

The status and distribution of alien plants on the islands of the south coast of Western Australia

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ABSTRACT

Alien plants pose a substantial threat to island ecosystems in Australia and worldwide. A better understanding of weed distributions is necessary to more effectively manage natural resources on islands. To address this need for Western Australian islands, we created a database of all available records of alien plants on these islands. Here we report on records from all islands located along the south coast of Western Australia. From 789 individual records, a total of 116 alien plant species were recorded on the 43 islands with existing weed records. A disproportionately large number of weed species were recorded on estuarine islands and islands with a history of intensive human activity. Some of the species are known to be serious environmental weeds, including bridal creeper (*Asparagus asparagoides*), pig's ear (*Cotyledon orbiculata*), sea spurge (*Euphorbia paralias*), cleavers (*Galium aparine*), African boxthorn (*Lycium ferocissimum*), tree mallow (*Malva arborea*), arum lily (*Zantedeschia aethiopica*), and the annual grasses *Avena*, *Bromus*, *Ehrharta*, *Hordeum*, *Lolium* and *Vulpia*. Developing management plans to address these species, as well as surveying islands adjacent to known infestations, should be a conservation priority for south coast islands. Improved biosecurity procedures and enforcement could prevent the establishment of new island weed populations and reduce future costs associated with the management of active infestations.

Keywords: biogeography, distribution maps, introduced plants, weeds

INTRODUCTION

Deleterious effects of introduced plants on native biodiversity and ecosystem function have been documented worldwide (Vila et al. 2011). Introductions of alien species represent a substantial component of anthropogenic global environmental change and disproportionately affect islands (Vitousek 1997). The Conservation Commission of Western Australia (2009) identified the establishment of weeds on conservation reserve islands as a significant issue affecting island biodiversity. Among the major knowledge gaps that the Conservation Commission listed as impairing effective management of island natural resources was a lack of review of weed occurrence and control methods.

Islands along the south coast of Western Australia have a long history of disturbance and deliberate plant introductions. Islands in this region range from unnamed, occasionally submerged rocks to Middle Island, which covers 1080 ha. Most islands along the south coast are steep-sloped granite domes with relatively few beaches. Many of these islands are difficult to access, even in good weather conditions, and have not been formally surveyed

by biologists. However, more accessible islands have been documented as plant introduction sites, starting in 1791 with Vancouver who planted grape vines, watercress, and sowed various seeds on Michelmas Island, although these species were not evident when searched for by Flinders in 1801 (Flinders 1814; Lamb 1984).

Several south coast islands were occupied either briefly or for longer periods by sealers, including the settlement on Middle Island by the 'pirate' Black Jack Anderson in 1827 (Dickson 2007; Forrestal 2008). A brief settlement for salt extraction occurred on Middle Island in 1890 (Bechervaise 1972). Little evidence of any gardens or resulting naturalised plants remains from these activities, although doubtlessly they resulted in some weed introductions.

A tourist development on Woody Island, which includes permanent structures and campsites, has facilitated continual introductions over a long period of time. Along with disturbance associated with human activities, this has led to Woody Island being the 'weediest' of all the Recherche Archipelago islands, even surpassing Cull Island with its resident feral goats (DEC 2012).

Lighthouses were constructed on Breaksea Island in 1858 and manned until 1926, with a second tower in 1902 (Cumming et al. 1995). Another was erected on

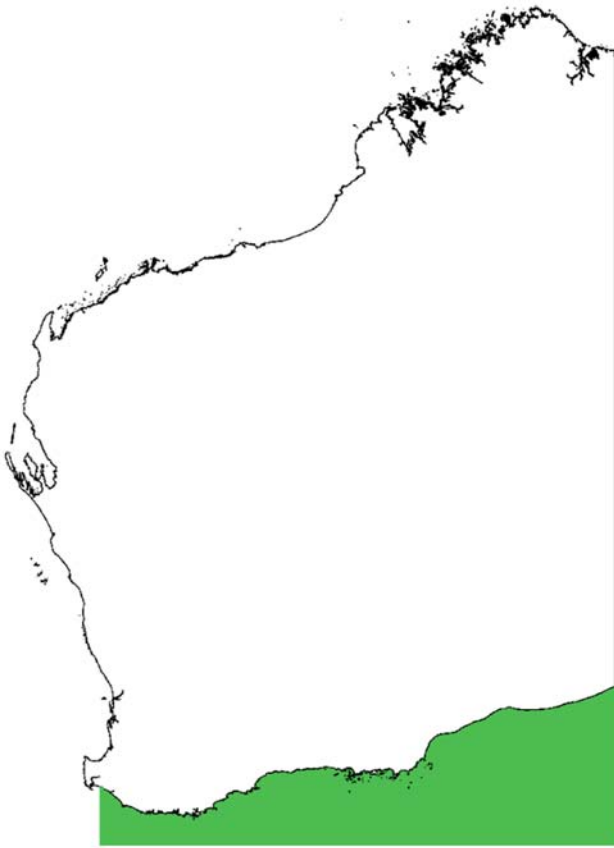


Figure 1. Our study area included all islands within the tenure of the Department of Parks and Wildlife Warren and South Coast regions (shaded). This area stretched from Black Point to the South Australia border.

Eclipse Island in 1926 and manned until 1976 (Cumming et al. 1995). At both sites, vegetable and ornamental gardens were established leading to the introduction of many potential weeds, some of which (e.g. arum lilies, *Zantedeschia aethiopica*) still remain.

Vegetables were planted on Green Island in 1826 (Shellam 2009). Soon after the first settlement of Albany, a gardener's hut was constructed on the island in 1830 (Shellam 2009). A grazing lease for the island was granted in 1918 but has been since discontinued (Garden 1977). This long history of clearing and disturbance has added many garden escapes to the flora of this small island.

New potential weeds on islands will continue to arrive as visitation increases. For example, five new weed records for Daw Island were noted at the campsite established after the Sanko Harvest oil spill (Keighery 1995). This is a worldwide trend (Drost & Junak 2009). While many of these weeds will not persist, the constant re-introductions suggest that any program to reduce weed impacts on offshore islands needs to focus on monitoring access sites.

To provide a baseline for such monitoring and address the knowledge gap in island weed occurrences identified by the Conservation Commission of Western Australia, we collated baseline information summarizing current knowledge of the distributions of introduced plants on the islands along the south coast of Western Australia. This information will help to facilitate and direct future

research and management efforts, as well as identify more specific gaps in existing knowledge of weed distributions. Additionally, we list exotic plant species that pose a particular risk to island biodiversity and conservation values that should be prioritized accordingly in management plans for the islands, where these plans exist.

We expected that islands with a more extensive history of human use would have more records of weeds. We also expected to see a higher number of weed species on estuarine islands than their oceanic counterparts due to increased propagule pressure from upstream sources.

METHODS

We gathered data on the distribution and prevalence of weeds on south coast islands from a variety of sources and entered and processed it using Microsoft Access. We defined south coast islands as all islands within the tenure of the WA Department of Parks and Wildlife's (DPaW) South Coast and Warren regions. This area covers all the islands in Western Australian waters from Black Point to the South Australian border. We used a list of 88 named and gazetted South Coast islands to guide the search for records. Sources included Western Australian Herbarium records, published journal articles, government and contractor reports, personal accounts from experts and surveys. We excluded records that did not contain taxonomic identification to the species level (i.e. specimens only identified to genus).

