7 Vegetation management

Tab photo: Native vegetation at Bellerive in south-east Tasmania. © Leah Page.

This chapter deals with managing coastal vegetation adjacent to the shoreline where specialised plants such as dune grasses, saltbushes and pigface grow; riparian vegetation adjacent to coastal wetlands; specialised wetland vegetation such as saltmarsh; and coastal vegetation found in coastal reserves, private land and along roadsides adjacent to the coast.

Native coastal vegetation provides wildlife habitat, stabilises sand, and is important for its biodiversity values. Coastal wetland vegetation is highly specialised and plays an important role in water quality. The major threats to coastal vegetation are clearing for development, unrestricted access to the coast, coastal weeds, fire and illegal clearing for views. Protection of vegetation and management of access, weeds and fire are important parts of many coastal works.

Priorities for vegetation conservation and management include communities that play significant functional roles (such as saltmarshes and dune plants), threatened species or communities and plants that provide habitat for significant fauna.

Managing roadside and other vegetation in coastal areas is not very different from managing vegetation in non-coastal areas, with the possible exception of sand blows, which occasionally affect roadside vegetation and roads.

Managing native vegetation closer to the shore is a much greater challenge than managing vegetation growing in more protected coastal areas. Vegetation near the shoreline is exposed to salt spray, sea breezes and intense sun, and plants near the high

water mark or in low-lying areas are often inundated by high tides or storm waves.

Native vegetation is adapted to these natural coastal processes and it is important to recognise that coastal vegetation communities require these natural cycles and processes to survive, and should be managed accordingly. Climate change is increasing coastal stresses and will make it difficult to determine where vegetation protection or intervention is required or will be successful.

Vegetation management activities should be monitored closely (measuring the response of the vegetation to each management strategy) and evaluated and adjusted in response to emerging issues. This is often termed 'adaptive management' and should form the basis of all vegetation management practices.

7.1 Conservation of coastal vegetation

This section deals with special considerations for threatened vegetation communities and threatened plant species which are a priority for protection and rehabilitation in the coastal zone.

A wide range of threatened native vegetation communities may occur in the coastal zone. In Tasmania these include: the coastal complex on King Island, *Eucalyptus globulus* dry forest and woodland, heathland on calcarenite, *Melaleuca ericifolia* swamp forest, seabird rookery complex and wetlands.

Many threatened species occur in the coastal zone, such as Tasmania's only EPBC-listed* saltmarsh species, *Limonium baudinii* (Tasmanian sea-lavender), known

Figure 7.1 Threatened lemon beauty head (Calocephalus citreus) occurs in the Ramsar wetland, Orielton Lagoon. This rare species is found in dry, disturbed grassland areas in a few locations in south-east Tasmania. © Lynne Sparrow

only from the Triabunna area. These species are further threatened by processes such as vegetation clearance, weeds and disease, inappropriate fire regimes, inappropriate stock grazing and climate change. The most efficient and cost-effective way to manage most of the state's threatened species is to address these threatening processes. (*See section 7.1.1.)

As a general principle, healthy intact vegetation should be left undisturbed. Natural disturbance will naturally regenerate and should not require specific management. However, vegetation management may be required for hazard removal (e.g. fuel loads or dangerous trees), for revegetation where damage has occurred or for stabilisation of dunes.

Land managers have a duty of care to maintain undisturbed vegetation cover for threatened species. Seek expert botanical advice where threatened communities or threatened species may be affected by proposed actions.

Mapping of some threatened plants and threatened vegetation communities is available through the Natural Values Atlas and Coastal Values data sets on the internet. ***Refer to section 7.8 Tools and resources.*** It should be noted that not all areas have been mapped. On-ground surveys and field checks are advised if significant vegetation intervention is being considered. Consult vegetation specialists for more information.

7.1.1 Legislation

A number of pieces of legislation cover native vegetation management. Please refer to ***Appendix 1 and 2*** for details.

Predominantly the *Threatened Species Protection Act 1995* and *Nature Conservation Act 2002* provide for the protection of vegetation communities at a state level and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the same at a national level.

Threatened species in Tasmania are classified, according to the level of threats to their survival, as endangered, vulnerable or rare in the schedules of the *Threatened Species Protection Act 1995*.

7.2 Plant and vegetation community identification

This section deals with the importance of correctly identifying plant species and communities to ensure native vegetation is managed appropriately.

Correct identification is important to ensure that appropriate native species are planted at a particular site, to identify weeds and also to avoid removing native species wrongly identified as weeds.

Land managers should become familiar with scientific names for native plants, as there can be many different common names in use. This is also important when ordering plants from a nursery as certain species (e.g. prickly Moses, *Acacia verticillata*) have different subspecies (e.g. *Acacia verticillata* subsp. *verticillata*), some of which may not thrive on the coast.

All native species should be identified at vegetation rehabilitation sites and other work sites, wherever possible, to assist the conservation of threatened species and vegetation communities.

If a new or unrecognised plant is discovered in an area then specialist advice should be sought from DPIPWE. It may be a threatened species or a new weed incursion.

Flora surveys can be seasonally dependent and therefore it may be necessary to time surveys to allow for particular seasonal variations to be assessed.

7.2.1 Local and non-local native species

'Local provenance' plants are adapted to the local conditions, and are often genetically distinct from the same species growing elsewhere in the state or Australia. They may also provide the most suitable food and habitat for native wildlife, which is adapted to the local plant species.

Wherever possible it is best to use species of local origin in any revegetation projects as this provides the best outcomes for the coastal ecosystem. Australian or Tasmanian natives that are not local to the area may grow more prolifically if introduced and dominate a vegetation community in much the same way as a weed, leading to lower biodiversity and reduced habitat for some fauna.

It is important to correctly identify species and be aware of the source of revegetation plants. Some northern Tasmanian species, such as coast tea-tree (*Leptospermum laevigatum*) and swamp paperbark (*Melaleuca ericifolia*) are regarded as weeds in the south. Coast wirilida (*Acacia uncifolia*) occurs naturally only on King and Flinders Islands. Sydney coast wattle (*Acacia longifolia* subsp. *longifolia*) is very similar to the widespread native coast wattle (*Acacia longifolia* subsp. *sophorae*).

7.2.2 Vegetation mapping and assessment

It is important for land managers to identify the vegetation communities within the areas for which they are responsible.

Guidelines for mapping vegetation are in *A technical manual for vegetation monitoring* (Barker, 2001). There are skilled consultants available that can undertake vegetation mapping. The *TASVEG vegetation condition manual* provides a methodology for assessing vegetation condition (Michaels 2006).

Some mapping can be found on the TASVEG maps, Tasmania's Land Information System, (the LIST) and the Natural Values Atlas. Consider all mapping to be indicative and check the site in question to verify accuracy.

TASVEG

TASVEG is a Tasmania-wide vegetation map, produced by the Tasmanian Vegetation Mapping and Monitoring Program (TVMMP) within the Department of Primary Industries, Parks, Water and Environment (DPIPWE). TASVEG uses 154 distinct vegetation communities to produce maps at a scale of 1:25 000.

