broader heart shaped leaves and fewer spines. Native nettles have narrower, lance shaped leaves heavily coated in spines. The stings of these are really uncomfortable, and some people react badly to them. A plant to be avoided!

Dispersal and Distribution

This weed does have some potential to spread through tussock grass vegetation, and along roadways, but as it prefers rich soils and moisture, the potential to spread is limited. Flowering and seed production occur in spring.

European nettle is mainly confined to the residence compound, particularly in and around the vegetable gardens, and around the septic tank outlet; and has also spread around the outside of the compound fence, where the passage of wallabies has kept a strip of soil bare. They are also found outside the main compound gates, and in the sheep and cattle yards. In addition, isolated plants have been found at other locations on the island where there have been gardens previously – Garden Cove for example.

Management History and Prescriptions

A few years ago, the use of gravel originating from the compound for work on the lighthouse road resulted in its spread nearly to half way house. These plants were quickly dispatched with glyphosate applied with a weed wand.

Apart from herbicide use, European nettles can be easily pulled out (the best way of dealing with them) and if it can be dealt with whilst plants are small, much pain can be avoided! Gloves are needed of course!

5.8 Cape Weed (*Arctotheca calendula*)

Environmental Weed

Although not listed as a declared weed under the *Tasmanian Weed Management Act 1999*, this weed does adversely affect native vegetation, pasture and crops, particularly in drought years. It was ranked number 3 by Tasmanian landholders, (farmers) as a weed which causes the greatest problems in their sphere. (Ireson, Davies, Friend, Holloway, Chatterton, Van Putten, & McFadyen 2007; CRC for Australian Weed Management)

Priority: Medium

This weed seemed to have been mainly confined to relatively small areas in and around the residence compound - mainly the north facing slopes. As such it was regarded as a weed of low priority for treatment. However thinning of grass cover caused by drought has allowed it to increase dramatically in its extent. There a real risk that it could spread into other more sparsely vegetated areas such as the slopes above East Cove and the flanks of Barn Hill. This potential elevated the priority of this weed.

Eventual Outcome: Control

Seed will probably remain in the soil for many years, and plants will reappear when competing vegetation becomes sparse due to drought, overgrazing or wear and tear.

Dispersal and Distribution

Cape weed thrives on light textured soils, especially in the absence of competition from other plants. Overgrazing by wallabies, and mowing grass and tracks too short will help the weed to spread. Cape weed flowers in late spring and early summer, and plants die off after seed production. Seeds germinate in the resultant spaces from late February through to late April, depending on when rain falls, and other conditions. Seed can remain dormant in the soil for many years.

Management History and Prescriptions

Cape weed has not been treated as in the past, because of its low priority however the recent dramatic expansion of the affected area should cause a rethink. Treatment options need to be considered in case it spreads beyond the compound area. Smaller areas of cape weed can be successfully treated early in the season by lifting plants with a garden fork and reseeding the area. Rosettes can be successfully treated by placing a single drop of pure glyphosate into the centre of each or on a larger scale, spot spraying with a broad leaf herbicide. However this should be done with caution where there are few plants to take their place.

Advice was sought from professionals about suitable grass species to use for re-seeding or competing with the capeweed. They suggested that we use grass species identified from the island to this purpose. It was suggested that *Hordeum murinum*, *Lolium rigidum*, *Dactylis glomerata*, *Festuca* sp or *Vulpia bromoides* be used (all introduced pasture species which are present in the compound). Alternatively a native species such as yellow spear grass (*Austrostipa flavescens*) collected from the wallaby enclosure could be used.

5.9 Mullein (*Verbascum thapsus* and *V creticum*)

(Stakes tagged with yellow.)

Environmental Weeds

Priority: High

At this stage, the mullein species are generally controlled and appear to be having little impact on native vegetation. Few plants appear to have seeded since management started.

Expected Outcome: Control

Time scale: continuing
(seed viable for 100 years!)

From the distribution, it appears that there is a fairly widespread store of seed of these species around the island. However the combination of competition from native plants, and caretakers' weeding seem to be keeping them under control. With the reported long period of viability of the seed, it is even more important to weed this plant before it sets seed.

Source and History

Both mullein species have attractive flowers, and may well have originated as garden flowers. Mullein was also grown for medicinal purposes.

Great Mullein (*Verbascum thapsus*) has occurred in the erosion gully above Winter Cove for a number of years. In 2004 there were flowering and seeding spikes present and it was then identified. Since then it has been weeded consistently, and few have flowered. Rosettes and seedling plants appear in the gully and elsewhere around the island, mainly between the tussocks in the *Poa* grassland.

In November 2005 a second mullein species (*Verbascum creticum*) was recorded – in flower - near Garden Cove (GR 527913E 5632065N GDA94). This was interesting as in Tasmania, the species is rare – albeit still a weed! In 2006, further rosettes were found and removed, including some from higher up in the Garden Cove Creek valley at (GR 527743E 5631531N GDA94), and a third patch behind the eastern end of Garden Cove (GR 528192E 5632282N GDA94).

Dispersal

Mulleins have tall flowering spikes which on maturing bear shaker like fruit from which the light seed can be spread by wind or water. The fruits also have hooks and can become attached to the fur of passing animals.

Management History and Prescriptions:

Caretakers have been pulling out those found since 2004. This practice appears to keep these weeds under control at this stage. It is though, a weed that could ‘take off’, and it is vital to remove plants before flowering spikes develop. Bag the seedy spikes and bring them back to base to burn. Mark the site of seeding mullein with a stake.

5.10 Bull rush - cumbungi (*Typha latifolia*)**Priority: High**

Confusion exists here. Bull rushes (*Typha* sp.) have been reported in just one place on Deal – a pool west of where the track to Winter Cove crosses the creek near the base of the erosion gully. It was first recorded by Stephen Harris and Georgina Davis during a vegetation survey in May 1990 as the native *Typha orientalis*. Karen Ziegler, reported *Typha* sp. in that pool in 2004, but it had no seed heads and was impossible to identify. Spring caretakers in 2004, did find and photograph flower heads on the plants. They were long, slender and light brown in colour, suggesting the species was *Typha domingensis* – a different native species. In winter 2006 another, different picture emerged with two types of *Typha* present which were identified at by Hobart Herbarium as native *Typha domingensis* and introduced *Typha latifolia*. Photographs of the seed heads of both species are in the weed folder.

Weedy *Typha* was treated by repeatedly cutting the stems below the waterline, after which it tends to rot. Removing it would have prevented its possible spread other water bodies such as the lower parts of Garden Cove Creek and Little Squally Creek.

5.11 Jonquils and Snowdrops – and other flower garden plants**Priority: Low**

Other weeds do more damage to native vegetation than these.

Expected Outcome: beyond the historic plantings, eradication

Source and History:

Jonquils had appeared along the roadside downhill of the lighthouse precinct, perhaps spread by road workings. There were also some westward of the ruins of the first light-keepers’ house perhaps spread by seed, and other isolated clumps in the precinct amongst the *Poa* tussocks. All of these have been dug up. The plantings of both jonquils and *Amaryllis* lilies around Baby’s Grave became very crowded and were thinned out.

Jonquils and snowdrops certainly multiplied in the main residential compound, and trailer loads of bulbs have been dug out and removed. In places they have spread to outside the compound fence, these too have been dug up. There are also a few jonquils beside the track to Garden Cove at the southern end of the old airstrip which have been dug a number of times.