We cross-referenced weeds present on the islands against existing weed lists and prioritizations to help clarify the current or potential negative environmental impacts of the weeds. These lists included:

- the Department of Parks and Wildlife Regional Weed Prioritization for both the South Coast and Warren regions;
- the IUCN's '100 of the World's Worst Invasive Alien Species' list (<http://www.issg.org/database/species/search.asp?st=100ss>);
- the Department of Agriculture and Food's (WA) Western Australian Organism List (<http://www.agric.wa.gov.au/bam/western-australian-organism-list-waol>), which enumerates the state's declared and prohibited plants;
- the federal Department of the Environment and Heritage National Environmental Alert List (<http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/alert.html>);
- a list of all weed species officially targeted for biocontrol;
- a list of weed risk rankings from Groves et al.'s (2003) Weed Categories for Natural and Agricultural Ecosystem Management; and
- the Pacific Island Ecosystems at Risk's list of risk assessments for plants in Australia.

Statuses in these lists are reported for each species recorded on south coast islands.

While some records were associated with specific coordinates, the coordinates were often inaccurate enough that the coordinates did not fall within the boundaries of the island the record was associated with. For this reason, we used island centroid coordinates to depict the known ranges of weeds with records on five or more south coast islands. For each species, we provide data on distribution, plant listings, abundance and the potential ecological threats posed by the plant when available.

RESULTS

We collected a total of 789 individual records of weeds on islands. A total of 116 species of weeds were recorded

on all islands in the region (Appendix 1). Of the 88 named and gazetted islands we searched for, only 43 islands had records of introduced plants being present.

Islands with the most weed species recorded were Woody Island (57), Boxer Island (31), Bald Island (29), Green Island (26) and Middle Island (22; Table 2). Three south coast islands have been described in the literature as being completely free of weeds: Coffin (Smith & Kolchis 1980), Six Mile (Keighery 1995) and Spindle (Keighery 1995). However, a subsequent publication from a year later (Abbott 1981) listed eight weed species as present on Coffin Island.

Despite accounting for less than 7% of islands with records of weeds, the three estuarine islands (Green Island, Gull Rock and Honeymoon Island) collectively had 77 weed species (66.4% of all species recorded). Twenty-two weed species (almost 19% of all weeds species recorded) were observed solely on the three estuarine islands.

Table 1

Key to weed ranking and recommended management actions from Department of Parks and Wildlife regional weed prioritizations.

Code	Weed ranking
VH	Very high (objective is eradication)
H	High (objective is eradication or control to reduce)
M	Medium (objective is control to reduce or containment)
L	Low (objective is containment at key sites only)
N	Negligible (no action to be undertaken but may include monitoring only)
Code	Recommended management action
A	No action (the weed species ranking is so low as to not warrant any investment in regional strategic management actions)
B	Monitor only (aims to detect any significant changes in the species' weed risk or management ability)
C	Improve general weed management (aims to minimise weed impact and maintain the overall biodiversity, social, cultural and economic values in the region through improved general weed management)
D	Protect priority sites (aims to prevent spread of weed species to key sites/assets of high biodiversity, social, cultural or economic value)
E	Targeted control to reduce infestations at priority sites (may include biocontrol) (aims to significantly reduce the impact of a weed species on key sites/assets of high biodiversity, social, cultural or economic value through targeted management)
F	Contain regional spread (aims to prevent the ongoing spread of the weed species in the region)
G	Reduce regional infestations (may include biocontrol) (aims to significantly reduce the extent of the weed species in the region)
H	Regional eradication (aims to remove the weed species from the region)
I	State-wide eradication (aims to remove the weed species from the state)

Annotated list

The regions named below refer to the management regions of the Department of Parks and Wildlife. Codes for regional weed prioritizations and recommended management actions are given in Table 1.

Aira caryophylla – Recorded on nine islands (Fig. 2a). Prioritized as L (B, C) in the South Coast Region. Widespread environmental weed in south-west WA found in bushland and degraded pasture (Hussey et al. 2007).

Aira cupaniana – Recorded on Bald, Coffin, Mondrain and Woody islands. Widespread environmental weed in south-west WA found in bushland and degraded pasture (Hussey et al. 2007). Prioritized as L (B, C) in the South Coast Region.

Aira praecox – Recorded on Bald and Woody islands. Widespread environmental weed in south-west WA found in bushland and degraded pasture (Hussey et al. 2007). Recorded on Woody Island as an early colonizer of areas that were severely disturbed by fire in 1950. Prioritized as L (B, C) in the South Coast Region.

Ammophila arenaria – One record from Sandy Island in Windy Harbour. Prioritized as L (C) in the South Coast Region and L (B, C, D) in the Warren Region. Modifies coastal dune ecosystems by increasing dune stabilization and outcompeting native dune vegetation (Western Australian Herbarium 2014). Preventing this plant from establishing in areas where it is not already present should be a priority for islands with dunes.

Arctotheca calendula – Recorded on five islands (Fig. 2b). Prioritized as N (B) in the South Coast Region. Primarily a weed of disturbed areas but can impact native vegetation once established (Western Australian Herbarium 2014). Records from Woody Island note that it is found within the settlement area.

Arctotheca populifolia – Recorded on Woody, Sandy, Gull Rock and Middle islands. Primarily a threat on islands with coastal dune ecosystems where it can colonize rapidly,

Table 2

Number of weed records per island, recorded number of weed species, and island type and for islands on the south coast of Western Australia.

Island name	No. weed records	No. species recorded	Type of island
Anvil	2	2	continental
Bald	49	29	continental
Bellinger	6	5	continental
Boxer	42	31	continental
Breaksea	27	19	continental
Cave	1	1	continental
Chatham	6	4	continental
Coffin	12	8	continental
Cull	2	1	continental
Daw (= Christmas)	22	10	continental
Doubtful Islands	33	18	continental
Eclipse	19	16	continental
Figure of Eight	25	19	continental
Green (Oyster Harbour)	31	26	estuarine
Gull Rock (King George Sound)	19	16	continental
High (Duke of Orleans Bay)	1	1	continental
Honeymoon (Wilson Inlet)	9	9	estuarine
Kermadec (= Wedge)	3	2	continental
Long (Recherche)	13	9	continental
MacKenzie	1	1	continental
Michaelmas	20	16	continental
Middle (Recherche)	72	22	continental
Mistaken	23	19	continental
Mistaken (nearby islet)	9	9	continental
Mondrain	30	19	continental
New Year	1	1	continental
North Twin Peaks	15	11	continental
Observatory	2	2	continental
Pasco (Recherche)	5	4	continental
Quagering (= Flat)	1	1	continental
Remark	12	9	continental
Round (Recherche)	2	2	continental
Saddle	13	7	continental
Sandy (Windy Harbour)	13	13	continental
Sandy Hook	14	7	continental
Seal (King George Sound)	14	9	continental
Shelter (= Mutton Bird)	5	5	continental
South Twin Peaks	8	6	continental
Taylor	10	9	continental
Westall (= Combe)	1	1	continental
Wickham (= Stanley)	12	9	continental
Wilson	11	7	continental
Woody	173	57	estuarine

increase dune biomass, and decrease native plant diversity (Western Australian Herbarium 2014). Prioritized as N (B) in the South Coast Region.