TASVEG incorporates mapping from various sources, such as that done for the Regional Forest Agreement. Non-forest community types include grasslands, heathlands, scrub, wetlands and saltmarshes as well as riparian and coastal vegetation, woodlands and forest remnants. A number of these vegetation communities are listed as threatened under the Tasmanian *Nature Conservation Act 2002*.

TASVEG is the official state vegetation map and land managers should use its classifications in planning and assessment processes to ensure consistency. The maps are available online through the LIST (go to LISTmap), or from the Tasmanian Vegetation Monitoring and Mapping Program (TVMMP) at DPIPWE. An important resource is the TASVEG 2.0 Metadata release notes to accompany the LIST maps, available from DPIPWE.

From Forest to Fjaeldmark: Descriptions of Tasmania's vegetation (Harris & Kitchener 2005) is an essential companion for people using TASVEG. It contains not

only descriptions of all the vegetation communities, but also keys that help to differentiate them and identify them, and a state-wide map of the distribution of each vegetation type.

Note that vegetation maps are always being updated, and are not always accurate at a property scale. They are just a guide to the vegetation at a site – get confirmation from a local botanist.

Figure 7.2 Plants in the native pea family in Tasmania such as Bossiaea cinerea are often confused with the highly invasive gorse weed. Take care to identify plant species carefully, a number of coastal species have weed look-alikes. © Leah Page

7.3 Revegetation

This section provides information to guide revegetation works in coastal vegetation communities. Revegetation may be necessary to restore vegetation degraded by vehicle or foot traffic, burning, grazing, sand extraction, land clearing or weeds. Vegetation loss can destabilise dunes and increase the natural rate of erosion, as well as remove important wildlife habitat and reduce biodiversity.

Revegetation should replicate the patterns of the local natural vegetation, especially where different native species live in zones based on distance from the sea. Wherever possible it is best to propagate and plant species that are native to the local area.

As part of the planning process, identify any natural and cultural values in the area that may be affected by revegetation works. Seek specialist advice. This is particularly important for shorebird and seabird rookeries such as penguin colonies.

Access control, and weed and fire management are also important aspects of vegetation management. ***Refer to Chapter 13 Access management, Chapter 8 Weed and disease management and Chapter 9 Fire management.***

7.3.1 Planning a revegetation strategy

Thorough investigation and planning are essential for effective revegetation and to minimise the resources or effort required in the future.

Many coastal areas contain important and protected Aboriginal heritage sites. To determine whether there are values in the area or if your works are likely to impact on heritage values, before commencing works contact Aboriginal Heritage Tasmania (AHT), who can provide advice, assessments and permits if required. If an Aboriginal site or artefact is discovered, stop work immediately and contact AHT.

Some dunes that appear to be degraded might be naturally unstable areas, of high geoconservation significance. Search the Tasmanian Geoconservation database before working in dunes, to ensure they are not of heritage value. ***Refer to Chapter 6 Coastal landscape management.***

Identify any natural values or threatened species and communities that require protection, with reference to DPIPWE's Natural Values Atlas website, the Coastal Values data set and specialist advice. Bare sand patches and blowouts can occur naturally, and are essential nesting sites for some shorebirds, including hooded plovers and pied oystercatchers, which are declining in numbers. There are particular considerations when working around penguins and shorebirds (covered in ***Chapter 10 Wildlife management***).

Undertake mapping and assessment to identify the area's vegetation type. Explore the TASVEG maps initially. A survey of nearby healthy vegetation may be required if the site is highly degraded. Seek specialist advice to ensure the nearby vegetation is not a different community.

Consult with local community groups such as Coastcare groups when planning revegetation works. Many groups undertake revegetation as part of their activities and may be able to contribute time to planting or monitoring revegetation works. Community organisations such as the Understorey Network have vast experience in propagating and growing native plants and non-government organisations such as Greening Australia have undertaken many revegetation and monitoring projects.

The *Bushcare Toolkit,* whilst dated, still provides good information for vegetation management planning and revegetation methods. Refer to the *Tasmanian Bushcare Toolkit, Kit 2, Managing your bush* (Kirkpatrick et al. 1999) and the *Tasmanian Bushcare Toolkit, Kit 4, Revegetating your farm* (Gilfedder et al. 1999).

General principles of revegetation planning:

- Identify and map the native vegetation and weeds.
- Identify and map causes of vegetation loss (e.g. uncontrolled access).
- Identify the highest priority locations for revegetation.
- Choose the best methods to restore native vegetation and make the site more resilient to weed invasion.
- Develop a works program to rehabilitate vegetation in the most effective way with the resources available.
- Monitor and record results.
- Be prepared to follow up with weeding (and possibly planting) for years afterwards.

7.3.2 Methods of vegetation restoration and revegetation

Vegetation restoration can be undertaken by allowing or assisting natural regeneration of the vegetation or by actively planting native species (revegetation). In some instances ecological burning may be appropriate but this needs to be determined by a fire ecologist. The types of works selected will depend on the purpose, budget and site conditions.

Natural regeneration

Encouraging natural regeneration (allowing the vegetation to grow back by itself) is the cheapest and easiest option. This will only occur if there is sufficient natural vegetation nearby as a seed source. Protecting the area from vehicles, stock and pedestrians is essential for regeneration, so there may be some costs for infrastructure to manage access. But constructing fences or other barriers can be cheaper in the long run than repeated planting in sites exposed to high foot traffic or grazing. ***Refer to Chapter 13 Access management.***

Monitoring is essential to assess whether natural regeneration is occurring. It will take at least one to two years before native seedlings appear. If no regeneration occurs, use one or more of the following methods.

Assisting natural regeneration

Natural regeneration may be assisted in various ways:

- Remove weeds that are preventing seed germination or suppressing native plant growth. ***Refer to Chapter 8 Weed and disease management.***
- Lightly scarify or rake the soil at the time of seed fall, to help create a seedbed and bury or hide seed, so that ants do not eat them.
- Lay native brush bearing ripe seed. Native brush cut from the area as part of access or vegetation management works can be laid down to stabilise the sand and provide a source of seed. Brush must be cut when seed is ripe, usually summer. Brush discourages grazing of new vegetation by rabbits and wallabies, and trampling by people.
- In some circumstances fire can be useful, but use it cautiously and only in vegetation types that may

Figure 7.3 Natural regeneration of coastal dune vegetation. © Leah Page

benefit, such as coastal heathland. It is essential to seek advice from a fire ecologist. Land managers must approve the use of fire; they may require a fire permit from Tasmania Fire Service. Qualified firefighters should undertake the burning.

- Do not fertilise (unless the topsoil has been removed), because coastal plants are adapted to low levels of soil nutrients and may be out-competed by weeds such as pasture grasses.

Planting native species

Many native species are useful as ornamental plants around facilities or recreational areas. They are attractive and will be easier to maintain than introduced species. ***Refer to section 7.5 Landscaping with native species.***

Revegetation of natural areas should only be necessary in places where natural regeneration is too slow. Planting can help where natural regeneration is inadequate, or if revegetation is required more quickly (e.g. to provide habitat for wildlife or to rehabilitate areas after construction works). Revegetating with tube-stock or direct seeding can be difficult in coastal sands and sandy soils.