Other garden flower plants which may spread sometime in the future includes *Agapanthus* which at present seems to be confined to the strip along the front fence of house 2 and must be preserved as a heritage planting unless they spread. There are also garden iris, freesia, and amaryllis amongst others, in the gardens of the current residences.

Prescriptions:

As stated in section 3.4 of this document, historic plantings in the residence compound, around graves, and other similar places are part of the heritage fabric of Deal Island, and should be retained. Flower garden plants found beyond the compound, or other established plantings can be dug out and destroyed.

5.12 Other Weeds

With about 30% of plant species recorded on the island being introduced, there are a great many other weedy plants on Deal. Sweet Melilot (*Melilotus indicus*), Fumitory (*Fumaria muralis*), Wall Rocket (*Diplotaxis muralis*) Black Nightshade (*Solanum nigrum*) sea rocket (*Cakile maritima*) and Pimpernel (*Lysimachia arvensis*, formerly *Anagallis*) are a few. All are naturalised, and are generally surviving quite happily with native plants. In some seasons they will be more numerous than they are in others - however while they do not seem to be 'taking over', and do not appear to be endangering threatened species, treatment of these species is not a high priority. In some instances, they may even be helping to crowd out weeds of higher priority for treatment.

Salvation Jane (*Echium plantagineum*)

According to the management plan, Salvation Jane was reported some time in the past in the park. The weed has not been seen since and it appears that this report may have arisen from miss-identification of, perhaps, coast poisonpea, *Swainsona lessertiifolia*.

5.13 Potential New Introductions

There is an infestation of sea wheat grass *Thinopyrum junceiforme* on the fore-dune and *Senecio elegans* and garden stocks are also weeds of the hind dunes of West Cove on Erith Island. Pyp grass (*Ehrharta villosa*) has also been recorded on the island, and Kikuyu (*Pennisetum clandestinum*) is rampant in places. There is a distinct possibility that seeds of these weeds will get to Deal Island – perhaps carried by people visiting Deal after Erith. And as mentioned previously, new weeds could be introduced to Deal with plants brought in for the vegetable garden

6. TREATING THE WEEDS

Suggested treatments for weeds of higher priority are outlined as the Action Plan summarised in the following table.

ACTION PLAN FOR PRIORITISED WEEDS

Name: Declared (D) or Environmental (E)	State of infestation (2015)	Actions Prescribed	Potential for control or elimination	Priority
Arum Lilies <i>Zantedeschia aethiopica</i> E	Occasional plants remain in the sites of the original infestations.	Mark and record the position of all plants dug with weed stakes. Check areas known to be previously infested in spring and summer (map in Weed Folder). Plants found should be dug up. Destroy flowers; bag up large and small underground parts and take off the island.	If all plants are removed before seed forms, elimination will eventually be effected.	High
Marram Grass <i>Ammophila arenaria</i> E	Small infestation at Winter Cove eradicated.	Regular checks of the coastline, especially Winter Cove for this weed. (See Weed Folder for description.) Paint the leaves of any marram with pure glyphosate, using a small brush or dabber. Burn any plant material removed.	Probably eradicated. All parts of coast need regular checking for new infestations.	High
Sea Spurge <i>Euphorbia paralias</i> E	Winter Cove: Intermittent small infestations from water borne seed. Garden Coven totally weeded, nine reweeding sweeps completed.(2015) East Cove: has been totally weeded, three reweeding sweeps and wallabies fenced out. (2015)	Coast Generally: Check for new infestations, pull any found and record in weed folder. Winter Cove: Patrol monthly & pull plants Garden Cove: patrol and clear entire area. Pay special attention to staked outlying patches. East Cove: Weed the area outside the fence. Inside the fence will be dealt with by working bees.	Controllable with consistent effort over time. Treatment period will be at least 10 years. It will initially require two working bees per year as the plants actively grow year round and appear to produce seed within six months of germination. Beyond the treatment phase, regular patrols of the coastline to note and remove further infestations is vital.	High
Horehound <i>Marrubium vulgare</i> D	Appears to have been widely distributed, usually small patches, and usually in the tussock vegetation. Most around the compound area such as the cattle yards, sheep yards and the navigation marker in front of the compound.	Monthly off track patrols over Spring and Summer of known horehound areas are needed. Mark new patches with labelled weed stake, GPS site if possible, add to map and set up new weed control record sheet in Weed Folder. Pull and bag seedy plants, and burn in incinerator in residence compound.	Control: with constant vigilance, known infestations will be eradicated, and new infestations will be found and treated before they become major problems.	High because of Declared Weed Status.
Ragwort <i>Senecio jacobaea</i> D	Affects an area of about 20 ha; appears to have spread noticeably since it was previously mapped.	1. Conduct a thorough survey of affected areas, using a GPS generated grid, and produce an accurate map of the infestations. 2. Mark the grid on ground to aid efficacy of treatments. 3. Treat outlying infestations as priority.	Controllable but difficult in the dense native veg. infested. Practical control needs to be investigated with professional help.	High because of Declared Weed Status

Name: Declared (D) or Environmental (E)	State of infestation (2015)	Actions Prescribed	Potential for control or elimination	Priority
Ragwort <i>Senecio jacobaea</i> (continued)	Continued	Remove all plants seen and avoid soil disturbance as much as possible. 4. Remove as many of the flowering spikes as possible from the main infestation, and destroy (bag and solarise or compost) the fertile parts. (Use a garden fork to loosen the plant if necessary, and cover disturbed soil.) 5. Seek further specialist advice regarding further biological or other forms of control. 6. Use Lontrel if chemical treatment is specified.	Continued	Continued
European nettle <i>Urtica urens</i> E	Escaping from garden / compound area. Infestations easily controlled by pulling or with herbicide.	Pull plants out or use weed wand with recommended dosage of glyphosate.	Controllable	Low
Cape weed <i>Arctotheca calendula</i> E	Mainly within residence compound but infestation seems to have grown rapidly to about 2ha during drought conditions.	Map/photograph the changes to the infestation when in flower. Gather seed from grasses in the wallaby enclosure. Spread the seed after die back in autumn. Small infestations can be removed with a fork – but minimise soil disturbance to reduce germination of seed and growth of new weeds. Alternatively treat with one drop of glyphosate in centre of each rosette.	Until drought showed little evidence of rapid spread. Controllable by management of grass / pasture species .	Medium
Mullein (both <i>Verbascum thapsus</i> and <i>V creticum</i>) E	Small main infestations but widespread isolated plants.	Search through tussock grassland for these weeds. Remove any rosette plants found and (unless seedy) place in an elevated position to dry out. Bag and burn seedy plants.	Controllable: V thapsus in particular needs constant checking.	High
Slender thistles <i>(Carduus tenuiflorus</i> D	Widespread but worst between East Cove and (including) residence compound.	Pull up using twisting motion. Alternatively, apply one drop of pure glyphosate to centre of each rosette. Compost all parts of the plants.	Controllable if East Cove infestation can be greatly reduced.	High
Spear thistle & variegated thistle E	Mainly occasional, but can be treated along with slender thistles	As above.	Controllable	Medium
Bull rush <i>Typha latifolia</i> E	It was only in one of the 3 pools on the island and has been eliminated	Weedy bull rush was eliminated in 2010.		High