Asparagus asparagoides – One record from Daw Island (also known as Christmas Island) in 1988 and one record from Honeymoon Island in Wilson Inlet in 1992. Bridal creeper is listed as a Weed of National Significance and as a declared pest organism in WA. It is officially listed as a biocontrol target. It is prioritized as L (D, E) in the Warren Region and L (D) in the South Coast Region. These low rankings are likely the result of the widespread range of bridal creeper in south-west WA and a largely successful biocontrol program that has substantially reduced the prevalence and impacts of bridal creeper across its

introduced range. While biocontrol agents are likely to spread to Honeymoon Island unassisted because of its close proximity to the mainland, they may not spread to the more distant Daw Island unassisted. Efforts should be made to assess the population of bridal creeper on Daw Island and translocate biocontrol agents if necessary as bridal creeper can substantially alter native ecosystems and could potentially be dispersed to adjacent islands by frugivorous birds.

Atriplex prostrata – One record from Middle Doubtful Island in April 1977. Common weed of estuarine and salty areas in south-west WA (Hussey et al. 2007). Prioritized as L (B, C, D) in the Warren Region and FAR in the South Coast Region.

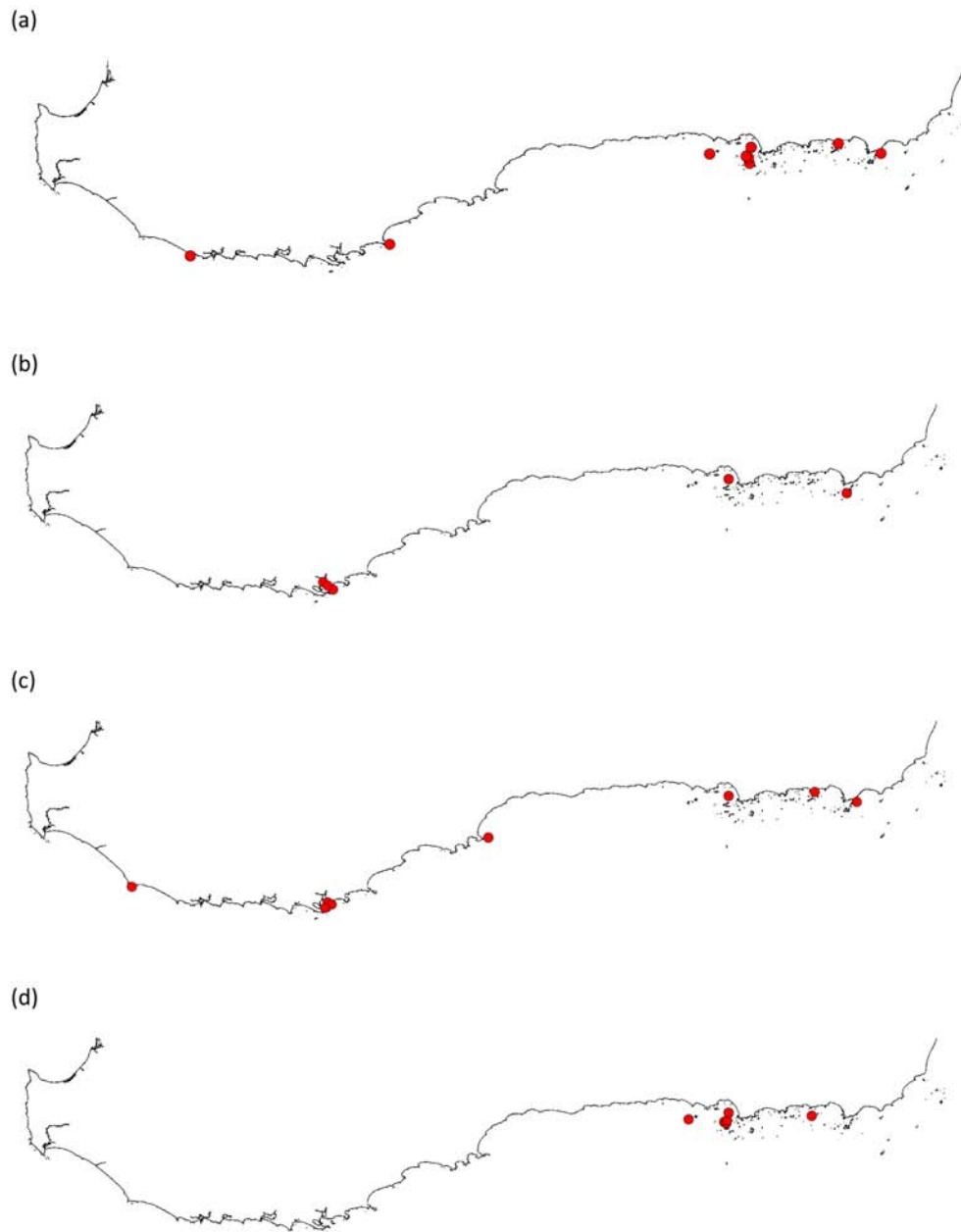


Figure 2. Recorded distribution of (a) *Aira caryophylla*, (b) *Arctotheca calendula*, (c) *Avena barbata* and (d) *Avena fatua* on islands of the south coast of Western Australia.

Avena barbata – Recorded on eight islands (Fig. 2c). Prioritized as N (B) in the South Coast Region. Allelopathic competitor with native grasses but possibly requires disturbance to establish (Western Australian Herbarium 2014).

Avena fatua – Recorded on six islands (Fig. 2d). Prioritized as N (B) in the South Coast Region. A weed in both crops and bushland. Dense stands of up to 8 ft (2.44 m) in height were recorded in areas of Woody Island that had been severely disturbed by fire (Willis 1953).

Brassica rapa – One record from Green Island in Oyster Harbour from 1986 noting that it was abundant on the island. Not known to be present on any other islands on

the south coast. Groves et al. (2003) assigned ratings of 1 to 4 for different *B. rapa* subspecies (Table 3). It is not known which subspecies was present on Green Island but subspecies readily hybridize and are not easily distinguishable.

Briza maxima – Recorded as present on Coffin and Mistaken islands. Prioritized as N (B) in the South Coast Region. A common weedy grass in south-west WA.

Briza minor – Recorded on seven islands (Fig. 3a). Prioritized as N (B) in the South Coast Region. A common weedy grass in south-west WA.