Figure 7.4 Revegetation work by volunteers on Carlton Bluff in south-east Tasmania. © Understorey Network

7.3.3 Where to plant coastal species

Coastal vegetation grows in zones based on proximity to the sea (see Figure 7.5 and Tables 7.1 and 7.2).

Coastal plants are classed as primary, secondary or tertiary species for the purposes of revegetation. The primary species grow closest to the sea (in the foredune zone). Secondary species grow a little further inland, and the tertiary species grow in more sheltered places, further inland.

The most effective revegetation usually starts with the primary species.

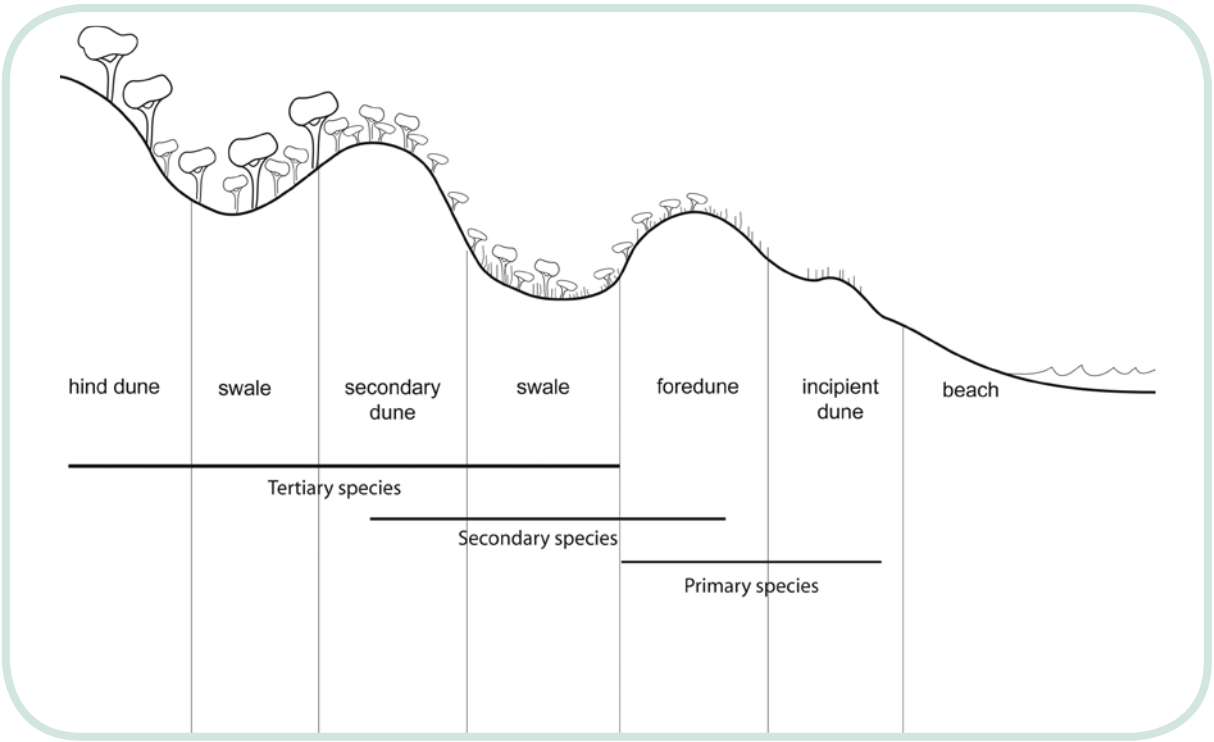
Primary, secondary and tertiary species

Primary species (sand-binding grasses, succulent creepers) grow in unstable sand nearest the sea. These pioneer plants can cope with being partly buried by sand. However, only *Spinifex sericeus* and *Austrofestuca littoralis* can grow in rapidly accumulating sand.

Secondary species (grasses, sedges, herbs, low shrubs) can also grow close to the sea but do not tolerate much burial by sand.

Tertiary species (taller shrubs, trees) can grow behind the top of the foredune but many species grow better further back from the sea.

Figure 7.5 Zones where plants grow on coastal dunes. Based on Coastal, Heath and Wetland Vegetation (Kirkpatrick & Harris 1999) in Vegetation of Tasmania Reid et al. (eds).



7.3

Table 7.1 Recommended places to plant species on coastal dunes.

Zone	Scientific name	Common name
Primary species Sand and salt tolerant. Plant on seaward side of foredune in unstable sand.	*Spinifex sericeus** *Austrofestuca littoralis* *Carpobrotus rossii* *Tetragonia implexicoma* *Atriplex cinerea*	spinifex coast fescue native pigface bower spinach grey saltbush
Secondary species Tolerate salt spray. Plant on foredune behind established primary species.	*Senecio pinnatifolius* *Poa poiformis* *Distichlis distichophylla* *Isolepis nodosa* *Acacia longifolia subsp. sophorae* *Acaena novae-zelandiae* *Pelargonium australe* *Leucopyhta brownii* (northern Tasmania) *Lomandra longifolia* *Kennedia prostrata* *Austrostipa flavescens* *Rhagodia candolleana* *Ozothamnus turbinatus* *Olearia axillaris* (northern Tasmania) *Correa alba* *Leucopogon parviflorus* *Dianella* species (coastal species only)	coast groundsel coast tussock grass salt grass knobby clubrush coast wattle buzzy native geranium cushion bush common sagg running postman yellow spear grass seaberry saltbush coast everlasting coast daisy bush white correa coast beard-heath flax-lilies
Tertiary species Need protection from wind and salt spray. Plant behind foredune crest once primary and secondary species established.	*Banksia marginata* *Myoporum insulare* *Leptospermum scoparium* *Leptospermum laevigatum* (northern Tasmania)	silver banksia boobyalla manuka coast tea-tree
Plant on secondary dune.	*Allocasuarina verticillata* *Dodonaea viscosa* var. *spathulata* *Acacia dealbata*	drooping she-oak native hop silver wattle
Plant on hind dunes.	*Bursaria spinosa* *Acacia verticillata subsp. verticillata* *Acacia melanoxylon* or other local *Acacia* species Local *Eucalyptus* species	prickly box prickly moses blackwood eucalypts

Most species, apart from *Spinifex* and *Austrofestuca*, can also be planted further back. Some species are found nearer the sea, but they will establish better if planted further inland. **Spinifex sericeus* is difficult to propagate and grow in southern Tasmania because the species prefers warmer temperatures – it is near the limit of its climatic range. Source: *Community Coastcare handbook* (Thorp (2005), based on Coastal, Heath and Wetland Vegetation (Kirkpatrick & Harris 1999) in *Vegetation of Tasmania*. Reid et al. (eds)

On exposed bare sites, only primary species should be planted, to stabilise the soil and provide a buffer for secondary species (which are usually planted in the following years).