7. REFERENCES

- Comfort, M., 2009, Deal Island: *Geodiversity Site Inspection A Report to the Parks and Wildlife Service*. Land Conservation Branch, DPIW.
- Cronin, S.J., 2004, *Weed Management Strategy – Northern Natural Resource Management Region*, Northern Region Weed Strategy Group.
- Department Environment and Water Resources, 2007, *The Australian Weed Strategy: a national approach for weed management in Australia*.
- Department of Primary Industry, Water and the Environment DPIWE, 2005, *Weedplan, Tasmania's Weed Management Strategy*.
- Department of Primary Industry, Water and the Environment DPIWE, 2008, *Draft Procedural Manual*
- DPIW, *Statutory Weed Management Plans*.
- Tasmanian Wilderness World Heritage Area *Beach Management Plan*, May 2008
- Harris, S. and Davis, G., 1995 *The Vegetation and Flora of Deal Island, Kent Group*, Papers and Proceedings of the Royal Society of Tasmania, Volume 129.
- Ireson, Davies, Friend, Holloway, Chatterton, Van Putten, & McFadyen (2007); *Weeds of Pastures and Seed Crops in Tasmania: economic impacts and biological control*, CRC for Australian Weed Management
- Natural Heritage Trust, 2004, *Introductory Weed Management Manual*
- Northern NRM Region 2004, *The Northern Tasmanian Weed Management Strategy*
- Parks and Wildlife Service, Tasmania 2005, *Kent Group National Park (Terrestrial Portion) Management Plan 2005*
- Rudman, T., 2003, *The Tasmanian Beach Weed Strategy for marram grass, sea wheat grass, pyp grass and beach daisy*. Nature Conservation Branch DPIWE
- Whinray, John, 2003, A Submission on the Draft Management Plan for Kents Group's National Park (unpublished correspondence to the Director of National Parks and Wildlife)

Appendix 1: Caretakers and the Weeding Program

You may be interested in contributing to the weeding program which some of your predecessors and the Friends of Deal Island have been working on since 2002. The following guide provides a brief list of the actions which would be most useful in our efforts to eliminate key weed species. Can you help?

Most of the tasks are to follow up on work previously done. Weeds and jobs have been prioritised according to the damage each weed can do and the amount of effort already spent in controlling it. Descriptions of the weeds themselves, the weedy sites, and suggested weed treatments are held in the blue Weed Folder in the caretakers' residence. Please record the work that you do on the sheets provided in the folder, and also record details of any new or suspected weed infestation you find.

To prevent seed spread, seedy weed plants or their seedy parts should be bagged, taken to the compound and rotted down in the drum provided in the quarry OR burnt in the incinerator. (See note about disposal in Weed Folder.) Most weed problems are in grassland areas and many are around the sites of settlements and human activity. Many of the weeding jobs can be integrated with walks or other activities in the area. Others will require trips for the purpose.

Sea Spurge

High Priority

This weed spread to the island as a result of seed being washed in by ocean currents. Seed can also be spread by wind. Management of spurge has been a big challenge, and it is the weed on which most effort is currently being spent. The aim is to remove all existing infestations and encourage natural vegetation to develop in their place. Thereafter, the hope is that regular patrol and removal of plants by caretakers and other volunteers will prevent further infestations arising by germination of seed carried in by the sea. Please do as much as you have time for. Pull the spurge plants and leave to rot. Any seedy parts can be brought back to base to be composted.

Prevent New Infestations

1. At least twice in your stint, check the beach at Winter Cove and pull out any spurge found.
2. If you visit coastal areas such as Squally Cove, Pegleg Cove Little Squally Cove, Pulpit Rock and the bay south west of East Cove, do check amongst the rocks on the beaches for spurge plants and remove them. Spurge has been found at all of them, except for Pegleg.

Follow up weeding

Garden Cove: A major infestation of about 5ha occupying the entire length of the beach, the plains behind, and the slopes to the west of the beach has been cleared. Follow-up weeding of seedlings still emerging continues over the entire area. As well, the beach and creek banks need to be patrolled and plants emerging from newly washed in seed must be pulled out.

Also check the outlier patches as described in the weed folder, and indicated by the weed markers with buoys for visibility. (Some of these patches are high up the hill.) Pull out any plants found.

East Cove: Another big infestation of similar size is being cleared. It would be most useful if you could remove spurge plants – as many as possible - which are outside the fenced enclosure. A weed team will look after the area inside. It is particularly important to keep the beach and rocky shores clear (pull plants, rake small seedlings to disrupt roots) and keep the roadway clear of spurge as well.

Arum Lilies

High Priority

Arums have been found mainly in the East Cove and Halfway House areas. (Refer to maps.) Please look out for them during spring and in summer. Dig them up and bag their under-ground parts for removal from the island. Put in a weed stake to mark the site. Label the stake with A (for arum) plus month/year.

Horehound

High Priority

This used to be widespread on Deal, but now is confined to some relatively small areas, the most important of which is the Jetty Patch – the slope immediately to the southwest of the jetty in East Cove. Its boundary is marked by stakes and it extends from the top of the spray zone right to the top of the bluff above. Distribution of the weed is patchy in the area. Another small patch, also marked with a stake is on the slopes of the next bay to the southwest.

There are also some small areas around the compound, plus a few small sites behind Garden Cove.

Please thoroughly check all areas – monthly from early spring to summer and 3 monthly for the rest of the year. Seedy plants should be bagged for transport to the incinerator then burnt.

Ragwort

High Priority

Help control this weed by pulling or digging up as many flowering plants as you can, particularly those from outlying patches – refer to map. Bag for transport then compost the flowers and seed. (Ragwort flowers in spring, summer, and into autumn.) Dig up rosettes, particularly any found in the patches near Winter Cove track, and in the area around the northern bank of Winter Cove Creek behind the beach, and cover disturbed ground with grass to retard new seed germination.

European Stinging Nettles

Low Priority

These come up in spring, especially around the vegetable gardens, just outside the East Cove compound gate, and in the Jetty horehound patch. Pull them up early, wearing gloves to avoid their stings.

Cape Weed

Med - Low Priority

Although this weed was considered a fairly low priority to treat, drought conditions experienced over recent years has resulted in its recent spectacular spread. The real danger is that it will spread beyond the compound. Please remove any plants seen outside the compound and burn them – before they set seed in summer. Alternatively, place a drop or dab of pure glyphosate in the centre of each rosette. (If time permits, feel free to do some inside the compound too!)

Great Mullein

High Priority

Always watch for these ‘lambs ears’-like plants (which grow tall yellow flowering spikes – up to a metre high) and remove any found. They appear in small numbers between the tussocks, in many places on the island. Bag then burn seedy material. Cretan mullein, a second type also occurs and info about this is in the Weed Folder.

Thistles

High Priority

(Again, lots to do and any time you spend is most useful.) These are best treated in early spring, when in the rosette (flat plant) stage. Treat as many as you can, particularly in the compound. Use the weed brush, or one drop, or a dab of glyphosate in the centre of each plant will kill it. Later in the season when the tall flowering spike has grown, they can be pulled up with a twisting motion (use gloves). Compost whole plants before they dry and set seed. (This happens quickly!) Add some water to speed composting.

Caution:

Sea spurge has sap which can be poisonous. It can cause skin irritation, and if it gets into someone’s eyes, it will cause severe and painful irritation. Please protect yourself. Always wear safety glasses or sunglasses and long sleeved shirt and trousers. Also wear gloves, and use barrier cream on hands and forearms for additional protection. First Aid kits on Deal contain saline solution to wash affected eyes.

Native nettles have a nasty sting, which can affect people for a number of days. Some are allergic to nettles. First Aid kits contain antihistamine for treatment of allergies.