Bromus diandrus – Recorded from nine islands (Fig. 3b) and noted as occurring frequently on Saddle Island. No

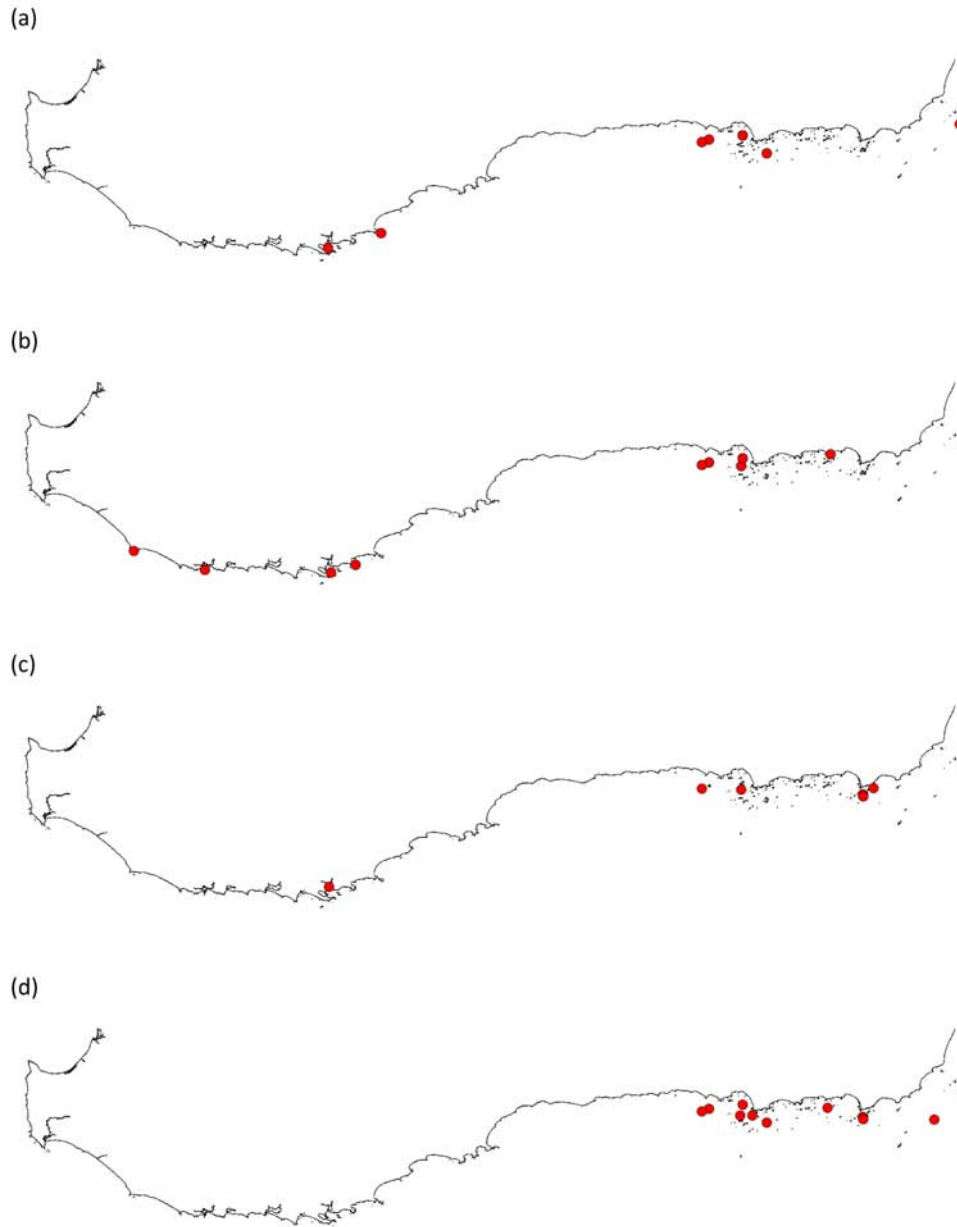


Figure 3. Recorded distribution of (a) *Briza minor*, (b) *Bromus diandrus*, (c) *Cakile maritima* and (d) *Centaurium erythraea* on islands of the south coast of Western Australia.

available records identified the particular variety of *B. diandrus* present on south coast islands but *B. diandrus* var. *diandrus* is cited as being a frequently occurring and serious weed on offshore islets in WA (Hussey et al. 2007). Prioritized as N (B) in the South Coast Region.

Bromus hordeaceus – Recorded on Boxer and Woody islands. Prioritized as N (B) in the South Coast Region. A common weedy grass found on damp soils across south-west WA (Hussey et al. 2007).

Bromus rubens – Recorded once in 2003 growing on granite on Bald Island. Prioritized as N (B) in the South Coast Region. Common on disturbed ground in the wheatbelt (Hussey et al. 2007) but less so along the south coast.

Cakile maritima – Recorded on six islands (Fig. 3c). Common weed of beaches in WA. Prioritized as N (B) in the South Coast Region.

Carpobrotus aciculatus – One WA Herbarium specimen from Wilson Island in 1960 and another from Middle Island in 1974. Prioritized as L (C) in the South Coast Region and FAR in the Warren Region. A mat-forming succulent that is commonly found in coastal heathland and beaches in WA.

Catapodium rigidum – Recorded from Boxer Island and a WA Herbarium specimen from Woody Island in 1998. The Woody Island specimen was noted to have been from a disturbed area near a campsite. A weedy grass of disturbed areas. Prioritized as L (B, C) in the South Coast Region.

Table 3

Rankings from Groves et al. (2003) of Australia-wide impacts of weed species in natural ecosystems for all recorded weed species on islands along the south coast of Western Australia. Potential rankings range from 0 (lowest risk) to 5 (known problematic weed). * indicates multiple rankings for different subspecies.