Secondary species are suitable for planting on the seaward side of the foredune but only if the primary vegetation is in place to provide shelter.

Tertiary species can be planted later when conditions are suitable for their growth, or at the same time in sheltered sites.

Planting to stabilise dunes

A well-developed vegetation cover reduces wind erosion by raising the wind above the ground surface. The minimum vegetation cover required to fix sand can vary between 30% to 60%, depending on how exposed the site is to the prevailing wind, the types of vegetation and the density of planting. Generally, the higher the percentage of vegetation covering the ground, the more resistant the surface is to erosion, but this depends on the type of vegetation.

Low-growing plants, such as grasses, are more effective at stabilising sand than trees or shrubs. This is because 90% of wind-borne sand is transported in the 0.5m closest to the ground. Planting a mix of plants of different height and life form will lift the wind above the ground more effectively.

In some circumstances blowouts in dunes or coastal erosion sites may occur in areas of non-native vegetation such as dunes dominated by marram grass. Blowouts in marram grass dunes may need to be rehabilitated with marram grass, particularly if dunes are encroaching onto roadsides, as has occurred in the Scamander marram dunefield.

The Tasmanian *Community Coastcare handbook* (Thorp 2005) has more detailed information about local variations in dune vegetation, saltmarsh and coastal heathland vegetation.

7.3.4 Planting methods

The methods selected will depend on the purpose, budget and site conditions. Suitable methods may include any or all of the following:

- tube-stock or other seedlings
- direct seeding (requires careful soil preparation)
- laying brush (useful for small areas if brush with ripe seed is available).

Large-scale direct seeding is not often used on sand dunes as it is difficult to operate machinery safely on soft undulating areas and seed does not germinate well in loose soils. This method may be appropriate on some coastal sites, but requires extensive preparation well in advance of sowing. Useful guidelines are provided in the South Australian *Coastcare community handbook* (Brooke et al. 2001).

The following methods have been adapted for planting in sand or very sandy soils.

Table 7.2 Zones where native plants grow on headlands and cliffs (in order starting nearest the sea).

Zone	Scientific name	Common name
Damp saline niches closest to the sea	*Sarcocornia quinqueflora* *Samolus repens* *Apium prostratum*	beaded glasswort brookweed sea celery
Succulent herbs	*Disphyma crassifolium* *Carpobrotus rossii* *Tetragonia implexicoma* *Tetragonia tetragonoides*	round-leaved pig face pigface bower spinach New Zealand spinach
Tussock grasses	*Austrostipa stipoides* *Poi poiformis* and/or *Poa labillardierei*	coast spear grass coast tussock grass
Heath	*Melaleuca, Leptospermum*, other plants in the *Myrtaceae* family *Asteraceae* family	coastal tea-trees, melaleucas daisy shrubs
Scrub	Plants in the *Myrtaceae* family Plants in the *Asteraceae* family	tea-trees, melaleucas coastal daisy shrubs
Woodland	*Allocasuarina* species	she-oaks
Low forest	*Eucalyptus viminalis* *Eucalyptus amygdalina* *Eucalyptus globulus* (eastern Tasmania) *Eucalyptus nitida* (north-west and western Tasmania)	white gum black peppermint blue gum Smithton peppermint

The number of zones may be fewer on some sites. Source: *Community Coastcare handbook* (Thorp (2005), based on Coastal, Heath and Wetland Vegetation (Kirkpatrick & Harris 1999) in *Vegetation of Tasmania*. Reid et al. (eds)

Tube-stock or other seedlings

Planting tube-stock is a reliable planting method if undertaken correctly. For successful planting, follow the steps in the **Guidelines** accompanying this manual.

Direct seeding by hand

Direct seeding is the spreading of seed onto carefully prepared soil. To be successful it requires good soil, adequate moisture and a lack of weed competition. This method has had limited success in coastal soils, especially on sand dunes. In loose, bare sand, seeds will often be uncovered or buried too deeply before they can germinate and the seedlings become established.

Direct seeding requires planning well in advance to ensure the site is thoroughly weed-free. This can involve weeding for two years or more prior to seeding; follow-up weeding is essential for years afterwards.

Collect seeds in late spring and summer (***see section 7.4.2 Propagation from seed***) and plant when soils have a high soil moisture content. This may be after heavy rainfalls have started in late autumn or winter; however, heavy rainfall after direct seeding may result in seed being washed away so care must be taken.

Choose sites where soil is not too loose or too hard. Heavy soils should be soft enough to enable water, air and roots to easily penetrate.

Rake the top few centimetres of soil with a rake-hoe (a heavy duty firefighting tool that combines both a rake and a hoe and is particularly useful for scraping away leaf litter and the top layer of soil) and sprinkle a pinch of seeds (mixed with sand to help make sowing more even). Lightly rake in the seeds and then firm down the soil with the back of the rake-hoe. Bury the seeds at a depth of about one or two times their size.

7.3.5 Monitoring revegetation projects

Revegetation is often quite difficult on the coast, and many projects have limited success. It is important to keep good records of works and the progress of revegetation, to find out whether the methods used are successful. Revegetation practices can then be modified to achieve the best results.

If good records are kept, it will be possible for someone else to determine the ecological effectiveness of the works, even if scientific monitoring was not the original purpose of record-keeping.

Ongoing monitoring will enable land managers to identify problems as they arise, such as new weed incursions, and help to determine future maintenance needs.

Use vegetation mapping and photopoints (locations, identified by marking with a tent peg or using a hand-held GPS, used to take photos at regular intervals from the same point) to record revegetation progress. Methods are provided in *A technical manual for vegetation monitoring* (Barker 2001) and *A user's guide to monitoring vegetation* (McCoull & Barnes 2002).

Tasmanian Vegetation Condition Assessment

Vegetation Condition Assessment (VCA) is one of the options for monitoring rehabilitation. It may be used alongside other techniques that assess particulars of plant survival etc.

The Vegetation Condition Assessment is a method for monitoring vegetation condition over time and comparing it to the benchmark health for that vegetation community. Different remnants of the same vegetation type can be compared using their benchmark scores.

This method is in fact a simple approach but needs

to be done by a trained person in accordance with *A manual for assessing vegetation condition in Tasmania* (Michaels 2006). A number of Natural Resource Management (NRM) officers have been trained in using this method and should be approached for assistance. Contact the regional NRM organisations, refer to ***Appendix 4***.

The method is most useful where some of the integrity of the native vegetation remains, allowing a native TASVEG unit to be defined for the area. It must be used when monitoring change over time if the data is to be contributed to regional environmental status reports.

Ecological monitoring projects

Ecological monitoring projects are more extensive (complex and long-term scientific) projects, usually organised by vegetation ecologists, which systematically measure the health of the native vegetation.

There are three common types:

- monitoring the impact of a change in the environment (e.g. monitoring the impact of a wildfire or a development)
- monitoring the impact of a management treatment (e.g. monitoring the impact of an ecological burn or a particular grazing regime)
- monitoring changes in plant populations or communities over time (e.g. monitoring a population of rare plants in a particular location).