The only **snakes** on Deal are the white lipped whip snake – venomous, but too small to cause you harm.

If you have any questions or comments about weed management on Deal Island, please contact the Park Manager or the weed planner from Friends of Deal Island – Penny or Bob Tyson on 03 62236761.

Appendix 2: Plant Species Recorded on Deal Island (as of May 2015)

e = endemic
n = native
i = introduced (yellow highlight)

D = Dicot (broad leafed plant)
M = Monocot (narrow leafed plant)
G = Gymnosperm (conifer)
P = Pteridophyte (fern)
B = Bryophyte (moss / liverwort)

D	AIZOACEAE	<i>Carpobrotus rossii</i>	native pigface	n
D	AIZOACEAE	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	roundleaf pigface	n
D	AIZOACEAE	<i>Tetragonia implexicoma</i>	bower spinach	n
D	AIZOACEAE	<i>Tetragonia tetragonoides</i>	new zealand spinach	n
D	APIACEAE	<i>Apium dulce</i>	garden celery	i
D	APIACEAE	<i>Apium insulare</i>	island sea-celery	n
D	APIACEAE	<i>Apium prostratum</i> subsp. <i>prostratum</i> v. <i>filiforme</i>	slender sea-celery	n
D	APIACEAE	<i>Daucus glochidiatus</i>	australian carrot	n
D	APIACEAE	<i>Hydrocotyle comocarpa</i>	fringe-fruit pennywort	n
D	APIACEAE	<i>Hydrocotyle hirta</i>	hairy pennywort	n
D	APIACEAE	<i>Hydrocotyle sibthorpioides</i>	shining pennywort	n
D	APIACEAE	<i>Lilaeopsis polyantha</i>	jointed swampstalks	n
D	APIACEAE	<i>Torilis nodosa</i>	knotted parsley	i
D	APOCYNACEAE	<i>Alyxia buxifolia</i>	seabox	n
D	ASTERACEAE	<i>Actites megalocarpa</i>	dune thistle	n
D	ASTERACEAE	<i>Angianthus preissianus</i>	salt cupflower	n
D	ASTERACEAE	<i>Apalochlamys spectabilis</i>	sticky firebush	n
D	ASTERACEAE	<i>Arctotheca calendula</i>	capeweed	i
D	ASTERACEAE	<i>Artemisia arborescens</i>	wormwood	i
D	ASTERACEAE	<i>Bellis perennis</i>	english daisy	i
D	ASTERACEAE	<i>Brachyscome diversifolia</i> var. <i>maritima</i>	coastal tall daisy	e
D	ASTERACEAE	<i>Carduus pycnocephalus</i>	slender thistle	i
D	ASTERACEAE	<i>Carduus tenuiflorus</i>	winged thistle	i
D	ASTERACEAE	<i>Cirsium vulgare</i>	spear thistle	i
D	ASTERACEAE	<i>Conyza sumatrensis</i>	fleabane	
D	ASTERACEAE	<i>Cotula australis</i>	southern buttons	n
D	ASTERACEAE	<i>Cotula coronopifolia</i>	water buttons	i
D	ASTERACEAE	<i>Cotula vulgaris</i> var. <i>australasica</i>	slender buttons	n
D	ASTERACEAE	<i>Cymbonotus preissianus</i>	southern bears-ears	n
D	ASTERACEAE	<i>Euchiton japonicus</i>	star cottonleaf	n
D	ASTERACEAE	<i>Euchiton sphaericus</i>	globe cottonleaf	n
D	ASTERACEAE	<i>Gnaphalium indutum</i>	tiny cottonleaf	n
D	ASTERACEAE	<i>Helichrysum luteoalbum</i>	jersey cudweed	n
D	ASTERACEAE	<i>Hypochoeris glabra</i>	smooth catsear	i
D	ASTERACEAE	<i>Hypochoeris radicata</i>	rough catsear	i
D	ASTERACEAE	<i>Lagenophora stipitata</i>	blue bottledaisy	n
D	ASTERACEAE	<i>Leiocarpa supine</i>	coast ploverdaisy	n
D	ASTERACEAE	<i>Leontodon saxatilis</i>	hairy hawkbit	i

D	ASTERACEAE	<i>Leucophyta brownii</i>	cushionbush	n
D	ASTERACEAE	<i>Olearia phlogopappa</i> subsp. <i>insularis</i>	common dusty daisybush	n
D	ASTERACEAE	<i>Ozothamnus turbinatus</i>	coast everlastingbush	n
D	ASTERACEAE	<i>Senecio biserratus</i>	crosscut fireweed	n
D	ASTERACEAE	<i>Senecio jacobaea</i>	ragwort	i
D	ASTERACEAE	<i>Senecio linearifolius</i> var. <i>linearifolius</i>	fireweed groundsel	n
D	ASTERACEAE	<i>Senecio minimus</i>	shrubby fireweed	n
D	ASTERACEAE	<i>Senecio odoratus</i>	scented groundsel	n
D	ASTERACEAE	<i>Senecio pinnatifolius</i> var. <i>lanceolatus</i>	dune groundsel	n
D	ASTERACEAE	<i>Senecio pinnatifolius</i> var. <i>maritimus</i>		
D	ASTERACEAE	<i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>		
D	ASTERACEAE	<i>Senecio quadridentatus</i>	cotton fireweed	n
D	ASTERACEAE	<i>Silybum marianum</i>	variegated thistle	i
D	ASTERACEAE	<i>Sonchus asper</i>	prickly sowthistle	i
D	ASTERACEAE	<i>Sonchus oleraceus</i>	common sowthistle	i
D	ASTERACEAE	<i>Taraxacum officinale</i>	common dandelion	i
D	ASTERACEAE	<i>Vellereophyton dealbatum</i>	white cudweed	i
D	BORAGINACEAE	<i>Myosotis australis</i>	southern forgetmenot	n
D	BRASSICACEAE	<i>Cakile maritima</i> subsp. <i>maritima</i>	searocket	i
D	BRASSICACEAE	<i>Capsella bursa-pastoris</i>	shepherds purse	i
D	BRASSICACEAE	<i>Diplotaxis muralis</i>	wall rocket	i
D	BRASSICACEAE	<i>Lepidium desvauxii</i>	bushy peppercress	n
D	BRASSICACEAE	<i>Lepidium didymium</i>	lesser swinecress	i
D	BRASSICACEAE	<i>Nasturtium officinale</i>	two-row watercress	i
D	CAMPANULACEAE	<i>Lobelia anceps</i>	angled lobelia	n
D	CAMPANULACEAE	<i>Lobelia irrigua</i>	salt pratia	n
D	CAMPANULACEAE	<i>Wahlenbergia gracilentia</i>	annual bluebell	n
D	CAMPANULACEAE	<i>Wahlenbergia gracilis</i>	sprawling bluebell	n
D	CAMPANULACEAE	<i>Wahlenbergia gymnoclada</i>	naked bluebell	n
D	CAPRIFOLIACEAE	<i>Sambucus gaudichaudiana</i>	white elderberry	n
D	CARYOPHYLLACEAE	<i>Cerastium glomeratum</i>	sticky mouse-ear	i
D	CARYOPHYLLACEAE	<i>Polycarpon tetraphyllum</i>	fourleaf allseed	i
D	CARYOPHYLLACEAE	<i>Sagina apetala</i>	annual pearlwort	i
D	CARYOPHYLLACEAE	<i>Sagina maritima</i>	sea pearlwort	i
D	CARYOPHYLLACEAE	<i>Sagina procumbens</i>	spreading pearlwort	i
D	CARYOPHYLLACEAE	<i>Silene gallica</i> var. <i>gallica</i>	french catchfly	i
D	CARYOPHYLLACEAE	<i>Silene gallica</i> var. <i>quinquevulnera</i>	spotted catchfly	i
D	CARYOPHYLLACEAE	<i>Spergularia rubra</i>	greater sandspurrey	i
D	CARYOPHYLLACEAE	<i>Stellaria media</i>	garden chickweed	i
D	CARYOPHYLLACEAE	<i>Stellaria multiflora</i> subsp. <i>nebulosa</i>	rayless starwort	n
D	CARYOPHYLLACEAE	<i>Stellaria pallida</i>	lesser chickweed	i
D	CARYOPHYLLACEAE	<i>Stellaria pungens</i>	prickly starwort	n
D	CASUARINACEAE	<i>Allocasuarina monilifera</i>	necklace sheoak	e
D	CASUARINACEAE	<i>Allocasuarina verticillata</i>	drooping sheoak	n
D	CHENOPODIACEAE	<i>Atriplex cinerea</i>	grey saltbush	n
D	CHENOPODIACEAE	<i>Atriplex patula</i>	spear orache	i
D	CHENOPODIACEAE	<i>Atriplex prostrata</i>	creeping orache	i

