National Recovery Plan for the Sand Ixodia *Ixodia achillaeoides* subsp. *arenicola*

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Australian Government

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Department for Environment and Heritage

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Department of Sustainability and Environment

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This is a Recovery Plan prepared under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999, with the assistance of funding provided by the Australian Government.

This Recovery Plan has been developed with the involvement and cooperation of a range of stakeholders, but individual stakeholders have not necessarily committed to undertaking specific actions. The attainment of objectives and the provision of funds may be subject to budgetary and other constraints affecting the parties involved. Proposed actions may be subject to modification over the life of the plan due to changes in knowledge.

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Cover photograph: Sand Ixodia *Ixodia achillaeoides* subsp. *arenicola* by Oberon Carter

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Summary

The Sand Ixodia *Ixodia achillaeoides* subsp. *arenicola* is a small shrub growing in coastal areas of south-western Victoria and south-eastern South Australia. Only four populations, containing 3,000–3,500 mature plants, are known. Current threats include weed invasion, disturbance and erosion. The Sand Ixodia is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. This national Recovery Plan for the Sand Ixodia is the first recovery plan for the species and details its distribution, habitat, threats and recovery objectives and actions necessary to ensure its long-term survival.

Species Information

Description

The Sand Ixodia is a small shrub growing to about 50 cm high, belonging to the Family Asteraceae. It has decumbent to ascending, glabrous, sticky stems with alternate, entire, sessile, flat, obovate, dark green leathery leaves 10–30 mm long and 6–10 mm wide, with a distinct mid-vein and often decurrent bases with a narrow wing along the stem. The tiny, numerous flowers appear from November to January, are cream or greenish and tinged with red, and have 30–90 florets arranged in a capitulum. The capitula are 3–80 per corymb, subglobose to globose, to 7 mm long, sessile or shortly pedunculate, with 20–60 involucral bracts, the outer bracts oblong to narrow elliptic with entire margins, the inner bracts spathulate, with opaque lamina 4–6 mm long and 3–5 mm wide. The involucral bract margins are entire or laciniate, the receptacle bracts chaffy, subtending and enveloping each floret, the apex sometimes shortly petaloid (description from Copley 1982; Short 1999).

There are two other subspecies of *Ixodia achillaeoides*. *Ixodia achillaeoides* subsp. *alata* is an erect shrub to 2 m high, with linear, narrowly rhombic or lanceolate leaves, and grows mostly away from the coast. *Ixodia achillaeoides* subsp. *achillaeoides* is coastal but has oblanceolate leaves less than 5 mm wide (Australian Daisy Study Group 2002). Some specimens of subsp. *arenicola* from Portland and Warrnambool are somewhat intermediate with subsp. *alata* (see photo). It is possible that these two subspecies represent extremes of a cline extending from the coast to inland areas.

Little is known of the ecology of Sand Ixodia. Fire is important for germination of subsp. *alata* (where germination is initiated by smoke) and other *Ixodia* species, but its role in germination of subsp. *arenicola* is not known. The natural cues that germinate seeds of Sand Ixodia are unknown, but based on the exposed coastal habitat of the taxon, could depend on factors such as specific soil moisture, fluctuations in soil temperature, soil storage or seed scarification by wind. These and other dormancy breaking mechanisms need to be understood to derive appropriate conservation management actions. Plants are likely to be long-lived, persisting via vegetative reproduction.

Distribution and Populations

The Sand Ixodia is endemic to south-eastern Australia, where it occurs along the coast of south-western Victoria and south-eastern South Australia (Figure 1), in the Naracoorte Coastal Plain IBRA bioregion (*sensu* DEH 2000). Only four original wild populations are currently known, containing 3,000–3,500 mature plants. Two populations occur in South Australia, one in Douglas Point Conservation Park containing about 3,000 plants (2004) and the second on public land at Cape Northumberland, containing only 28 plants (2004). Two populations occur in Victoria, both in the Discovery Bay Coastal Park, and contain about 300 plants (2004). A new, translocated population of 20 plants has been established at Carpenters Rocks (South Australia).

