Weed Management and Restoration Plan for Penguin Island

June 2009

Contents.

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Department of
Environment and Conservation
Our environment, our future

1.Weed Management Program 2009

Action required	Site number, location (see attached maps) and method								Penguin Breeding Season						Cost
		Priority	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Remove Geraldton Carnation Weed (*Euphorbia terracina*)	Hand remove all adults and seedlings in three mapped populations June – November. Very high priority as GCW has the capacity to invade all undisturbed plant communities on the Island.	**High**						X	X	X	X	X	X		
Remove the planted specimens of *Melaleuca nesophila* from natural areas.	**Site 6** Cutting at the base any time of the year. *M. nesophila* is not known to sucker or re-sprout. Germination of seedlings will occur and will need to be removed for a year or 2 following removal of mature plants. **This plant has become naturalized in bushland in Western Australia and has the potential to spread on Penguin Island.**	**High**				X	X				X	X			
Control and aim to eradicate *Malva dendromorpha*	**Site 2a 2b 2c 2d** Cut to base and paint base with 15% glyphosate when actively growing. Best before flowering (August to October) and fruit set (November to January). Spray flush of seedling growth (often occurs in spring) with 1: 100 glyphosate. Minimize soil disturbance in these areas.	**High**					X	X	X	X	X	**X (seedling control)**	**X (seedling control)**		
Identify and control all introduced *Malva* on northern end of Island	**Site 2c** Cut to base and paint base with 15% glyphosate when actively growing. Hand remove germinating seedlngs through winter spring.	**High**				X	X	X	X	X					
Treat weeds in beach revegetation site using Glyphosate or hand removal	**Site 5** Hand remove *Cakile maritima* any time of the year. If erosion is a concern spray with 1:100 glyphosate and a wetting agent anytime of the year. Hand remove other weeds as required.	**Medium**	X	X	X	X	X	X	X	X	X	X	X	X	
Hand remove dune onion weed (*Trachyandra divaricata)* from identified sites. This weed is usually wide spread in coastal areas. There is an opportunity to contain it on Penguin Island.	**Site 3** Germinates any time of the year with a flush in late summer to autumn. The seedlings grow slowly and usually take 18 months before flowering, but in some areas they act as annuals and flower in the same season then die. Older plants make their main growth over winter and flower from June to November. Hand remove central track infestations before track is closed.	**Medium**	X	X	X	X	X	X	X	X	X	X	X	X	
	Site 7 Jetty area. Hand removal.	**Medium**	X	X	X	X	X	X	X	X	X	X	X	X	
	Site 3c Southern area. The infestation here is denser and may require a herbicide treatment (Glean + the penetrant pulse).	**Low**					X	X	X						
Treat and remove Fig	Cut and paint 50% glyphosate when fig is actively growing.	**Low**									X	X	X		
Control buffalo grass and brush bare area with *Acacia rostellifera* when in fruit.	Buffalo grass can be controlled using grass selective herbicide when actively growing. Anytime outside winter.	**Low**	X	X	X	X	X				X	X	X	X	
Remove isolated *Agonis flexuosa* from natural areas.	**Site 6** Cut to base and paint base with 50% glyphosate any time of the year.	**Low**	X	X	X	X	X	X	X	X	X	X	X	X	
Remove *Callitris* preissii near penguin discovery centre.	**Site 6** Still a small shrub, easily hand removed.	**Low**	X	X	X	X	X	X	X	X	X	X	X	X	
Control *Chenopodium album*	**Site 2** Summer annual, germinates spring, seeds through summer and autumn, dies back in winter. Spray 1:100 glyphosate on seedlings in spring	**Low**									X	X	X	X	

2. Site based restoration guidelines (see attached map for locations of sites)

Site 1 – Eastern dunal slopes north of depot
Aim: gradually replace *Tetragonia decumbens* largely with *Rhagodia baccata*, *Acanthocarpus preissii*, limiting erosion on slope. Actions:

- seed collection and propagation of *R. baccata, A.preissii*
- plant in vegetated areas of *T. decumbens* in late May/start of June

Site 2 – Northern pelican site
Aim: control and contain major weed species to site with minimum disturbance. Examine feasibility of reintroducing the native *Malva preissiana*, working around pelican occupation times. Actions:

- Control *Malva dendromorpha*, *M. parviflora* by cut and paint
- Control other Brassicacaea, grass weeds and *Chenopodium album* at appropriate time
- Monitor spread of major weeds outside this area
- Examine distribution of *M preissiana* (native Malva) on other islands and explore options for gaining seed/cutting material from other local islands and germination/propagation requirement

Site 3 – East/west sandtrack from surf beach
Aim: Control *Trachyandra divaricata* and prevent re-establishment by brushing. Actions:

- Remove *T. divaricata* – herbicide/hand removal from track edges
- Brush edges especially exposed areas using cut material from boardwalk construction

Site 4 – Steep south east dune slopes
Aim: Gradually replace *T. decumbens* with *R. baccata* and *Nitraria*, minimizing erosion. Actions:

- Collect seed/cutting material of *R. baccata* and *Nitraria*, propagate
- Plant *R. baccata* on mid to upper slope and *Nitraria* on lower slope in late May/early June

Site 5 – Reclaimed beach site adjacent to Discovery Centre
Aim: Remove non-indigenous plants and brushing from revegetation site, replant and stabilize beach/dune. Actions:

- Remove/treat weeds from revegetation area (including *Tetragona decumbens, Solanum nigrum*, *Hypochaeris* spp, *Cakile maritima*)
- Supplementary planting of Nitraria in eroding dune at rear of revegetation area
- Atriplex isatidea does not occur naturally on Penguin Island and should be removed.
- Additional brushing using indigenous plant material only. *Acacia rostellifera*, Rhagodia at no more than 10% from live plants. Do not use *Tamarix aphylla,* eucaplypts, *Melaleuca nesophylla* or *M. lanceolata.* These will spread and become problematic weeds in the natural areas on the Island.

Site 6 – Surrounds of Penguin Discovery Centre
Aim: Remove non-indigenous plant species, replant and lightly brush with indigenous species. Actions:

- Remove exotics (see weed actions)
- Collect seed, propagate and replant with *A. rostellifera*
- Lightly brush as required with *A. rostellifera*

Site 7 – Jetty entry area
Aim: Control *Euphorbia terracina* and *Trachyandra divaricata* in this area and gradually replace *T. decumbens* with *R. baccata*. Actions:

- Hand remove *Euphorbia terracina* and monitor for new seedlings every winter/spring
- Hand remove *Trachyandra divaricata*
- Collect seed, propagate and plant *R. baccata* in open areas and within *T. decumbens*

Site 8 – Small open section north west of boardwalk
Aim: to control weeds in this area, suppress further weed invasion and restore native vegetation cover. Actions:

- Control major weeds (see weed plan)
- Brush area with *A. rostellifera*, preferably with seed
- Monitor and remove *Euphorbia terracina*

Penguin Island - weed program and restoration plan

restoration site

Malva spp*

Carnation Weed: Euphorbia terracina

Trachyandra divaricata: dune onion weed

1:3,500

0 12.5 25 50 75 100

Metres

Department of Environment and Conservation

Produced under the Direction of Norman McNamara, Director General, Department of Environment and Conservation

Projection: Universal Transverse Mercator
MGA Zone 50, Datum: GDA94

Graticule shown at 6 seconds intervals

Produced at 12:27pm, on April 7, 2009

4. Suitable species for restoration on Penguin Island and associated propagation information- **GENERAL NOTES:**

Most sand dune plants can handle some burial ≤ 1/3 of tubestock. Burial can be beneficial in that it places the rootball closer to the moist area of the sand dune. The top 2 inches of beach sand is usually very dry and will not promote rotting of the stems.

Do not collect more than 20% from each individual plant. Collect from a broadest range of individuals as possible. Preserve genetic integrity and collect provenance seed only from Penguin Island. Refer to the Florabank database for detailed information guidelines about seed collecting http://www.florabank.org.au/default.asp?V_DOC_ID=755

Fleshy fruits are generally ripe when readily dislodged. Hard fruits are generally ripe when dry and crisp. Avoid fruits with holes in them as they are a sign of insect damage and insects may consume the other seed collected. Store seed in breathable containers – not in plastic bags.

The field cut test can be used to check whether seed is ripe. Cut a seed or fruiting bodies in half with your secateurs. If the cross-section of the seed's endosperm is a white colour – like the inside of a coconut – then the seed is probably ripe. If the endosperm is translucent or greenish then the seed is most probably not ripe yet. If you can't spot any seed then it might be that the fruiting body is not fertile and no viable seed has been produced.