D	CHENOPODIACEAE	<i>Chenopodium glaucum</i>	pale goosefoot	i?
D	CHENOPODIACEAE	<i>Dysphania pumilio</i>	small crumbweed	i
D	CHENOPODIACEAE	<i>Rhagodia candolleana</i> subsp. <i>candolleana</i>	coastal saltbush	n
D	CHENOPODIACEAE	<i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i>	beaded glasswort	n
D	CHENOPODIACEAE	<i>Sarcocornia quinqueflora</i> subsp. <i>tasmanica</i>	tasmanian glasswort	n
D	CHENOPODIACEAE	<i>Threlkeldia diffusa</i>	coast bonefruit	n
D	CLUSIACEAE	<i>Hypericum gramineum</i>	small st johns-wort	n
D	CONVOLVULACEAE	<i>Dichondra repens</i>	kidneyweed	n
D	CRASSULACEAE	<i>Crassula decumbens</i> var. <i>decumbens</i>	spreading stonecrop	n
D	CRASSULACEAE	<i>Crassula helmsii</i>	swamp stonecrop	n
D	CRASSULACEAE	<i>Crassula sieberiana</i>	rock stonecrop	n
D	CRASSULACEAE	<i>Crassula tetramera</i>	wiry stonecrop	n
D	DROSERACEAE	<i>Drosera auriculata</i>	tall sundew	n
D	DROSERACEAE	<i>Drosera pygmaea</i>	dwarf sundew	n
D	EPACRIDACEAE	<i>Epacris impressa</i>	common heath	n
D	EPACRIDACEAE	<i>Leptecophylla juniperina</i>	common pinkberry	n
D	EPACRIDACEAE	<i>Leucopogon parviflorus</i>	coast beardheath	n
D	EPACRIDACEAE	<i>Monotoca glauca</i>	goldey wood	n
D	EUPHORBIACEAE	<i>Euphorbia helioscopia</i>	sun spurge	i
D	EUPHORBIACEAE	<i>Euphorbia paralias</i>	sea spurge	i
D	EUPHORBIACEAE	<i>Euphorbia peplus</i>	petty spurge	i
D	EUPHORBIACEAE	<i>Phyllanthus gunnii</i>	shrubby spurge	n
D	EUPHORBIACEAE	<i>Poranthera microphylla</i>	small poranthera	n
D	FABACEAE	<i>Goodia lotifolia</i>	smooth goldentip	n
D	FABACEAE	<i>Medicago lupulina</i>	black medick	i
D	FABACEAE	<i>Melilotus indicus</i>	sweet melilot	i
D	FABACEAE	<i>Pultenaea daphnoides</i>	heartleaf bushpea	n
D	FABACEAE	<i>Swainsona lessertiiifolia</i>	coast poisonpea	n
D	FABACEAE	<i>Trifolium dubium</i>	suckling clover	i
D	FABACEAE	<i>Trifolium glomeratum</i>	cluster clover	i
D	FABACEAE	<i>Trifolium micranthum</i>	slender clover	i
D	FABACEAE	<i>Trifolium resupinatum</i>	reversed clover	i
D	FABACEAE	<i>Vicia sativa</i> subsp. <i>nigra</i>	narrowleaf vetch	i
D	FUMARIACEAE	<i>Fumaria muralis</i> subsp. <i>muralis</i>	wall fumitory	i
D	GENTIANACEAE	<i>Centaurium erythraea</i>	common centaury	i
D	GERANIACEAE	<i>Erodium cicutarium</i>	common heronsbill	i
D	GERANIACEAE	<i>Geranium dissectum</i>	cutleaf cranesbill	i
D	GERANIACEAE	<i>Geranium molle</i>	soft cranesbill	i
D	GERANIACEAE	<i>Geranium potentilloides</i> var. <i>potentilloides</i>	mountain cranesbill	n
D	GERANIACEAE	<i>Geranium solanderi</i>	southern cranesbill	n
D	GERANIACEAE	<i>Geranium</i> sp. pale pink flowers Vic. Herbarium		n
D	GERANIACEAE	<i>Pelargonium littorale</i>	coast storksbill	n
D	GOODENIACEAE	<i>Dampiera stricta</i>	blue dampiera	n
D	GOODENIACEAE	<i>Goodenia ovata</i>	hop native-primrose	n
D	GYROSTEMONACEAE	<i>Gyrostemon thesioides</i>	broom wheelfruit	n
D	HALORAGACEAE	<i>Gonocarpus teucroides</i>	forest raspwort	n
D	HALORAGACEAE	<i>Myriophyllum salsugineum</i>	lake watermilfoil	n