There are several small populations growing in coastal reserves near Portland and Warrnambool, in south-western Victoria, that comprise individuals with characteristics intermediate between subsp. *alata* and subsp. *arenicola*. Their taxonomic status needs to be determined. In addition, there are old Melbourne Herbarium records reportedly of Sand Ixodia from 'the mouth of the Glenelg [River] towards Portland, Port Fairy' (1857), Upper Avoca [River] (1893), Grampians (1904), Hopkins River (1894), and Jan Juc (no date). The current status of

these populations is unknown. It seems unlikely that the inland records are of subsp. *arenicola*, although the coastal records may well be of this taxon. There is a 1979 record from Carpenters Rocks in South Australia, although a search in 2007 failed to find any plants (C. Dickson, DEH SA, pers. comm.).

Maps showing the distribution of Sand Ixodia are available from the Department of Sustainability and Environment (for Victoria) and the Department for Environment and Heritage (for South Australia).

Plant at Point Danger, near Portland, south-western Victoria, showing intermediate characteristics between *I. achillaeoides* subsp. *arenicola* and *I. achillaeoides* subsp. *alata*. Photo by O. Carter

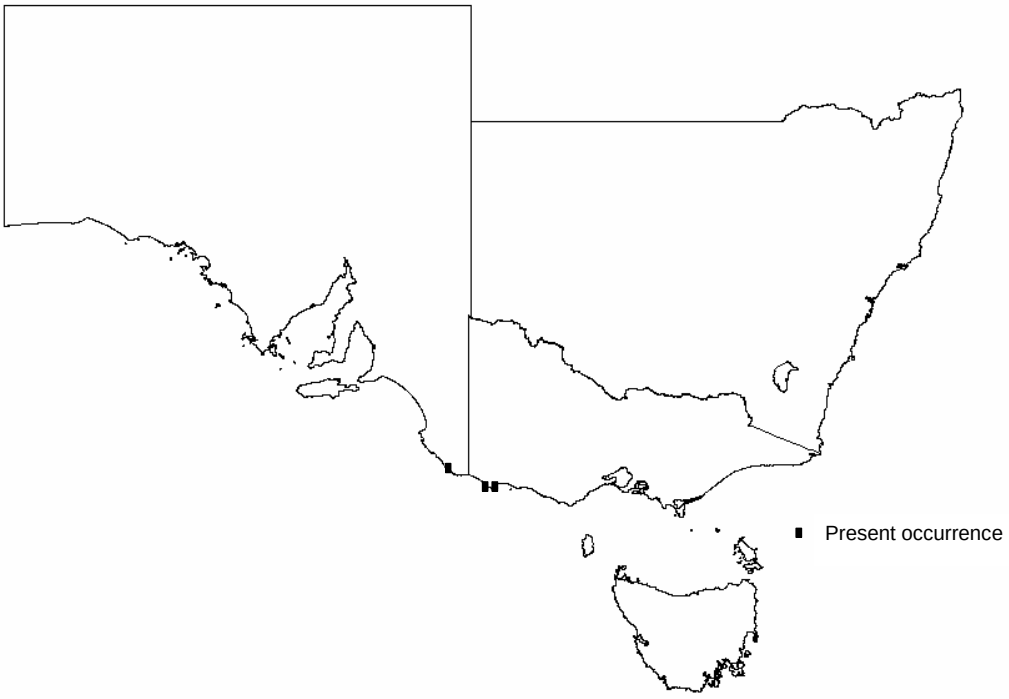

Figure 1. Distribution of Sand Ixodia

Habitat

The Sand Ixodia occurs on windswept, exposed limestone headlands in low coastal shrublands, often on steep slopes. Native plants commonly associated with Sand Ixodia include *Acacia longifolia* var. *sophorae* Coast Wattle, *Aceana novae-zelandiae* Bidgee-widgee, *Actites megalocarpa* Dune Thistle, *Alyxia buxifolia* Sea Box, *Apium prostratum* subsp. *prostratum* Native Celery, *Austrofestuca littoralis* Coast Fescue, *Austrostipa stipoides* Coast Spear-grass, *Carpobrotus rossii* Ross's Noon-flower, *Clematis microphylla* Old Man's Beard, *Lasiopetalum discolor* Coast Velvet-bush, *Leucophyta brownii* Coast Cushion-bush, *Leucopogon parviflorus* Coast Beard-heath, *Olearia axillaris* Coast Daisy-bush, *Ozothamnus turbinatus* Coast Everlasting, *Pelargonium australe* Austral Storks-bill, *Pimelea serpillifolia* subsp. *serpillifolia* Thyme Riceflower, *Poa poiformis* Blue Tussock-grass, *Rhagodia candolleana* subsp. *candolleana* Seaberry Saltbush, *Samolus repens* Creeping Brookweed, *Sarcocornia quinqueflora* Beaded Glasswort, *Scaevola albida* Pale Fan-flower, *Senecio latus* Elegant Yellow-top, *Sen. pinnatifolius* var. 2 Dune Groundsel, *Stackhousia spathulata* Coast Stackhousia, *Swainsona lessertifolia* Darling Pea, *Tetragonia implexicoma* Bower Spinach and *Zygophyllum billardierei* Coast Twinleaf. Recovery actions include mapping of habitat critical to survival.

Decline and Threats