4. Suitable species for restoration on Penguin Island and associated propagation information

Species	Material	Flowering Time	Collection Time	Treatment	Sowing	Approximate Germination (days)	Notes
Rhagodia baccata	Seed[3]	After June[3]	Late January to February when the black seed is visible through the fruit[6]	Soak in smoke water for 24 hours[1,6] Collect ripe berries and ferment the fruit off in water[2]		18-46[1]	Men of the Trees Rockingham propagate mostly from seed[2] Best propagated from seed[3]
	Cuttings[2]		Nov-Jan[2] End of spring beginning of summer[6]	soft tip to semi-hard wood cuttings[2] Soft-tip cuttings[6]	Summer[2]		City of Joondalup propagates mostly from cuttings rather than seed. They have found cuttings strike very quickly[2]
Acanthocarpus preissii	Seed[1]	April - October[3] April – August[4]		Nil[1] De-husk the seed[2] Benefits from stratification in summer by storing in the fridge for 4-6 weeks[2]		10-76[1] If no stratification seeds will germinate over an 18 month period[2].	Hard to collect seed – got to catch at the right time, and very difficult to germinate once seed is collected[6]
	Cuttings[2]			50:50 beach sand: potting mix[2]			Cuttings strike very rarely[2] Not easy from cuttings – dislike humidity[6]
Nitraria billardierei		September – November[4]					Very difficult to get it to strike from cuttings[2]. Never got any fruit to germinate[2]. Very difficult from seed & cuttings[6]. Fruit is designed to pass through the digestive tract of seagulls[2]
Carpobrotus virescens	Cuttings[2]			Keep humidity low and don't place under plastic covers as cuttings will rot[2]. Just poke into sand[2].			**Do not confuse with weed species *C.edulis***
	Seed[2]	August-September[4]		Squirt very ripe fruit onto paper to dry out and then sprinkle onto potting mix[2] No pre-treatment[6].			Very easy to grow from seed[6]

4. Suitable species for restoration on Penguin Island and associated propagation information

Species	Material	Flowering Time	Collection Time	Treatment	Sowing	Approximate Germination (days)	Notes
Malva preissiana	Seed[7]	August-November[4]	Summer[7]	None[7]	Autumn[7]		Probably best to use fresh seed[7]
Spinifex longifolius	Cuttings2		Summer[2]	Grow directly from side-shoots 20-30cm long. Trim the tops to remove straggly ends and remove any dead leaf sheaths to expose nodes. 20% potting mix 80% sand[2].			Bury most of the Spinifex when planting out leaving 5-10cm max above the ground[2].
	Seed[2]	July-January[4]		Rub seed head with gloves, collect falling seed & spread on seed trays.[2]	Nil[1]	20-42[1]	May benefit from cold stratification see Acanthocarpus[2]
Acacia rostellifera	Seed[3]	August – October[3,4]		Soak in very hot water (~95°C) for about 2 minutes[1,6]	Summer[2] End Dec-early Jan[6]	7-13[1]	Seed is hard to collect as this is not a prolific seeder[2].
	Cuttings[2]		As available	Treat root suckers as for cuttings and plant out when roots have emerged.[2]			Can grow it from root suckers if unearthed by disturbance[2] eg. boardwalk construction .

Sources:

[1] Sweedman L & Merritt D 2006 *Australian Seeds: A guide to their Collection, Identification and Biology* CSIRO publishing, Collingwood

[2] David Pike Natural Areas Supervisor City of Joondalup, personal comment 7 April 2009

[3] *Floradata* accessed on 8 April 2009 at http://www.florabank.org.au/default.asp?V_DOC_ID=986

[4] Rippey E & Rowland B 2004 *Coastal Plants Perth and the South-West Region 2nd Edition* UWA Press, Nedlands