D	LAMIACEAE	<i>Ajuga australis</i>	australian bugle	n
D	LAMIACEAE	<i>Marrubium vulgare</i>	white horehound	i
D	MALVACEAE	<i>Malva arborea</i>	tree mallow	i
D	MALVACEAE	<i>Modiola caroliniana</i>	redflower mallow	i
D	MIMOSACEAE	<i>Acacia melanoxylon</i>	blackwood	n
D	MIMOSACEAE	<i>Acacia mucronata</i> subsp. <i>dependens</i>	blunt caterpillar wattle	n
D	MIMOSACEAE	<i>Acacia mucronata</i> subsp. <i>longifolia</i>	longleaf caterpillar wattle	n
D	MIMOSACEAE	<i>Acacia mucronata</i> subsp. <i>mucronata</i>	erect caterpillar wattle	n
D	MIMOSACEAE	<i>Acacia verticillata</i> subsp. <i>verticillata</i>	prickly moses	n
D	MYOPORACEAE	<i>Myoporum insulare</i>	common boobialla	n
D	MYRTACEAE	<i>Calytrix tetragona</i>	common fringemyrtle	n
D	MYRTACEAE	<i>Eucalyptus nitida</i>	western peppermint	e
D	MYRTACEAE	<i>Kunzea ambigua</i>	white kunzea	n
D	MYRTACEAE	<i>Leptospermum laevigatum</i>	coast teatree	n
D	MYRTACEAE	<i>Leptospermum scoparium</i>	broadleaf manuka	n
D	MYRTACEAE	<i>Melaleuca ericifolia</i>	coast paperbark	n
D	NYCTAGINACEAE	<i>Mirabilis jalpa</i>	marvel of Peru	I
D	ONAGRACEAE	<i>Epilobium billardierianum</i> subsp. <i>billardierianum</i>	robust willowherb	n
D	ONAGRACEAE	<i>Epilobium sarmentaceum</i>	mountain willowherb	n
D	OXALIDACEAE	<i>Oxalis perennans</i>	grassland woodsorrel	n
D	OXALIDACEAE	<i>Oxalis pes-caprae</i>	soursob	i
D	OXALIDACEAE	<i>Oxalis rubens</i>		n
D	PAPAVERACEAE	<i>Papaver somniferum</i>	opium poppy	i
D	PITOSPORACEAE	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	prickly box	n
D	PLANTAGINACEAE	<i>Plantago bellidioides</i>	herbfield plantain	e
D	PLANTAGINACEAE	<i>Plantago coronopus</i> subsp. <i>coronopus</i>	buckshorn plantain	i
D	PLANTAGINACEAE	<i>Plantago hispida</i>	hairy plantain	n
D	PLANTAGINACEAE	<i>Plantago varia</i>	variable plantain	n
D	POLYGALACEAE	<i>Comesperma volubile</i>	blue lovecreeper	n
D	POLYGONACEAE	<i>Acetosella vulgaris</i>	sheep sorrel	i
D	POLYGONACEAE	<i>Rumex brownii</i>	slender dock	n
D	PORTULACEAE	<i>Calandrinia calyptata</i>	pink purslane	n
D	PRIMULACEAE	<i>Lysimachia arvensis</i>	scarlet pimpernel	i
D	PROTEACEAE	<i>Banksia marginata</i>	silver banksia	n
D	PROTEACEAE	<i>Hakea</i> sp (plant in garden)		i
D	RANUNCULACEAE	<i>Clematis decipiens</i>	coast clematis	n
D	RANUNCULACEAE	<i>Clematis microphylla</i>	small-leaf clematis	n
D	RANUNCULACEAE	<i>Ranunculus amphitrichus</i>	river buttercup	n
D	RANUNCULACEAE	<i>Ranunculus muricatus</i>	sharp buttercup	i
D	RHAMNACEAE	<i>Pomaderris apetala</i> subsp. <i>apetala</i>	common dogwood	n
D	RHAMNACEAE	<i>Pomaderris apetala</i> subsp. <i>maritima</i>	coast dogwood	n
D	ROSACEAE	<i>Acaena novae-zelandiae</i>	common buzzy	n
D	RUBIACEAE	<i>Galium albescens</i>	downy bedstraw	n
D	RUBIACEAE	<i>Galium australe</i>	coast bedstraw	n
D	RUBIACEAE	<i>Galium palustre</i>	marsh bedstraw	i
D	RUBIACEAE	<i>Galium murale</i>	small bedstraw	i
D	RUBIACEAE	<i>Opercularia varia</i>	variable stinkweed	n

D	RUBIACEAE	<i>Sherardia arvensis</i>	field madder	i
D	RUTACEAE	<i>Correa alba</i> var. <i>alba</i>	white correa	n
D	RUTACEAE	<i>Correa reflexa</i> var. <i>nummulariifolia</i>	roundleaf correa	n
D	RUTACEAE	<i>Correa reflexa</i> var. <i>reflexa</i>	common correa	n
D	RUTACEAE	<i>Zieria arborescens</i> subsp. <i>arborescens</i>	stinkwood	n
D	SAPINDACEAE	<i>Dodonaea viscosa</i> subsp. <i>spatulata</i>	broadleaf hopbush	n
D	SCROPHULARIACEAE	<i>Verbascum creticum</i>	cretan mullein	i
D	SCROPHULARIACEAE	<i>Verbascum thapsus</i>	great mullein	i
D	SOLANACEAE	<i>Solanum laciniatum</i>	kangaroo apple	n
D	SOLANACEAE	<i>Solanum nigrum</i>	blackberry nightshade	i
D	SOLANACEAE	<i>Solanum vescum</i>	gunyang	n
D	STACKHOUSIACEAE	<i>Stackhousia monogyna</i>	forest candles	n
D	STYLIDIACEAE	<i>Stylidium armeria</i> subsp. <i>armeria</i>	coastal trigger plant	n
D	STYLIDIACEAE	<i>Stylidium graminifolium</i>	narrowleaf triggerplant	n
D	THYMELAEACEAE	<i>Pimelea linifolia</i>	slender riceflower	n
D	CUPRESSACEAE	<i>Callitris rhomboidea</i>	oysterbay pine	n
D	URTICACEAE	<i>Parietaria debilis</i>	Shade pellitory	
D	URTICACEAE	<i>Urtica incisa</i>	scrub nettle	n
D	URTICACEAE	<i>Urtica urens</i>	stinging nettle	i
D	ZYGOPHYLLACEAE	<i>Zygophyllum billardierei</i>	coast twinleaf	n
M	ARACEAE	<i>Zantedeschia aethiopica</i>	arum lily	i
M	CENTROLEPIDACEAE	<i>Centrolepis polygyna</i>	wiry bristlewort	n
M	CENTROLEPIDACEAE	<i>Centrolepis strigosa</i> subsp. <i>pulvinata</i>	bassian bristlewort	e
M	CENTROLEPIDACEAE	<i>Centrolepis strigosa</i> subsp. <i>strigosa</i>	hairy bristlewort	n
M	CYPERACEAE	<i>Baumea acuta</i>	pale twigsedge	n
M	CYPERACEAE	<i>Baumea juncea</i>	bare twigsedge	n
M	CYPERACEAE	<i>Carex appressa</i>	tall sedge	n
M	CYPERACEAE	<i>Carex breviculmis</i>	shortstem sedge	n
M	CYPERACEAE	<i>Carex inversa</i>	knob sedge	n
M	CYPERACEAE	<i>Ficinia nodosa</i>	knobby clubsedge	n
M	CYPERACEAE	<i>Gahnia trifida</i>	coast sawsedge	n
M	CYPERACEAE	<i>Isolepis aucklandica</i>	slender clubsedge	n
M	CYPERACEAE	<i>Isolepis cernua</i>	nodding clubsedge	n
M	CYPERACEAE	<i>Isolepis inundata</i>	swamp clubsedge	n
M	CYPERACEAE	<i>Isolepis marginata</i>	little clubsedge	n
M	CYPERACEAE	<i>Isolepis platycarpa</i>	flatfruit clubsedge	n
M	CYPERACEAE	<i>Isolepis subtilissima</i>	dwarf clubsedge	n
M	CYPERACEAE	<i>Lepidosperma concavum</i>	sand swordsedge	n
M	CYPERACEAE	<i>Lepidosperma gladiatum</i>	coast swordsedge	n
M	CYPERACEAE	<i>Schoenus nitens</i>	shiny bogsedge	n
M	IRIDACEAE	<i>Freesia</i> hybrid	freesia	i
M	IRIDACEAE	<i>Iris</i> sp (domestic garden)	iris	i
M	JUNCACEAE	<i>Juncus acutis</i>	sharp rush	
M	JUNCACEAE	<i>Juncus bufonius</i>	toad rush	n
M	JUNCACEAE	<i>Juncus kraussii</i> subsp. <i>australiensis</i>	sea rush	n
M	JUNCACEAE	<i>Juncus pallidus</i>	pale rush	n
M	JUNCACEAE	<i>Juncus pauciflorus</i>	looseflower rush	n