Species	Groves et al. ranking	Species	Groves et al. ranking
<i>Aira caryophylla</i>	4	<i>Lagurus ovatus</i>	4
<i>Aira cupaniana</i>	4	<i>Leontodon saxatilis</i>	3
<i>Aira praecox</i>	4	<i>Lepidium bonariense</i>	4
<i>Ammophila arenaria</i>	5	<i>Lolium loliaceum</i>	4
<i>Arctotheca calendula</i>	5	<i>Lolium rigidum</i>	5
<i>Arctotheca populifolia</i>	3	<i>Lotus subbiflorus</i>	4
<i>Asparagus asparagoides</i>	5	<i>Lycium ferocissimum</i>	5
<i>Atriplex prostrata</i>	5	<i>Lycopersicon esculentum</i>	2
<i>Avena barbata</i>	5	<i>Lysimachia arvensis</i>	4
<i>Avena fatua</i>	5	<i>Malva arborea</i>	5
<i>Brassica rapa</i>	*	<i>Malva parviflora</i>	4
<i>Briza maxima</i>	5	<i>Medicago polymorpha</i>	4
<i>Briza minor</i>	5	<i>Melilotus indicus</i>	4
<i>Bromus diandrus</i>	5	<i>Oxalis corniculata</i>	4
<i>Bromus hordeaceus</i>	4	<i>Oxalis pes-caprae</i>	5
<i>Bromus rubens</i>	3	<i>Parapholis incurva</i>	4
<i>Cakile maritima</i>	5	<i>Parentucellia latifolia</i>	4
<i>Carpobrotus aequilaterus</i>	4	<i>Parentucellia viscosa</i>	4
<i>Catapodium rigidum</i>	4	<i>Pelargonium capitatum</i>	5
<i>Centaurium erythraea</i>	4	<i>Petrorhagia dubia</i>	4
<i>Centaurium tenuiflorum</i>	4	<i>Phytolacca octandra</i>	4
<i>Cerastium glomeratum</i>	4	<i>Poa annua</i>	4
<i>Chenopodium album</i>	5	<i>Polycarpon tetraphyllum</i>	5
<i>Chenopodium murale</i>	4	<i>Polypogon maritimus</i>	4
<i>Cirsium vulgare</i>	5	<i>Polypogon monspeliensis</i>	4
<i>Conyza bonariensis</i>	4	<i>Raphanus raphanistrum</i>	5
<i>Conyza sumatrensis</i>	4	<i>Romulea rosea</i>	5
<i>Corrigiola litoralis</i>	2	<i>Rostraria cristata</i>	3
<i>Cotula bipinnata</i>	3	<i>Rumex crispus</i>	4
<i>Cotula coronopifolia</i>	3	<i>Sagina apetala</i>	4
<i>Cotyledon orbiculata</i>	3	<i>Silene gallica</i>	4
<i>Crassula natans</i>	3	<i>Silene nocturna</i>	3
<i>Cynodon dactylon</i>	4	<i>Sisymbrium orientale</i>	5
<i>Cyrtomium falcatum</i>	2	<i>Solanum nigrum</i>	5
<i>Dactylis glomerata</i>	4	<i>Sonchus asper</i>	*
<i>Disa bracteata</i>	3	<i>Sonchus oleraceus</i>	4
<i>Dischisma arenarium</i>	2	<i>Sparaxis bulbifera</i>	5
<i>Dittrichia graveolens</i>	3	<i>Spergularia diandra</i>	3
<i>Ehrharta longiflora</i>	5	<i>Spergularia rubra</i>	4
<i>Erodium cicutarium</i>	4	<i>Sporobolus africanus</i>	5
<i>Euphorbia paralias</i>	5	<i>Stellaria media</i>	4
<i>Euphorbia peplus</i>	4	<i>Stellaria pallida</i>	3
<i>Fumaria capreolata</i>	4	<i>Trachyandra divaricata</i>	5
<i>Fumaria muralis</i>	4	<i>Trifolium campestre</i>	4
<i>Galium aparine</i>	3	<i>Trifolium cernuum</i>	4
<i>Galium murale</i>	4	<i>Trifolium glomeratum</i>	4
<i>Geranium molle</i>	4	<i>Trifolium tomentosum</i>	4
<i>Gladiolus floribundus</i>	1	<i>Triticum aestivum</i>	2
<i>Holcus lanatus</i>	4	<i>Tropaeolum majus</i>	3
<i>Hordeum leporinum</i>	5	<i>Urtica urens</i>	4
<i>Hordeum murinum</i>	4	<i>Vellereophyton dealbatum</i>	4
<i>Homungia procumbens</i>	4	<i>Vulpia bromoides</i>	5
<i>Hypochaeris glabra</i>	4	<i>Vulpia fasciculata</i>	3
<i>Isolepis marginata</i>	3	<i>Vulpia muralis</i>	5
<i>Juncus bufonius</i>	5	<i>Vulpia myuros</i>	*
<i>Lactuca serriola</i>	3	<i>Zantedeschia aethiopica</i>	5

Centaureum erythraea – Recorded from 10 islands (Fig. 3d). Prioritized as L (B, C) in the South Coast Region. All but two records are from 1950 and were listed under the synonym *Erythraea centaurium*. Given that this species has few WA Herbarium collections from areas of the adjacent mainland and is similar in appearance to the native plant *Schenkia australis*, the presence of this species on south coast islands is suspect.

Centaureum tenuiflorum – One WA Herbarium specimen collected on Bald Island in 1963. Prioritized as L (B, C) in the South Coast Region. Frequently found on disturbed sites (Hussey et al. 2007).

Cerastium glomeratum – Recorded on nine islands (Fig. 4a). Prioritized as L (B, C) in the South Coast Region. One WA Herbarium specimen collected on Middle Island in 1973 was found on burnt ground and noted to be rare on the island at the time. On Woody Island, it was found in 1950 and 2003 but Goodsell et al. (1976) noted that it was absent during their survey.

Chenopodium album – One WA Herbarium specimen collected from Honeymoon Island in 1992 noted that it was common in the area. Prioritized as N (B) in the South Coast Region. Highly allelopathic and competes aggressively with other plants in disturbed areas with high nitrate levels. These traits make this species potentially problematic on islands that support colonies of seabirds (Western Australian Herbarium 2014).

Chenopodium murale – Recorded on six islands (Fig. 4b). Prioritized as N (B) in the South Coast Region. A herbarium specimen from 1991 notes that it was common on Honeymoon Island. Another specimen was collected on Middle Island in 1973 with notes that multiple growth habits (both prostrate and erect) were present on and near areas that had recently been burnt. As with its congeners, disturbance events like fire probably facilitate the spread of this weed.

Cirsium vulgare – Recorded on Middle, Bald, Eclipse and West Doubtful islands. Prioritized as L (D) in the South Coast Region and L (B, C) in the Warren Region, but this species has a high Pacific Island Ecosystems at Risk (PIER) ranking of 21 for Australia. A serious weed in disturbed areas (Western Australian Herbarium 2014).

Conyza bonariensis – Recorded on Middle, Eclipse, Middle Doubtful and West Doubtful islands. Prioritized as L (B, C) in the South Coast Region and M (D, E, F) in the Warren Region. A WA Herbarium specimen was collected from Eclipse Island in 1988 with notes that it was abundant there, and a specimen was collected on Middle Island in 1974 with notes that it was common in the area surrounding a hut.

Conyza sumatrensis – One WA Herbarium specimen was collected from Honeymoon Island in 1992. Prioritized as L (B, C) in the South Coast Region and M (D, E, F) in the Warren Region. Removal of island populations of a plant prioritized at the level of 'medium' would normally be recommended. However, the close proximity of

Honeymoon Island to the mainland and this plant's capability to disperse long distances via wind-borne seeds makes it likely that the island would be quickly re-invaded following any control efforts.

Corrigiola littoralis – One WA Herbarium specimen collected from Wickham Island (also known as Stanley Island) in 1991. Noted as being abundant in shallow claypans. Prioritized as L (B, C) in the South Coast Region.

Cotula bipinnata – One WA Herbarium specimen was collected from Woody Island in 2005. This plant was from a population of 2–5 plants in a recently disturbed area beside a track. Prioritized as FAR in the South Coast Region; however, there are few WA Herbarium records from this part of the coastline and eradication of this island population while it is still small might be of benefit to the Esperance area in general.

Cotula coronopifolia – Recorded on eight islands (Fig. 4c). Prioritized as L (B, C) in the South Coast Region. Collections are usually from damp disturbed areas or areas near a lake or spring.

Cotyledon orbiculata – Present on Breaksea Island. Naturalized garden escape that has become abundant on the island. Believed to be spreading and difficult to control (J Lavers, pers. comm., 5 December 2013). This species is prioritized as L (B, C, D) in the South Coast Region.

Crassula natans – Recorded on Bald and Mondrain islands. One WA Herbarium specimen collected from Mondrain Island in 2002 was found growing in a pan gnamma hole and was identified as the variety *Crassula natans* var. *minus*. Prioritized as L (B, C) in the South Coast Region.