An ecological monitoring project typically takes many years to complete because it must record changes over a number of seasons. To be effective, it requires a commitment to conducting reliable and systematic measurements, including control sites, which requires considerable resources and planning. This can only be achieved if a professional ecologist, who should also analyse the results and recommend the most appropriate management responses to changes in the vegetation, scientifically designs the project.

Land managers must approve any ecological monitoring project and commit to being involved in reviewing the outcomes and modifying or improving land management practices as required. This adaptive management should continue in a cycle that includes measuring the biodiversity response of each management change. Methods suitable for ecologists and non-ecologists are provided in *A technical manual for vegetation monitoring* (Barker 2001), including monitoring ecological burns.

7.3.6 Marking sites for protection or management

Significant vegetation communities and values, such as threatened species, can be identified at the site through markers, which will inform all land managers and users of the presence of these values and help them to manage the site appropriately to protect these values. There are several marking methods but simple signage is most effective.

Enviromark

Enviromark is a corridor management system designed for managing threats and significant values along corridors (corridors of land with native vegetation left intact, which allows fauna to move across a wider territory and maintains connectivity of vegetation communities). It is designed for managing corridors along roads, railways and powerlines, and other areas where significant values are at risk, including coastlines.

This simple system can be used by land managers to protect threatened species, maximise vegetation conservation and habitat values and manage weeds

and revegetation areas. It assists councils and other corridor managers in fulfilling their obligations under weed and threatened species legislation.

The Enviromark system provides an integrated set of field markers, specifications, user guide, training and monitoring and evaluation (Figure 7.6).

The field markers show the location of the significant value or threat. The colours and symbols on the markers indicate the issue being managed, while the codes relate to relevant specification sheets, which set out how normal maintenance activities (e.g. mowing and slashing, drain clearing, grading, pruning and weeding) and constructions can be modified to avoid damaging significant conservation values or spreading weeds. In this way management plans and strategies can be translated into appropriate on-ground actions.

Enviromark is being used to manage weeds of national significance and of regional significance, as well as threatened species, significant native habitat, revegetation areas, no-spraying areas, hygiene areas and stockpile and parking areas. It is being used in three states so far, by both state corridor managers and local councils.

The system is run by Greening Australia (Tasmania), which produces the materials and conducts training sessions. Refer to *Introduction to Enviromark: a system for managing roadside and corridor vegetation* at the Greening Australia website.

Figure 7.6 Enviromark field markers. The picture on the right shows the revegetation marker on a roadside planting site. Although the new plantings are obvious now, in summer they will be hidden in long grass and vulnerable to accidental damage or destruction by slashers, herbicide or fire. Source: Introduction to Enviromark: a system for managing roadside and corridor vegetation. (Greening Australia, n.d.)

7.4 Plant propagation

This section provides guidance for successful plant propagation. It is more cost-effective to rely on natural regeneration of native vegetation, but in some circumstances propagating plants may be necessary to supplement the natural growth. Growing plants for coastal rehabilitation is quite different from growing plants for ornamental gardens. It requires tough plants with deep root systems that will survive being planted out in dry, salty and windy sites.

It is important to grow only plants that have been propagated from parent material (seed or cuttings) collected from local plants that are native to the area. This local provenance stock is adapted to the local conditions, provides the best habitat for wildlife and is often genetically distinct from the same species growing elsewhere.

The main propagation methods are by seed, cuttings and division. Many common coastal plants will propagate readily from one or more of these methods, which are generally used in spring or autumn. The Tasmanian Understorey Network plant database has information about the identification, habitat and propagation of most Tasmanian native species.

7.4.1 Guidelines for successful plant propagation

Propagating only plant species that are native to the local area will protect genetic diversity and provide hardy plants suitable for local conditions.

Correct identification is important to avoid propagating the wrong species. In some cases, such as prickly Moses (*Acacia verticillata*), certain subspecies may not thrive on the coast (only *Acacia verticillata* subsp. *verticillata* is adapted to dry coastal sites). ***Refer to section 7.2 Plant and vegetation community identification.***

Planning ahead is essential because propagation can take months or more and plants must be ready for the planting season (usually late autumn and winter).

Standard propagation methods may require modifying to produce hardy plants suitable for coastal planting.

Correct hygiene is critical to avoid spreading weeds, pests or diseases.

7.4.2 Propagation from seed

Propagation from seed enables land managers to ensure stock for planting comes from local species and that genetic populations are maintained. Propagation from seed involves collecting seed (a permit may be required); drying and cleaning seed; and planting the seed.

7.4.3 Propagation from cuttings

Most native plants will grow from cuttings. The exceptions include eucalypts, she-oaks and some acacias.

- Early morning is the best time to take cuttings.
- Choose healthy plants without signs of disease or insect attack.
- Take tip cuttings (tips) at the end of shoots and from the top of the plant, to avoid soil contamination.
- Softwood cuttings (from new soft shoots) can be taken whenever new shoots are available, usually after flowering. Cut a number of tips 100–150mm in length.
- Semi-hardwood cuttings can be taken in March or April. Cut tips 50–80mm long.
- Avoid cuttings with buds or flowers. If this is not possible, cut them off.

- Place cuttings in moist paper or in plastic bags (labelled with the species name). Keep cuttings cool. Place in an Esky-type cooler with a freezer block, if travelling long distances.
- Plant cuttings deeply into trays or pots of sterile, well-drained potting mix (e.g. 3 parts river sand, 1 part Cocopeat (coir dust made from coconut husks), 1 part perlite or vermiculite).
- Use mist spray indoors to keep cuttings moist. Supplying heat under pots indoors is generally unnecessary – striking may take longer, but the success rate is likely to be higher without a heat bed.
- Alternatively grow the cuttings in a warm, shady place outdoors for a few days before gradually moving them to a sunnier spot. Use bottom-watering or spray gently each day to keep them moist.
- Harden off indoor cuttings before planting, by putting them outside for an hour or two in cooler, sunnier conditions and gradually increasing the time each day.
- When the cuttings have rooted, transfer each seedling to its own pot. Gently remove each cutting from its pot and tease out the root mass. Put one cutting into each pot, so that the roots are straight, and firm the soil around the stem. Label the pot and water gently.
- Place pots in a sheltered, sunny (but not hot) spot, and water regularly. Plants may take from one to 18 months to grow 100–150mm tall, large enough for planting.

7.4.4 Propagation from division

Grasses, sedges and similar plants can be propagated by dividing the tussocks.

Divide plants just before or during the start of the root-growing season. This time will vary between species. It may be in late autumn, winter or early spring. Refer to the Understorey Network plant database.

Use a mattock to divide the plant into 100–300mm diameter sections, preferably after watering. Lift the plant carefully to retain the roots, and cut back the top to about 10cm.

Plant divisions in 50mm diameter tubes filled with potting mix and a little slow-release fertiliser.

7.4.5 Plant hygiene when propagating

Good hygiene is critical when collecting propagation material in coastal areas, to avoid spreading weeds, pests and diseases from an infested area to an unaffected area on vehicles, machinery and other equipment and boots.