It is difficult to make any comment about previous distribution and abundance of the Sand Ixodia. The Carpenters Rocks (SA) population appears to be one recent loss. There are other records attributed to this taxon from well beyond its current known range, but some of these records, especially the inland ones, are doubtful and probably misidentifications. The existence of apparent intermediate forms between the subspecies of *I. achillaeoides* also makes identification problematic in some circumstances. Records from elsewhere along the coast are more likely to be this taxon. If the Jan Juc (Vic) record is correct (and the taxon no longer occurs there), then it represents a substantial decline in range. Current threats to Sand Ixodia include the following:

Weed invasion

Weed invasion is the major threat to Sand Ixodia, with several native and introduced plants having the potential to competitively exclude Sand Ixodia from some areas. *Acacia longifolia* subsp. *sophorae* Coast Wattle and the introduced *Lycium ferocissimum* African Boxthorn are a threat at all sites. Other potentially invasive species include *Senecio elegans* Purple Groundsel, *Cakile maritima* subsp. *maritima* Sea Rocket and *Euphorbia paralias* Sea Spurge.

Disturbance

The costal location of Sand Ixodia populations and the fragile nature of plants makes them especially vulnerable to trampling by people. Rubbish dumping has occurred at the Cape Northumberland site.

Browsing

Minor browsing by European Rabbit has been observed at one site in Victoria.

Erosion

The costal location of Sand Ixodia populations makes them vulnerable to sand blowouts from erosion possibly smothering plants, as wind-blown sands may cover plants in exposed areas.

Recovery Information

Recovery Objectives

The overall objective of recovery is to minimise the probability of extinction of Sand Ixodia in the wild and to increase the probability of important populations becoming self-sustaining in the long term. Within the duration of this Recovery Plan (5 years), the specific objectives of recovery for Sand Ixodia are to:

1. Determine taxonomy, distribution, abundance and population structure
2. Determine habitat requirements
3. Ensure that all populations and their habitat are protected and managed appropriately

4. Manage threats to populations
5. Identify key biological functions
6. Determine growth rates and viability of populations
7. Establish a population in cultivation
8. Establish new populations in the wild
9. Build community support for conservation

Program Implementation and Evaluation

This Recovery Plan guides recovery actions for the Sand Ixodia and will be implemented and managed by the Department of Sustainability and Environment for Victoria and the Department for Environment and Heritage for South Australia, supported by other agencies, educational institutions, regional natural resource management authorities and community groups as appropriate. Technical, scientific, habitat management or education components of the Recovery Plan will be referred to specialist groups on research, *in situ* management, community education and cultivation as required. Contact will be maintained between the State agencies on recovery issues concerning conservation of the Sand Ixodia. The Recovery Plan will run for a maximum of five years from the date of its adoption under the EPBC Act, and will be reviewed and revised within five years of the date of its adoption by responsible agencies.