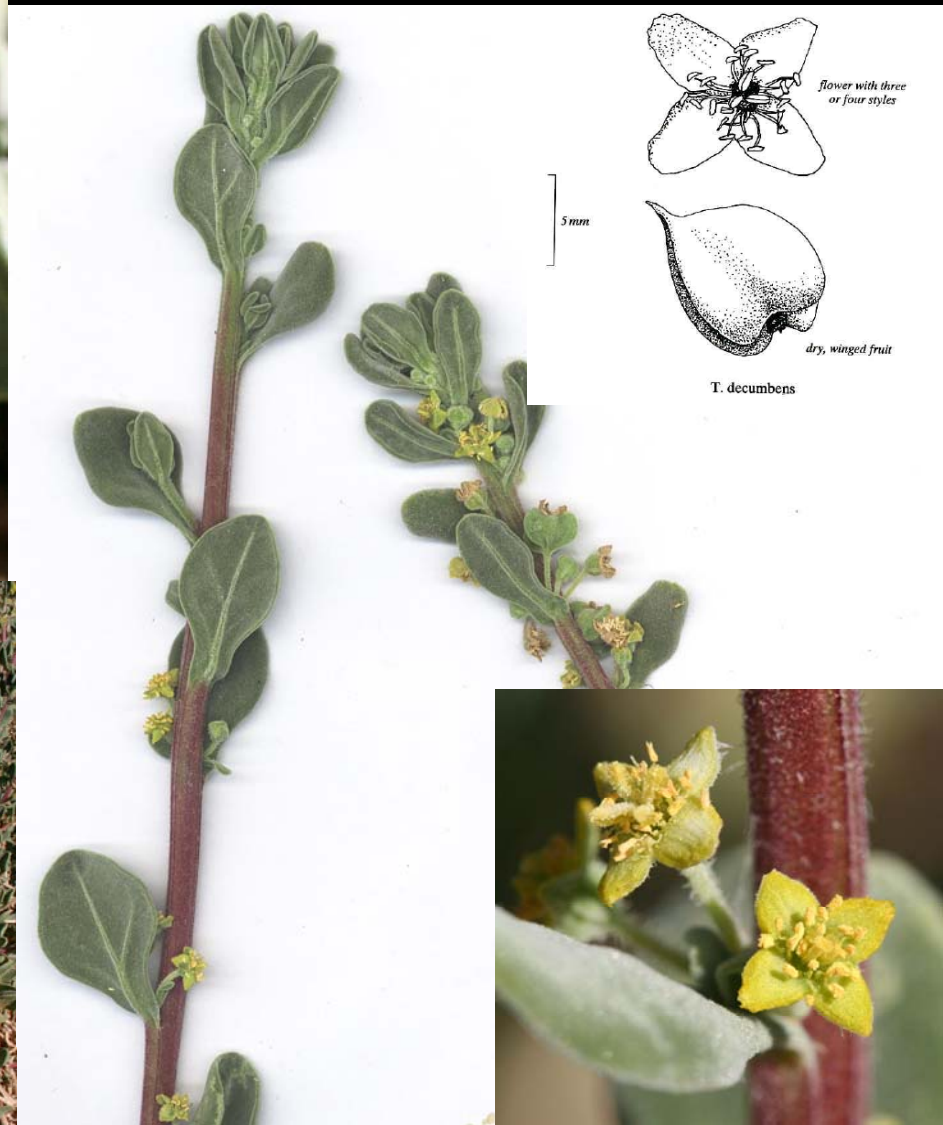
[5]. Florabase accessed on 8 April 2009 at http://florabase.dec.wa.gov.au/

[6] Brenda Kent, Men of the Trees Nursery Rockingham, personal comment 8 April 2009

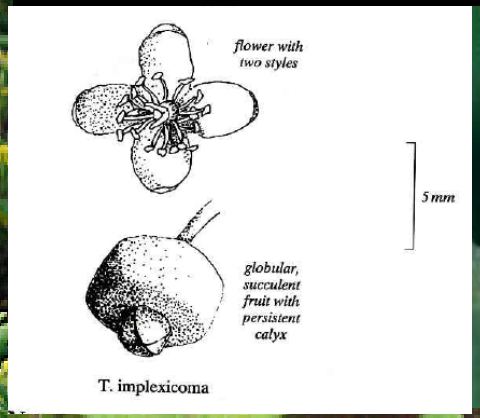
[7]Kate Brown, Department Environment and Conservation, personal comment 6 May 2009

Enchylaena tomentosa

* *Tetragonia decumbens* (Sea Spinach)