Take care not to introduce plant diseases like phytophthora root rot (*Phytophthora cinnamomi*).

Generally *P. cinnamomi* will not be an issue in coastal revegetation, in primary sand dunes, saltmarsh and coastal scrub (e.g. *Meleuca ericoides*). However, if working in coastal heath or heathy forest/moorland do not propagate and plant out without further advice on the disease status of the site and the nursery hygiene required to minimise the chance of diseased stock being used.

Do not take seed or cuttings from plants in infected areas. Maps of areas with, or susceptible to, phytophthora are at the DPIPWE weeds website. Seed and cuttings will not spread *P. cinnamomi*, but your shoes might.

Wash boots and other equipment before visiting coastal vegetation or moving to another site.

Keep vehicles clean, especially underneath.

Also refer to Chapter 8 Weed and disease management and section 7.8 Tools and resources.

7.5 Landscaping with native plants

This section briefly describes the opportunity to improve the vegetation values of public spaces and urban areas through the use of local native plant species in landscaping and gardens.

Local native plants can be incorporated into gardens and urban public spaces in the same way in which exotic plants are used. There are many attractive and striking coastal plants, from ground covers and grasses to shrubs, flowering plants and screening trees. They offer a good variety of colours and textures and are

Figure 7.7 Cleaning boots and personal equipment is the best way to prevent the spread of weeds and diseases. Source: Keeping it clean: A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens.
© Hydro Tasmania

highly suited to plantings designed to create visual interest and contrast.

Being suited to the local conditions, local natives will be easier and cheaper to maintain and have the added benefit of providing habitat for local wildlife.

Consider collaborating with the local community to create landscaped native gardens in recreational spaces or high-use points along the coast. These gardens can become an inspiration and a learning tool for local residents who are struggling to maintain traditional exotic gardens.

There are several brochures and resources that provide information on selecting native plants, including the South Australian publication *Coastal gardens: A planting guide* (Adelaide and Mount Lofty Ranges Natural Resources Management Board n.d.), which provides information on plant selection for landscaping in a variety of different styles. ***Refer to section 7.9 Tools and resources.***

Figure 7.8 Local native plants incorporated into public open space at Port Willunga in South Australia, has greatly improved the aesthetic value of this popular coastal location. © Leah Page

7.6 Stock management

This section provides guidance for minimising impacts of livestock on coastal vegetation. Allowing livestock access to coastal dunes and wetlands for grazing or water can easily cause environmental damage, which may be difficult and expensive to remediate. Coastal dunes and wetlands are particularly fragile and highly vulnerable to damage by livestock.

Livestock grazing in coastal dunes (in addition to rabbits, wallabies and wombats) can increase wind erosion by reducing the plant cover and exposing bare sand. The hard hooves of livestock break the ground surface and sever the soil-binding plant roots, which may result in erosion and remobilisation of dunes. For these reasons, grazing should be avoided on actively or potentially mobile dunes. Livestock can also introduce and transport weed species.

Also, as livestock are likely to expend more energy climbing dunes than grazing in paddocks, this may negate the feed value of these areas.

Tasmania has many coastal wetlands, including lagoons and saltmarshes, which provide food and habitat for numerous animals. Grazing in wetlands can destroy the vegetation, spread weeds, damage the soil structure and degrade the water quality.

Excluding livestock from wetlands and pumping their drinking water into troughs can increase their weight gain. The stock are less prone to disease and footrot, erosion problems are reduced and water supplies kept clean, producing benefits and savings that can offset the cost of fencing and water-supply equipment.

Future sea level rises will threaten coastal wetlands. Protecting them from stock grazing pressure should help these important ecosystems adjust to future changes.

Figure 7.9 Livestock are very destructive to coastal areas. Stock should be excluded from dunes and wetland areas. © Emma Williams

7.6.1 Impacts of stock grazing in coastal environments

Coastal dunes and wetlands have important nature conservation values including threatened communities and species. They are vital nesting and feeding places for shorebirds, penguins, shearwaters and waterbirds, including threatened species such as fairy terns.

Many of the threatened plants in coastal environments have a highly restricted distribution, with small vulnerable populations in dunes and wetlands that could be eliminated by poor site management. Certain dunes have important geoheritage values that can be damaged by stock grazing.

Grazing should be avoided in dunes and wetlands, especially foredune complexes and other mobile dunes and saltmarshes. ***Refer to Chapter 6 Coastal landscape management.***

Vegetation loss from over-grazing can destabilise dunes and increase erosion, allowing large quantities of sand to be blown onto productive paddocks.

Grazing in or near water may degrade the water quality with excess nutrients and bacteria. As a result, grazing may damage valuable habitat for wildlife.

Aboriginal heritage values can be disturbed and compromised by erosion caused by stock grazing.

Management plans have been prepared for some significant wetlands. Seek specialist advice from the Department of Primary Industries, Parks, Water and the Environment (DPIPWE) to identify whether these wetlands will be affected by the proposed stock grazing.

7.6.2 Guidelines for grazing in dunes

Where grazing is practised in coastal dunes, thorough management is necessary and the following guidelines are recommended.

- Obtain specialist advice about the potential impacts of grazing on dunes and other sandy landforms (from a geomorphologist) and the vegetation and wildlife (from a biologist) in sensitive areas, to identify areas where grazing should be avoided or managed carefully.
- Avoid grazing livestock on dunes where this could damage vegetation with high conservation values or cause erosion (e.g. on mobile or potentially mobile dunes).
- Where grazing is practised, reduce the stocking rate, and use short grazing periods
- Restrict grazing preferably to the moist months of the year but avoid or limit grazing, if possible, when the vegetation is establishing itself or flowering (usually in spring and summer). Heavy grazing at these times makes it hard for the plants to develop roots or to flower and set seed.
- Maintain a vegetation cover of at least 30%, preferably 60%, to stabilise the sand (depending on how exposed the site is to the prevailing wind and the types of vegetation). Do not use fire to increase green pick, as this can promote erosion.
- Avoid grazing after wildfire, when the bare soil is prone to erosion. Fire often triggers the germination of new seedlings, which could be destroyed by trampling if grazing occurs.
- Exclude stock from dunes, by fencing, to help improve the stability of vulnerable dunes that have been damaged by grazing.

7.6.3 Guidelines for grazing near wetlands

The following guidelines are recommended when managing livestock in or near wetlands. Careful management is necessary and includes the following measures.

- Avoid grazing livestock on sensitive coastal wetlands such as saltmarshes. Excluding grazing is the best option on all wetlands, where practicable.
- Check the conservation significance of wetlands with the Biodiversity Conservation Branch, DPIPWE. Prepare management plans for significant wetlands.
- If grazing is allowed, obtain specialist advice about managing it wisely (e.g. using appropriate grazing intensities and maintaining water levels and quality).
- Determine a sustainable stocking rate appropriate to the seasonal conditions, and use short grazing periods.
- Avoid or limit grazing when plants are actively growing and producing seed (spring and summer), where practicable.
- Grazing in wetlands that dry out is least damaging when the wetland is totally dry. Exclude stock while the wetland is drying out, as trampling on boggy soil will destroy the vegetation mat that is important to sustain a healthy wetland.
- Ideally, provide alternative watering points away from the wetland. If that is not viable, fence off most of the wetland so access is limited to the most suitable watering point(s). Consider the options for fencing and alternative watering systems in *Managing streamsides: stock control, fencing and watering options* (Wright & Jacobson 2000) available from DPIPWE.