Cynodon dactylon – Recorded on Woody Island in 1950. Later publications disagree on whether it was absent (Goodsell et al. 1976) or present (Abbott 1992). Prioritized as L (B, C) in the South Coast Region. Common lawn grass that frequently escapes cultivation.

Cyrtomium falcatum – One WA herbarium specimen from Breaksea Island in 1999. Noted as being rare and occurring in crock crevices. Prioritized as L (B, C, D) in the South Coast Region.

Dactylis glomerata – One WA herbarium specimen from Honeymoon Island in 1992. Noted as being rare at the time. Prioritized as L (B, C, D) in the South Coast Region and L (C) in the Warren Region with a very low PIER ranking of 2. Grown as a pasture grass.

Dischisma arenarium – Recorded on the north coast of Boxer Island in 1950 and on Sandy Island in 1980. Prioritized as L (B, C) in the South Coast Region. Common in coastal areas of WA.

Disa bracteata – Recorded on Taylor and Bald islands. Prioritized as L (B, C) in the South Coast Region. Escaped garden plant found more commonly in disturbed areas (Hussey et al. 2007).

Dittrichia graveolens – Recorded on Eclipse and West

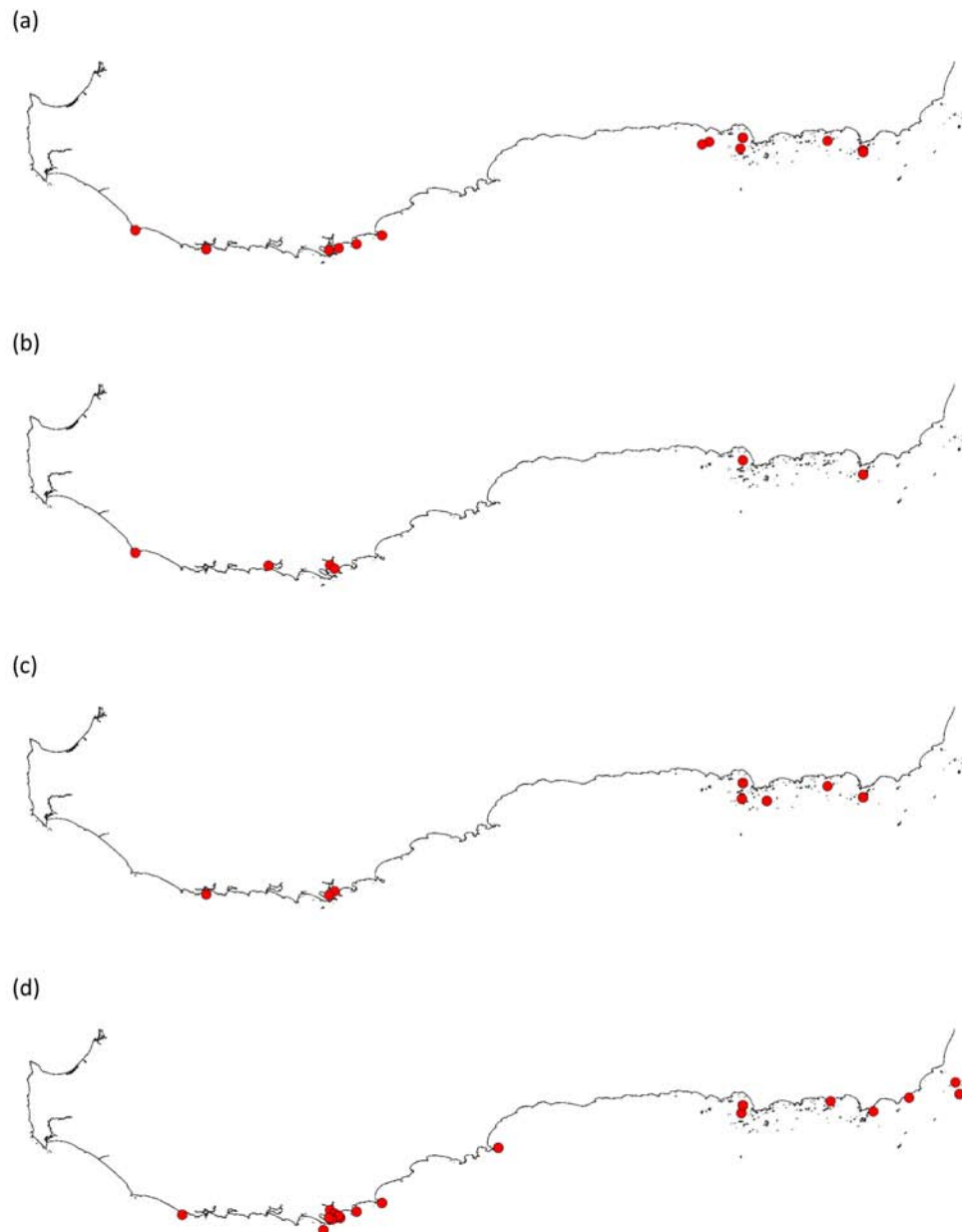


Figure 4. Recorded distribution of (a) *Cerastium glomeratum*, (b) *Chenopodium murale*, (c) *Cotula coronopifolia* and (d) *Ehrharta longiflora* on islands of the south coast of Western Australia.

Doubtful islands. Prioritized as L (B, C) in the South Coast Region and FAR in the Warren Region. Primarily a weed of disturbed areas.

Dysphania pumilio – Native to WA but recorded once as a weed on Woody Island. Considered a weed in agricultural areas.

Ehrharta longiflora – Recorded on 18 islands (Fig. 4d). Prioritized as L (B, C) in the South Coast Region. Weedy grass commonly found in coastal areas and offshore islands (Hussey et al. 2007).

Erodium cicutarium – Recorded on Eclipse, Seal and Woody islands. Prioritized as N (B) in the South Coast Region. Common weed of sandy soils in WA.

Euphorbia paralias – Recorded on 13 islands (Fig. 5a). While specific islands are not mentioned, published literature indicates that *E. paralias* is present on all islands with beaches in the Recherche Archipelago (Keighery & Dodd 1997). An environmental weed which forms dense monocultures on beaches and foredunes. Believed to alter beach and dune shape and formation (Heylingers 1985), and negatively impact seabird populations by reducing the amount of bare ground available for nesting (Rudman 2003). Also an amenity weed because exposure to its sap can cause dermatitis in some individuals. Prioritized as L (B, C) in the South Coast Region and N (B) in the Warren Region. This species has been officially targeted for biocontrol but no biocontrol agents have been developed or released yet (Scott 2012). Success at controlling related