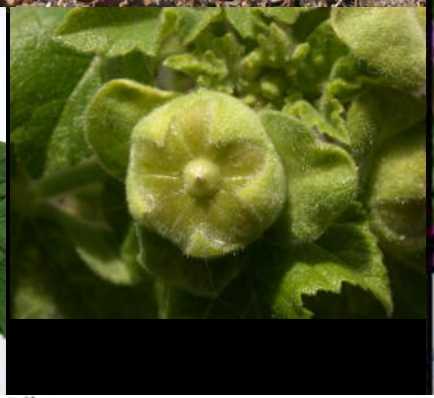
Tetragonia implexicoma (Bower Spinach)

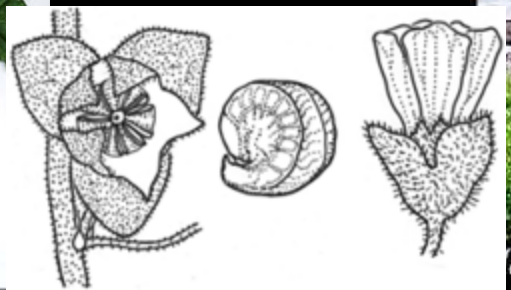


Rhagodia baccata
(Seaberry Saltbush)

*Malva dendromorpha

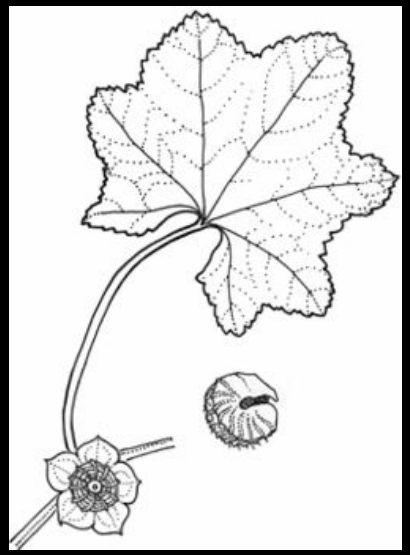
(Tree Mallow)



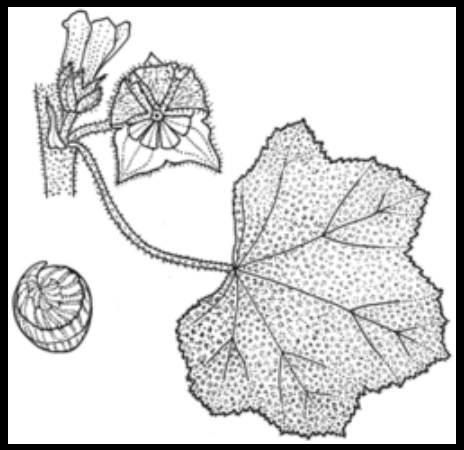


*alva dendromorpha

Photos: R. Davis



* *Malva parviflora*
(Marshmallow)

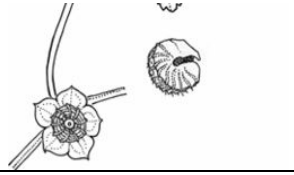
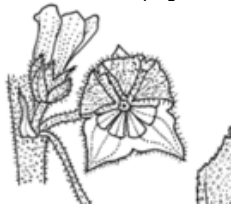
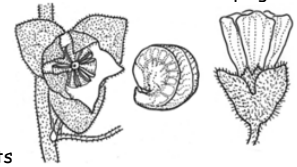


*Malva multiflora

(Cretan Mallow)

Malva priesianna

(Australian Hollyhock)

Character *Introduced weed	***Malva parviflora*** **(Marshmallow)**	***Malva multiflora*** **(Cretan Mallow)**	***Malva dendromorpha*** **(Tree Mallow)**	***Malva preissiana*** ***(Australia Hollyhock)***
Corolla colour	Pale pink 	Lilac to blue 	Lilac to purple 	Usually white but can be pink 
Mericarp on dorsal face	Distinctly reticulate ribbed 	Smooth or with transverse wrinkles 	Smooth to slightly wrinkled 	Smooth to slightly wrinkled 
Adjacent margins of the mericarp	 Toothed	Rounded to sharp and toothed 	Slightly raised 	Smooth or toothed
Number of mericarps per fruit	 10	 8	 6-8	10-15 
Fruiting calyx lobes	Calyx lobes spread outwards at maturity 	Calyx lobes cover developing fruits 	Calyx lobes do not cover developing  fruits	Calyx lobes spread outwards at maturity 

6. Guide to identification of native and introduced Malva