7.6.4 Ongoing monitoring of grazing

Monitoring is important to see whether grazing levels are appropriate and to check for any damage to coastal values and systems. Visit the site regularly to monitor grazing and ensure damage is minimal.

It may be necessary to repair erosion, protect water quality or deal with weeds.

Inspection and maintenance should check the effects of grazing on the vegetation, landforms and wildlife or water quality.

Figure 7.10 Damage to wetland area from inappropriate stock access. Source: Waterways and wetlands works manual: Environmental best practice guidelines for undertaking works in waterways and wetlands in Tasmania (Gallagher 2003)

7.7 Vegetation removal

This section deals with legal vegetation removal by land managers and illegal vegetation removal. It is sometimes necessary to remove native vegetation as part of land management works such as to reduce fire hazard in coastal reserves, to remove dangerous trees, to clear lines of sight along coastal roadsides or to provide access to the foreshore. ***More information on vegetation management for fire hazard reduction is available in Chapter 9 Fire management.***

Identify any threatened species or communities and ensure appropriate approval has been granted before any vegetation removal works are undertaken. Removal of vegetation from coastal foreshores such as dunes and wetlands can cause severe damage to these fragile systems and lead to erosion and foreshore instability. Such works should be avoided if possible and only undertaken with specialist advice.

Consult with the local community prior to undertaking works. This is very important as many local residents and community group volunteers will be distressed by the removal of vegetation, in particular large trees, if they do not understand the reasons for their removal. Give them enough time to become informed about the proposed vegetation removal and to ask questions and seek advice.

Ensure that appropriate riparian buffers are maintained as vegetation on the edge of waterways protects the water from neighbouring land uses and pollutants.

Some coastal foreshores have been subject to illegal removal of coastal vegetation by adjacent landowners, usually to open up coastal views. Land managers can play a role in educating the public about the value of coastal vegetation and in enforcing illegal activity.

7.7.1. Tree removal and pruning

Sometimes it is necessary to remove or prune large trees. Inappropriate techniques look unsightly and do not allow the tree to heal properly, causing rot in the remaining limb which can spread into the trunk and reduce the structural integrity of the tree, making it unsafe. Correct pruning techniques will protect both the appearance and structural integrity of the tree.

Tree pruning and removal should only be undertaken by qualified and experienced staff and contractors. All staff and contractors should be briefed on the environmental considerations of the site and any restrictions or specific work practices that are required to meet those considerations. Appropriate supervision is required to ensure environmental standards are being met.

Figure 7.11 Correct pruning cut allows for wound to heal, preventing water from rotting the remaining limb and trunk. © Leah Page

7.7.2 Guidelines for slashing vegetation

Slashing is a form of mechanical vegetation removal that can be undertaken with large specialised machinery, smaller mowers and hand-held brush-cutters.

As for any coastal works, land managers should complete a risk assessment, which should also consider potential impacts to the coastal environment and values.

Identify the following values:

- areas that are being actively managed by a local Coastcare or other community group – ensure the slashing will not be detrimental to any revegetation or natural regeneration works
- vegetation values that warrant protection
- natural or wildlife values that may be at risk from accessing the site with machinery and slashing
- Aboriginal or other heritage values that might be affected by the works – seek assessments and approvals if that is the case
- Aesthetic values and visual appearance.

Implement the following practices to minimise impacts on other values:

- Consider the life cycle of local native species. Allow flowering and seed ripening before slashing, to maintain the seed supply and the capacity for natural regeneration.
- Brief all staff and contractors on environmental considerations for the site and any consequent restrictions or specific work practices required. Appropriate supervision is required, to ensure environmental standards are being met.
- Scalping is sometimes used as a weed management tool where immediate rehabilitation is planned. Be aware that slashing scalps the ground if the mower is set too low and causes substantial soil disturbance, leaving bare patches of earth subject to erosion. In sandy soils the risk of erosion and destabilisation is very high.
- Remove grass clippings after mowing and edging if possible, as they can be washed or blown down stormwater drains or into waterways, spreading weeds, causing problems for gross pollutant traps and reducing water quality.
- Maintain appropriate riparian buffers on the edge of waterways to protect the water from neighbouring land uses and pollutants.
- Take care with fuel products especially around waterways and avoid spills when filling machinery. Ensure that managing a fuel spill is covered within the risk assessment. Clean up any spills immediately.
- Remove all litter and debris prior to slashing to prevent further spreading of these contaminants.
- Ensure mowers and brush-cutters project grass clippings away from waterways, drains and gutters and use a grass catcher in sensitive areas. If possible, send collected grass clippings to a composting facility or worm farm (where it will be recycled for use in gardens).
- Avoid mowing or slashing if the ground is very wet, as this can lead to erosion, and tyre tracks can become unwanted water conduits.
- Slashing has a history of spreading weeds. Ensure the sites to be slashed are surveyed for weeds and slashing is undertaken when there is the least risk of them being in seed. Ensure all machinery and vehicles are free from weeds and diseases prior to bringing them on site. If weeds or disease are present at the site, ensure that tools, boots, vehicles and machinery are cleaned at a suitable location before leaving the site. ***Refer to Chapter 8 Weed and disease management.***

7.7.3 Illegal removal of vegetation

The illegal removal of coastal vegetation to 'improve' views is unfortunately not uncommon. Another common reason for illegal vegetation removal is the harvesting of timber for firewood.

Vegetation destruction in coastal areas not only destroys vegetation communities and wildlife habitat, but may put threatened species at risk and, in many cases, makes foreshore areas more susceptible to coastal erosion.

Education and enforcement are critical to managing illegal vegetation removal, as many perpetrators simply do not realise that their actions have a serious impact.

Figure 7.12 Kingborough Council has erected a sign where local residents illegally removed coastal vegetation. © Bridget Jupe

Local residents and community group volunteers are often the first to notice illegal vegetation removal and are willing to report it to authorities. These reports should be followed up promptly by the land manager, involving Tasmania Police where appropriate.

Where vegetation has obviously been illegally removed to 'improve' a view, some local councils, both interstate and in Tasmania, have erected signage on public land to impede the perpetrator's view and serve as a deterrent to others who might consider similar action.

7.8 Vegetation management and climate change

This section provides an overview of potential climate change impacts on native coastal vegetation and is primarily sourced from the *Vulnerability of Tasmania's natural environment to climate change: An overview* (DPIPWE 2010).

Climate change is likely to lead to ecosystem changes and local species extinctions. Changes such as decreased rainfall and increased temperature, and increased frequency of extreme events such as drought, storm surges, and fire, will variably impact on biodiversity in different regions in Tasmania (DPIPWE 2010).