M	JUNCACEAE	<i>Luzula densiflora</i>	dense woodrush	n
M	JUNCACEAE	<i>Luzula flaccida</i>	pale woodrush	n
M	JUNCAGINACEAE	<i>Triglochin minutissima</i>	tiny arrowgrass	n
M	JUNCAGINACEAE	<i>Triglochin striata</i>	streaked arrowgrass	n
M	LILIACEAE	<i>Amaryllis belladonna</i> (baby's grave)	amaryllis lily	i
M	LILIACEAE	<i>Bulbine crassa</i>	island leeklily	n
M	LILIACEAE	<i>Dianella brevicaulis</i>	shortstem flaxlily	n
M	LILIACEAE	<i>Hypoxis glabella</i>	tiny yellowstar	n
M	LILIACEAE	<i>Leucojum aestivum</i>	snowdrop	i
M	LILIACEAE	<i>Narcissus tazetta</i>	jonquil	i
M	ORCHIDACEAE	<i>Acianthus caudatus</i>	mayfly orchid	n
M	ORCHIDACEAE	<i>Acianthus pusillus</i>	small mosquito-orchid	n
M	ORCHIDACEAE	<i>Caladenia alata</i>	fairy fingers	n
M	ORCHIDACEAE	<i>Caladenia aurantiaca</i>	orangetip fingers	n
M	ORCHIDACEAE	<i>Caladenia carnea</i>	pink fingers	n
M	ORCHIDACEAE	<i>Caladenia latifolia</i>	pink fairies	n
M	ORCHIDACEAE	<i>Caladenia mentiens</i>	lesser fingers	n
M	ORCHIDACEAE	<i>Caladenia prolata</i>	white fingers	n
M	ORCHIDACEAE	<i>Caladenia pusilla</i>	tiny fingers	n
M	ORCHIDACEAE	<i>Caladenia transitoria</i>	green finger-orchid	n
M	ORCHIDACEAE	<i>Caladenia vulgaris</i>	summer fingers	n
M	ORCHIDACEAE	<i>Calochilus paludosus</i>	strap beard-orchid	n
M	ORCHIDACEAE	<i>Calochilus platyichilus</i>	purple beard-orchid	n
M	ORCHIDACEAE	<i>Corybas diemenicus</i>	stately helmet-orchid	n
M	ORCHIDACEAE	<i>Corybas incurvus</i>	slaty helmet-orchid	n
M	ORCHIDACEAE	<i>Corybas unguiculatus</i>	small helmet-orchid	n
M	ORCHIDACEAE	<i>Cyrtostylis reniformis</i>	small gnat-orchid	n
M	ORCHIDACEAE	<i>Cyrtostylis robusta</i>	large gnat-orchid	n
M	ORCHIDACEAE	<i>Dipodium roseum</i>	rosy hyacinth-orchid	n
M	ORCHIDACEAE	<i>Diurus sulphurea</i>	tiger orchid	n
M	ORCHIDACEAE	<i>Eriochilus cucullatus</i>	autumn orchid	n
M	ORCHIDACEAE	<i>Microtis arenaria</i>	notched onion-orchid	n
M	ORCHIDACEAE	<i>Microtis parviflora</i>	slender onion-orchid	n
M	ORCHIDACEAE	<i>Microtis unifolia</i>	common onion-orchid	n
M	ORCHIDACEAE	<i>Pterostylis curta</i>	blunt greenhood	n
M	ORCHIDACEAE	<i>Pterostylis melagramma</i>	blackstripe greenhood	n
M	ORCHIDACEAE	<i>Pterostylis nana</i>	dwarf greenhood	n
M	ORCHIDACEAE	<i>Pterostylis nutans</i>	nodding greenhood	n
M	ORCHIDACEAE	<i>Pterostylis pedunculata</i>	maroonhood	n
M	ORCHIDACEAE	<i>Pterostylis sanguinea</i>	banded greenhood	n
M	ORCHIDACEAE	<i>Pterostylis tasmanica</i>	small bearded g'hood	n
M	ORCHIDACEAE	<i>Thelymitra carnea</i>	tiny sun-orchid	n
M	ORCHIDACEAE	<i>Thelymitra juncifolia</i>	large-spotted sun-orchid	n
M	ORCHIDACEAE	<i>Thelymitra pauciflora</i>	slender sun-orchid	n
M	ORCHIDACEAE	<i>Thelymitra xtruncata</i>	truncate sun-orchid	n
M	POACEAE	<i>Aira caryophylla</i>	silvery hairgrass	i
M	POACEAE	<i>Ammophila arenaria</i>	marram grass	i

M	POACEAE	<i>Anthosachne scabra</i>	rough wheatgrass	n
M	POACEAE	<i>Anthoxanthum odoratum</i>	sweet vernalgrass	i
M	POACEAE	<i>Austrofestuca littoralis</i>	coast fescue	n
M	POACEAE	<i>Austrostipa flavescens</i>	yellow speargrass	n
M	POACEAE	<i>Austrostipa stipoides</i>	coast speargrass	n
M	POACEAE	<i>Austrostipa stupos</i>	corkscrew speargrass	n
M	POACEAE	<i>Briza minor</i>	lesser quaking-grass	i
M	POACEAE	<i>Bromus diandrus</i>	great brome	i
M	POACEAE	<i>Bromus hordeaceus</i>	soft brome	i
M	POACEAE	<i>Catapodium rigidum</i>	ferngrass	i
M	POACEAE	<i>Cenchrus clandestinus</i>		I
M	POACEAE	<i>Cynodon dactylon</i> var. <i>dactylon</i>	couchgrass	I
M	POACEAE	<i>Cynosurus echinatus</i>	rough dogstail	I
M	POACEAE	<i>Dactylis glomerata</i>	cocksfoot grass	I
M	POACEAE	<i>Deyeuxia monticola</i>	mountain bentgrass	n
M	POACEAE	<i>Dichelachne crinata</i>	longhair plumegrass	n
M	POACEAE	<i>Distichlis distichophylla</i>	australian saltgrass	n
M	POACEAE	<i>Holcus lanatus</i>	yorkshire fog	i
M	POACEAE	<i>Hordeum leporinum</i>	long-anther barleygrass	i
M	POACEAE	<i>Lachnagrostis aemula</i>	tumbling blowgrass	n
M	POACEAE	<i>Lachnagrostis filiformis</i>	common blowgrass	n
M	POACEAE	<i>Lolium perenne</i>	perennial ryegrass	i
M	POACEAE	<i>Lolium rigidum</i>	wimmera ryegrass	i
M	POACEAE	<i>Parapholis incurva</i>	coast barbgrass	i
M	POACEAE	<i>Pennisetum clandestinum</i>	kikuyu grass	i
M	POACEAE	<i>Phragmites australis</i>	southern reed	n
M	POACEAE	<i>Poa annua</i>	winter grass	i
M	POACEAE	<i>Poa labillardierei</i>	silver tussockgrass	n
M	POACEAE	<i>Poa poiformis</i> var. <i>poiformis</i>	coastal tussockgrass	n
M	POACEAE	<i>Poa pratensis</i>	kentucky bluegrass	i
M	POACEAE	<i>Polypogon monspeliensis</i>	annual beardgrass	i
M	POACEAE	<i>Puccinellia stricta</i>	australian saltmarshgrass	n
M	POACEAE	<i>Rytidosperma caespitosum</i>	common wallabygrass	n
M	POACEAE	<i>Rytidosperma penicillatum</i>	slender wallabygrass	n
M	POACEAE	<i>Rytidosperma pilosum</i>	velvet wallabygrass	n
M	POACEAE	<i>Rytidosperma racemosum</i> var. <i>racemosum</i>	stiped wallabygrass	n
M	POACEAE	<i>Spinifex sericeus</i>	beach spinifex	n
M	POACEAE	<i>Sporobolus africanus</i>	rat-tail grass	i
M	POACEAE	<i>Stenotaphrum secundatum</i>	buffalo grass	i
M	POACEAE	<i>Vulpia bromoides</i>	squirreltail fescue	i
M	POACEAE	<i>Vulpia myuros</i>	foxtail fescue	i
M	TYPHACEAE	<i>Typha domingensis</i>	slender cumbungi	n
M	TYPHACEAE	<i>Typha latifolia</i>	great reedmace	i
P	ADIANTACEAE	<i>Pellaea calidirupium</i>	hotrock fern	n
P	ADIANTACEAE	<i>Pellaea falcata</i>	sickle fern	n
P	ASPLENIACEAE	<i>Asplenium flabellifolium</i>	necklace fern	n
P	ASPLENIACEAE	<i>Asplenium obtusatum</i> subsp. <i>northlandicum</i>	shore spleenwort	n