Recovery Actions and Performance Criteria

Action	Description	Performance Criteria
Specific Objective 1: Determine taxonomy, distribution, abundance and population structure		
1.1	Clarify taxonomy of populations of Sand Ixodia of apparently intermediate form, using morphological and molecular studies. **Responsibility: DSE, RBG**	• Determination of taxonomic status of plants at Nelson Bay, Warrnambool, Deans Heath & Point Danger.
1.2	Undertake surveys to determine the area and extent of populations, the number, size and structure of populations, inference or estimation of population change and threats to populations. **Responsibility: DSE, PV, DEH**	• All current population sites searched, sites mapped for population size, condition and habitat.
Specific Objective 2: Determine habitat requirements		
2.1	Survey known habitat and collect floristic and environmental information relevant to community ecology and condition. **Responsibility: DSE, DEH**	• Species/habitat specific survey design prepared. • Habitat critical to survival mapped for any extant populations.
2.2	Identify and survey potential habitat, using ecological and bioclimatic information that may indicate habitat preference. **Responsibility: DSE, DEH**	• Potential habitat surveyed at two locations. • Predictive model for potential habitat developed & tested at two locations.
Specific Objective 3: Ensure that all populations and their habitat are protected and managed appropriately		
3.1	Protect populations on public Land. **Responsibility: DEH**	• Measures for legal protection of habitat containing Sand Ixodia at Cape Northumberland, South Australia initiated.
Specific Objective 4: Manage threats to populations		
4.1	Control threats from pest plants. **Responsibility: PV, DEH**	• Reduction in cover of weeds (notably Coast Wattle, African Boxthorn, Sea Spurge) at and near all sites. • Measurable seedling recruitment in treated populations.
4.2	Control threats from pest animals. **Responsibility: PV**	• Reduction in damage by European Rabbit at Discovery Bay (Vic). • Measurable seedling recruitment in treated populations.
4.3	Control the threat of direct damage by human activities. **Responsibility: DEH**	• Signs & barriers at Cape Northumberland maintained. • Impact of disturbance monitored at all sites and reduced if required.
Specific Objective 5: Identify key biological functions		
5.1	Evaluate current reproductive status, seed bank status, longevity, fecundity and recruitment levels. **Responsibility: DSE, DEH**	• Reproductive ecology and regenerative potential quantified for all sites. • Seed bank potential quantified for all sites.
5.2	Identify key stimuli for seed germination requirements. **Responsibility: DSE, DEH**	• Stimuli for recruitment identified. • Management strategies identified to maintain, enhance or restore processes fundamental to reproduction and • survival.

Specific Objective 6: Determine the growth rates and viability of populations		
6.1	Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data. **Responsibility: DSE, DEH**	• Population monitoring maintained in SA. • Techniques for monitoring developed and implemented in Victoria. • Population growth rates determined and Population Viability Analysis completed for all populations.
Specific Objective 7: Establish a population in cultivation		
7.1	Establish a seed bank and determine seed viability. **Responsibility: DSE, RBG, DEH**	• Seed from all Victorian populations in storage. • Seed from SA populations continue to be maintained.
7.2	Maintain a cultivated population for research and as a source for reintroductions. **Responsibility: DEH**	• 50 mature plants in cultivation.
Specific Objective 8: Establish new populations in the wild		
8.1	Continue the reintroduction to Carpenters Rocks. **Responsibility: DEH**	• A reintroduced population of 250 plants.
8.2	Maintain and manage the Carpenters Rocks site to support the reintroduction. **Responsibility: DEH**	• A reintroduced population of 250 plants.
Specific Objective 9: Build community support for conservation		
9.1	Identify opportunities for community involvement in the conservation of the Sand Ixodia. **Responsibility: DSE, PV, DEH**	Community nature conservation and Landcare groups aware of the species and support its conservation.

Abbreviations: DEH – Department for Environment and Heritage (SA); DSE – Department of Sustainability and Environment (Victoria); PV – Parks Victoria; RBG – Royal Botanic Gardens, Melbourne

Management Practices

The philosophy of the strategy for recovery is habitat conservation, restoration and management combined with an understanding of the ecological and biological requirements of Sand Ixodia. The emphasis is on using knowledge to better implement *in situ* management techniques that protect populations and promote regeneration and recruitment. To achieve this, recovery actions are primarily structured to (i) acquire baseline data, (ii) assess habitat condition including ecological and biological function, (iii) protect populations to maintain or improve population growth and (iv) to engage the community in recovery actions. On-ground site management will aim to mitigate threatening processes and thereby insure against extinction. Major threats requiring management include accidental destruction and competition from pest plants. A range of strategies will be necessary to alleviate these threats including weed and pest animal control. In addition, searches of known and potential habitat should continue to better define the distributions and size of populations.