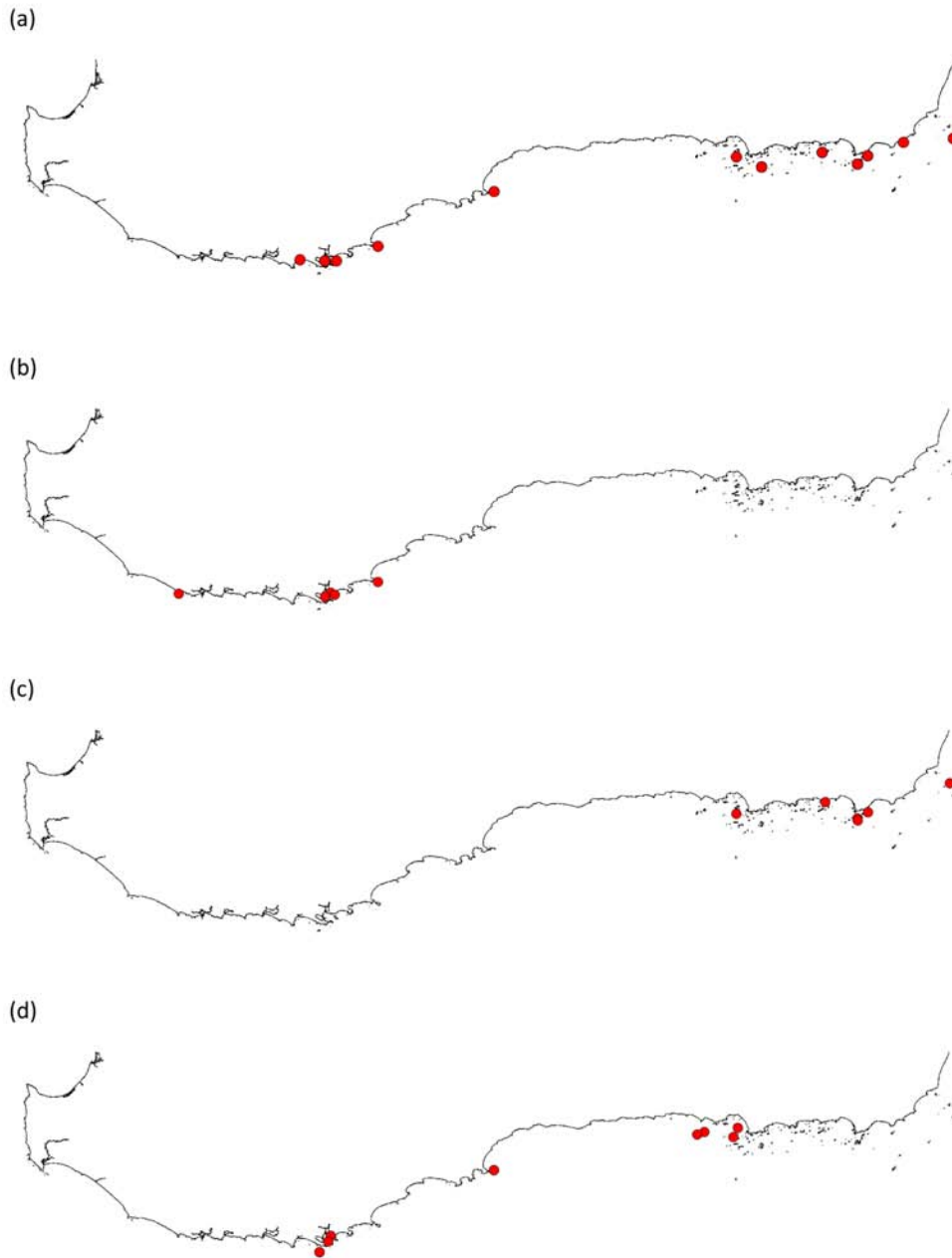


Figure 5. Recorded distribution of (a) *Euphorbia paralias*, (b) *Geranium molle*, (c) *Helichrysum luteoalbum* and (d) *Hordeum leporinum* on islands of the south coast of Western Australia.

Euphorbia species in North America suggest that it is possible for an effective agent to be developed for *E. paralias* in the future (Scott 2012).

Euphorbia pepus – Recorded on Bald and Woody islands. Largely a weed of disturbed areas. The Woody Island record is associated with a 2003 WA Herbarium specimen that came from a population of 6–20 plants on disturbed soil in the settlement. Prioritized as L (B, C) in the South Coast Region.

Fumaria capreolata – Recorded on Bald and Green islands. A 1986 WA Herbarium specimen from Green Island noted that this species was abundant. Prioritized as L (C) in the South Coast Region.

Fumaria muralis – Recorded on Breaksea and Green islands. The Green Island record is from a WA Herbarium specimen collected in 1986 that was identified at a finer taxonomic level and belongs to subspecies *muralis*. Prioritized as L (C) in the South Coast Region.

Galium aparine – One record from 1950 on Boxer Island. Listed by DAFWA as a prohibited plant in WA due to its negative impacts on canola production. An alert species for DPaW-managed lands in the South Coast Region. Some taxonomic uncertainty exists regarding the identity of WA specimens that have been identified as either *Galium aparine* or *Galium spurium*. Assessment and identification of the Boxer Island population is recommended in order

to determine whether it poses serious agricultural or environmental risks.

Galium murale – Recorded on Bald and Woody Islands. One WA Herbarium specimen collected on Woody Island in 2003 beside a track near the settlement. Prioritized as L (B, C) in the South Coast Region.

Geranium molle – Recorded on six islands including a small unnamed islet near Mistaken Island (Fig. 5b). Prioritised as FAR in the South Coast Region. Mostly a weed of disturbed areas.

Gladiolus floribundus – One record from Mistaken Island (Abbot 1981). Not currently accepted as being naturalized in WA. It is unclear what species this record actually represents. Given that some *Gladiolus* species are problematic invaders of bushland in WA, efforts should be made to determine the identity of this population.

Helichrysum luteoalbum – Recorded on six islands (Fig. 5c). Currently listed as native to WA but its status is ambiguous. Prioritised as FAR in the South Coast Region.

Holcus lanatus – One record from Green Island in Oyster Harbour from a WA herbarium specimen collected in 1986. Prioritized as L (B, C, D) in the South Coast Region with a relatively high PIER ranking of 15 for Australia. A serious weed on the edges of freshwater wetlands (Western Australian Herbarium 2014). Unlikely to spread to oceanic islands.

Hordeum leporinum – Recorded on eight islands (Fig. 5d). Prioritised as N (B) for the South Coast Region. Common weedy grass across south-west WA.

Hordeum murinum – Recorded on Woody, Long, Boxer and Figure of Eight islands. Not known to be naturalized in WA. All records are from one early source (Willis 1953) and may be due to misidentification of *Hordeum leporinum*, which is recorded on all four of these islands. One later account specifically lists *Hordeum murinum* as absent on Woody Island (Goodsell et al 1976).

Hornungia procumbens – Two records from WA Herbarium specimens on Middle Island in 1973 and Breaksea Island in 1975. Noted as being rare on Middle Island. Prioritized as L (C) in the South Coast Region. Hussey et al. (2007) note that it is commonly found in coastal areas and on offshore islands in WA.

Hypochaeris glabra – Recorded on 20 islands (Fig. 6a). Prioritized as L (B, C) in the South Coast Region. Common wind-dispersed weed found throughout south-west WA.

Isolepis marginata – Recorded on six islands (Fig. 6b). Sometimes considered a native plant but is currently listed as introduced by the WA Herbarium. It is believed to have been introduced from South Africa (Hussey et al. 2007). Prioritized as L (B, C) in the South Coast region. Noted as being common near the marsh east of Pink Lake on Middle Island.