P	ATHYRIACEAE	<i>Diplazium australe</i>	southern ladyfern	n
P	BLECHNACEAE	<i>Blechnum nudum</i>	fishbone waterfern	n
P	BLECHNACEAE	<i>Doodia australis</i>	rasp fern	n
P	CYATHACEAE	<i>Cyathea australis</i> subsp. <i>australis</i>	rough treefern	n
P	DENNSTAEDTIACEAE	<i>Histiopteris incisa</i>	batswing fern	n
P	DENNSTAEDTIACEAE	<i>Hypolepis rugosula</i>	ruddy groundfern	n
P	DENNSTAEDTIACEAE	<i>Pteridium esculentum</i>	bracken	n
P	DICKSONIACEAE	<i>Dicksonia antarctica</i>	soft treefern	n
P	DRYOPTERIDEACEAE	<i>Polystichum proliferum</i>	mother shieldfern	n
P	DRYOPTERIDEACEAE	<i>Rumohra adiantiformis</i>	leathery shieldfern	n
P	OPHIOGLOSSACEAE	<i>Ophioglossum lusitanicum</i>	adders-tongue	n
P	POLYPODIACEAE	<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	kangaroo fern	n
P	PTERIDEACEAE	<i>Pteris tremula</i>	tender brake	n
P	SCHIZEACEAE	<i>Schizaea bifida</i>	forked combfern	n
B	Bryophytes – mosses and liverworts			n
B	BRYACEAE	<i>Rosulabryum</i> sp.		n
B	DICRANACEAE	<i>Campylopus clavatus</i>		
B	DICRANACEAE	<i>Campylopus insititius</i>		n
B	DICRANACEAE	<i>Campylopus introflexus</i>		n
B	FRULLANIACEAE	<i>Frullania</i> sp.	(Liverwort)	n
B	GRIMMIACEAE	<i>Grimmia laevigata</i>		n
B	POLYTRICHACEAE	<i>Polytrichum juniperinum</i>		n
B	POTTIACEAE	<i>Triquetrella papillata</i>		n
B	POTTIACEAE	<i>Barbula calycina</i>		n
B	PTYCHOMNIACEAE	<i>Ptychomnion aciculare</i>		n
B	RACOPILACEAE	<i>Racopilum cuspidigerum</i> var. <i>convolvulaceum</i>		n
B	SEMATOPHYLLACEAE	<i>Sematophyllum homomallum</i>		n
B	THUIDIACEAE	<i>Thuidium furfurosum</i>		n

This list is based on Tasmanian Herbarium records, Harris and Davis (1995), and Whinray (2003).

Appendix 3: Weed Folder Cover Sheet and copy of a Recording Sheet.

DEAL ISLAND WEED FOLDER

Use of this folder:

In this folder is a section for each of the major weeds found on Deal. For each weed there is a description, with photos to help you to recognise it.

There is a record sheet for every known site where the weed is found. At the top of the sheet is a site description, and suggestions of the best way to treat the weed. The lower part of the sheet - and the back of it is used by caretakers to record the work that they have done to weeds at that site. Please record the weed work that you do on these sheets. The records are invaluable for tracking the success of our weed management.

Weed Site Markers:

The site of each known weed patch is being marked with a white topped weed stake. On the top is recorded the date it was put in, the name of the weed concerned, and the site number. Smaller markers are proposed for single plants or small clumps.

Checking Weed Sites:

Please visit each staked site at the times suggested in the weed folder, and check for the weed. Treat the weeds or remove and dispose of them as recommended in the weed folder. Record your work.

If you find a new weed site:

There are lots of weeds on Deal, and it is likely that you will find a weed patch which is not recorded in the folder. If you do find one, please describe its location as accurately as you can – take a GPS record if possible. Place a weed stake (marked with the appropriate details) in the centre of the site. Write up a record sheet for the new site and place it in the Weed Folder.

If you find a Strange Plant – possibly a weed:

If an unusual plant, possibly a new weed is found, the first step is to mark its location – with a labelled stake, and by marking its position on a map, or record its GPS if possible.

Next step is to identify it. If it is not in the weed folder, have a look through the folders of the herbarium collection of plants on the island.

If you can't find it there, seek outside help. Take photos of it. Collect small specimen/s (not more than 10% of the plant), press and dry them, and give them to the ranger. If necessary they can be sent away for identification.

Once identified, the plant can be preserved if native, or eradicated quickly if it is a weed.

WEED CONTROL RECORD SHEET

Area: East Cove

Weed: Arums

Site Name: 2. East Cove Bank

Site Description: This is outside the compound fence, to the left of the gate as you face downhill. It extends westwards to the grave site (where three plants were found) and downhill to the lower section of the roadway. Most plants though are close to the compound fence.

Maintenance: Check every six months, and especially during spring. Remove any flowers before they set seed. Small plants should be dug up and destroyed. Larger plants can be chemically treated or carefully dug to remove all underground parts.

Date	Who did the work?	What was found, the weather if chemically treated, what was done and any recommendations	Person hours
11 - 12 Oct 04	Tyson	Injected larger plants and sprayed smaller ones in this patch. Weather very warm and still.	
17 and 28 Nov 04	Tyson	Re-treated (injecting and spraying) arums in this patch.	
March 05	Tyson	Checked and found that large plants had disappeared but small plants had developed from propagules around some.	
May 05	Buchhorn	Scattered plants ≈ 20 small found and dug and burnt	2
Sept 05	Jainorhwa	2 supermarket bags + 1/2 garage bag full of plants removed from the bank - Telstra cone	
NOV 05	WATTS	CONSIDERABLE NUMBER OF SEEDLING REMOVED NEAR MAIN GATE AND ALONG THE COMPOUND FENCE TO 30M NORTH OF FENCE LINE. A FEW OLD PLANTS FURTHER DOWN THE BANK	8 1/2
06	Tyson	14/7 Arums - down bank + a few in sheep yards removed. 24/7 9 small plants removed from flat area just uphill of jolly along the road 19/8 2 small clumps, one in bank, and 4 or 5 others taken 24/8 - 4 weed-bags - dug all that could be found along front compound fence to W of gate 29/8 - 4 clumps from along bank from Telstra corner.	