The Recovery Plan also advocates strategies to fill some of the major gaps in our knowledge to date. These include an understanding of the mechanisms underlying recruitment and regeneration. Successful *in situ* population management will be founded on understanding the relationships between Sand Ixodia and associated flora, and its response to environmental processes. These are directly linked to biological function and are thus vital to recovery. A demographic census will be necessary to gather life history information and to monitor the success of particular management actions. In addition to the above, *ex situ* conservation measures will be required and will include seed storage. Community participation in recovery actions will be sought, particularly in regard to recovery team membership and implementation of on-ground works.

Affected Interests

Important populations of Sand Ixodia are managed by Parks Victoria (in Victoria) and Department for Environment and Heritage (for SA), who have approved the actions outlined in this recovery plan, subject to availability of sufficient funding to implement these actions.

Role and Interests of Indigenous People

Indigenous communities on whose traditional lands the Sand Ixodia occurs are being advised, through the relevant regional Indigenous facilitator, of the preparation of this Recovery Plan and have been invited to provide comments and be involved in the implementation of the plan.

Biodiversity Benefits

The Recovery Plan includes a number of potential biodiversity benefits for other species and vegetation communities in Victoria and South Australia. Principally, this will be through the protection and management of habitat. The adoption of broad-scale management techniques and collection of baseline data will also benefit a number of other plant species growing in association with *Ixodia achillaeoides* subsp. *arenicola*, particularly those species with similar life forms and/or flowering responses. The Recovery Plan will also provide an important public education role as threatened flora have the potential to act as 'flagship species' for highlighting broader nature conservation and biodiversity issues such as land clearing, grazing, weed invasions and habitat degradation.

Social and Economic Impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. Remaining populations occur on public land managed by State government agencies. Any protection measures required at these sites (e.g. fencing, signage, track closures) will have minimal impact on current recreational and commercial activities.

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Priority, Feasibility and Estimated Costs of Recovery Actions

Action	*Description*	*Priority*	*Feasibility*	*Responsibility*	*Cost estimate*					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	**Distribution, abundance**									
1.1	Taxonomy	2	100%	DSE, RBG	$0	$8,000	$8,000	$0	$0	$16,000
1.2	Surveys	1	100%	DSE, PV, DEH	$5,000	$5,000	$5,000	$5,000	$5,000	$25,000
2	**Habitat requirements**									
2.1	Known habitat	2	100%	DSE, DEH	$10,000	$10,000	$0	$0	$0	$20,000
2.2	Potential habitat	2	75%	DSE, DEH	$0	$10,000	$10,000	$10,000	$0	$30,000
3	**Habitat protection**									
3.1	Public land	1	100%	DEH	$2,000	$2,000	$0	$0	$0	$4,000
4	**Threat management**									
4.1	Pest plants	1	75%	PV, DEH	$10,000	$10,000	$10,000	$8,000	$8,000	$46,000
4.2	Pest animals	1	75%	PV	$5,000	$5,000	$5,000	$2,000	$2,000	$19,000
4.3	Human damage	1	75%	DEH	$5,000	$2,000	$1,000	$1,000	$1,000	$10,000
5	**Biological functions**									
5.1	Reproductive status	2	75%	DSE, DEH	$5,000	$5,000	$5,000	$0	$0	$15,000
5.2	Seed germination	2	75%	DSE, DEH	$0	$5,000	$5,000	$0	$0	$10,000
6	**Population viability**									
6.1	Censusing	1	90%	DSE, PV, DEH	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
7	**Cultivation**									
7.1	Seed bank	3	100%	DSE, RBG	$0	$0	$2,000	$2,000	$2,000	$6,000
7.2	Cultivated population	2	100%	DEH	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000
8	**New populations**									
8.1	Reintroduction	1	100%	DEH	$2,000	$2,000	$2,000	$0	$0	$6,000
8.2	Site management	1	90%	DEH	$5,000	$5,000	$5,000	$5,000	$5,000	$25,000
9	**Community support**									
9.1	Community extension	3	75%	DSE, PV, DEH	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000
				TOTALS	$63,000	$83,000	$72,000	$47,000	$37,000	$302,000