Native coastal vegetation is already under pressure from a range of threats including weeds and diseases, inappropriate fire regimes, and illegal or inappropriate clearing. It is difficult to predict the ways in which climate change will interact with these existing pressures.

Possible particular impacts on coastal vegetation:

- marram grass out-competing native grasses
- loss of coastal habitat; reduction in area of beach grasslands and beach sedgelands
- loss of shrubland communities such as coast beardheath (*Leucopogon parviflorus*) shrubland
- loss of coastal communities such as sandy beaches and dunes and loss of frontline beach foredune
- saltmarsh migrating inland, if suitable habitat is available
- inundation of coastal wetlands and saltmarshes where they are unable to migrate inland.

Some of these changes will put threatened species and restricted distribution species found only on coastal dunes at risk. In north-west Tasmania these include coast speedwell (*Veronica novae hollandiae*) and *Stackhousia spathulata*.

To mitigate the impact of climate change, it is essential to conserve natural vegetation communities and ecosystems and restore degraded ones, thereby protecting habitat diversity. In view of uncertainty about the specific impacts of climate change, maintaining diversity will act as an insurance policy (DPIPWE 2010).

7.9 Tools and resources

Complete details of all printed publications listed here are provided in a reference list at the end of the Manual. Other tools and resources including websites are collated in ***Appendix 5***.

Threatened species

Threatened Communities listing

http://www.dpipwe.tas.gov.au Go to native plants and animals > threatened species > list of threatened species

Threatened native vegetation community information sheet: Threatened native vegetation communities (Forest Practices Authority 2007)

Information sheet for identifying threatened vegetation communities
http://www.fpa.tas.gov.au/fileadmin/user_upload/PDFs/Botany/threatened_veg_intro_info_sheet.pdf

Plant ID and mapping tools

Use field guides and keys to identify plants. Further weed identification resources are provided in ***section 8.7***.

A key to Tasmanian vascular plants

University of Tasmania

Based on pictures and perhaps the easiest to use of the keys

http://www.utas.edu.au/dicotkey/dicotkey/key.htm

Coastal values data

Vegetation, species habitat and geomorphic values data for a 100m wide coastal strip of the northern, southern and north western Tasmania NRM Regions. Available on the LIST.

www.thelist.tas.gov.au

Community Coastcare handbook (Thorp 2005)

Photo comparisons between weeds and similar looking native species

Guide to the flowers and plants of Tasmania (Simmons et al. 2008)

Herbarium: Tasmanian Museum and Art Gallery

Advice about identification and natural distribution of species http://www.tmag.tas.gov.au/Herbarium

Natural Values Atlas

Provides authoritative, comprehensive information on Tasmania's natural values. Download a free registration form from the website to access

https://www.naturalvaluesatlas.tas.gov.au

Plant Identikit Series: Coastal plants of Tasmania and woodland wildflowers of Tasmania (Australian Plants Society Tasmania 1988-2003)

Tasmania's natural flora (Whiting et al. 2004)

The little book of common names for Tasmanian plants (Wapstra et al. 2005)

Revegetation and monitoring

In addition to the resources for plant and plant community identification, the following may be helpful for planning and monitoring revegetation works.

A manual for assessing vegetation condition in Tasmania, Version 1.0. (Michaels 2006)

A technical manual for vegetation monitoring (Barker 2001)

A users guide to monitoring vegetation (McCoull & Barnes 2002).

Coastcare community handbook (South Australia) (Brooke et al. 2001)

From Forest to Fjaeldmark: Descriptions of Tasmania's vegetation (Harris & Kitchener 2005) Available on the DPIPWE website

http://www.dpipwe.tas.gov.au

Introduction to Enviromark, A system for managing roadside and corridor vegetation

www.greeningaustralia.org.au

Monitoring remnant bushland (Greening Australia 2002)

Technical notes available from Greening Australia

http://www.granitenet.com.au/assets/files/Landcare/FB_MonitoringRemnant.pdf

TASVEG metadata notes and on-line maps available through the LIST website, under Vegetation

http://www.thelist.tas.gov.au/

Plant propagation

Community Coastcare handbook (Thorp 2005)

Detailed information about propagating common coastal species is in Chapter 13.

FloraBank Model

Code of practice for community-based collectors and suppliers and other guidelines on the website

www.florabank.org.au

Royal Tasmanian Botanical Gardens

Provides advice on seed propagation. In 2005 the Gardens established the Tasmanian Seed Conservation Centre (TSCC), a seed-bank focused on Tasmania's native flora. The TSCC conducts current international best practice in seed collecting, cleaning, storage and germination. Current priorities are focused on rare and threatened flora but the seed-bank aims to ultimately hold multiple provenance collections for all Tasmania's flora. Germination tests are regularly conducted on collections to ascertain and monitor seed viability. Germination testing data for the seed-bank collections are made publicly available on the RTBG website.

http://www.rtbg.tas.gov.au/index.aspx?base=227

In addition 26 pages of information on the germination and dormancy of wild seed can be found at Tasmanian Seed Conservation Centre web pages.

http://www.rtbg.tas.gov.au/index.aspx?base=224

Understorey Network

Plant database provides information on the identification, habitat and propagation of most Tasmanian native species. Seeding times, best times for taking cuttings and a step-by-step method for plant propagation is provided in: *The understorey network guide to growing native plants in Tasmania* (Thorp 2001) available from the Understorey Network.

www.understorey-network.org.au

Landscaping with native plants

In addition to plant identification and propagation tools, the following resources will be helpful when landscaping with native plants.

Coastal gardens: A planting guide (Adelaide and Mount Lofty Ranges Natural Resources Management Board, n.d.)

Very useful booklet on which native plants can replace more traditional exotics. Also provides design ideas for a number of landscaping styles. Although plants described are local to South Australia, many of the species, or similar ones, are also native to Tasmania

www.amlrnrm.sa.gov.au

Plants for a water friendly garden: Native plant field guide (Clarence City Council, n.d.)

A booklet providing photos and descriptions of native plants suitable for the Clarence municipality but could be applied more broadly across south-east Tasmania. A water-friendly garden is displayed at the Rosny Historic Centre in Clarence in southern Tasmania.

http://www.ccc.tas.gov.au/webdata/resources/files/PlantBkFINAL3.pdf

Urban forest biodiversity program

Information on establishing native plants and making gardens wildlife-friendly

www.backyards4wildlife.com.au

Weed and disease hygiene

More information about weed and disease management is available in ***Chapter 8 Weed and disease management.***

Interim *Phytophthora cinnamomi* management guidelines (Rudman 2005)

Keeping it clean: A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens (Allan & Gartenstein 2010)

Tasmanian washdown guidelines for weed and disease control (Rudman et al. 2004)

Grazing

Managing streamsides: Stock control, fencing and watering options (Wright & Jacobson 2000)

Detailed guidelines and fencing designs. Available from DPIPWE

www.dpipwe.tas.gov.au

Tasmanian Bushcare Toolkit, Kit 9, other bush types (Kirkpatrick 1999)