Juncus bufonius – Recorded on six islands (Fig. 6c). Prioritized as L (C) in the South Coast region. Both native

and naturalized forms may be present in WA (Hussey et al. 2007). A WA Herbarium record from 1973 indicated that both cushion and non-cushion forms were present on Middle Island. Additional research on the taxonomy and origins of taxa currently classified as *Juncus bufonius* could help clarify the status of plants present on south coast islands.

Lactuca serriola – Recorded on Mondrain, West Doubtful and Middle Doubtful islands. The record from Mondrain Island was from a single plant seen in 2002 that was dispatched at the time of observation (S Hopper, pers. comm., 16 April 2014). Prioritized as FAR in the South Coast Region. Primarily found in disturbed areas (Hussey et al. 2007).

Lagurus ovatus – Recorded on Sandy, Shelter, Taylor and Woody islands. The Taylor Island record is from 2011 and describes the population as consisting of over 50 plants. On Woody Island it was described as locally common in 1998, and in 2002 it was noted that there were ‘many scattered plants’. Common across Shelter Island. Usually in sandy soils (Hussey et al. 2007). Prioritized as L (B, C) in the South Coast Region.

Leontodon saxatilis – Recorded on Honeymoon Island in 1992 from one WA Herbarium specimen. Mostly found in lawns and highly disturbed areas (Hussey et al. 2007). Prioritized as L (D) in the South Coast Region but no prioritization for the Warren Region.

Lepidium bonariense – Recorded on Honeymoon Island in 1992 from one WA Herbarium specimen. Prioritized as L (B, C, D) in the South Coast Region but no prioritization for the Warren Region.

Lolium loliaceum – Recorded on five islands (Fig. 6d). Prioritized as N (B) in the South Coast Region. More common along the coast than currently recognized.

Lolium rigidum – Recorded on Boxer, Figure of Eight, Green and Woody islands. Prioritized as N (B) in the South Coast Region. Notes associated with a WA Herbarium specimen collected in 2005 state that there was a population of 21–50 plants on the east end of Woody Island.

Lotus subbiflorus – Recorded on Gull Rock and Mistaken Island. Prioritized as L (B, C, D) in the South Coast Region. Primarily a weed of disturbed winter-wet areas (Hussey et al. 2007).

Lycopersicon esculentum – One record from Middle Island. Prioritized as an alert species in the South Coast Region. Low PIER rating of 2. Occasional garden escape.

Lycium ferocissimum – Recorded on seven islands (Fig. 7a). African Boxthorn is listed as a Weed of National Significance and is a declared weed in all states and territories except for Western Australia (Australian Weeds Committee 2013). It is prioritized as M (D, E, F) in the South Coast Region. African boxthorn was recorded on Boxer, Sandy Hook and Woody islands as early as 1950 and Middle Doubtful Island in 1980, with many of these

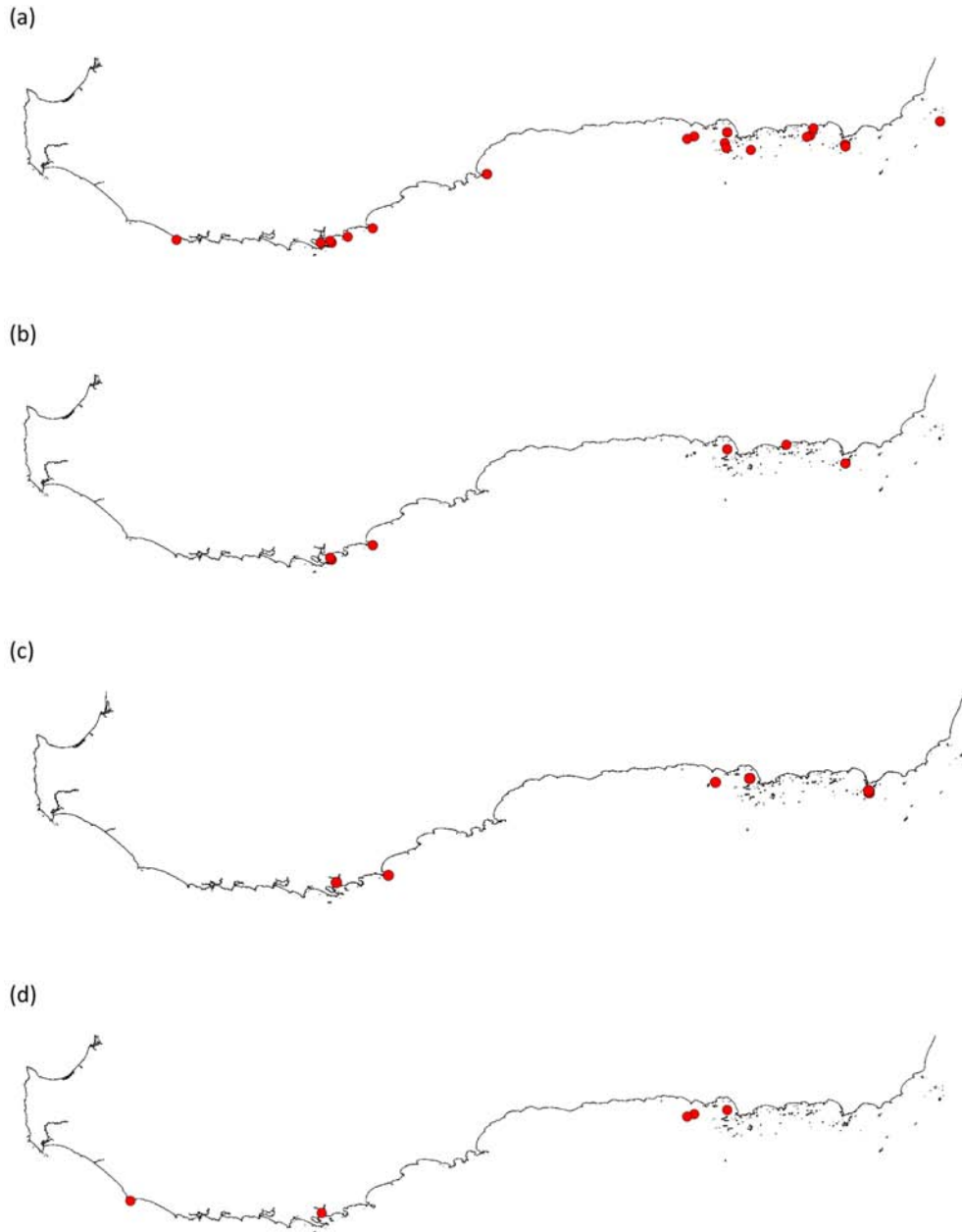


Figure 6. Recorded distribution of (a) *Hypochaeris glabra*, (b) *Isolepis marginata*, (c) *Juncus bufonius* and (d) *Lolium loliaceum* on islands of the south coast of Western Australia.

islands having more recent records. A serious infestation is also present on Cull Island where grazing by feral goats has removed most other vegetation from the island (J Lavers, pers. comm., 5 December 2013). African boxthorn is known to severely impede nesting by burrowing seabirds and breeding of seals and sea lions on offshore islets (Western Australian Herbarium 2014). It has also been observed to entangle and kill flesh-footed shearwaters (*Puffinus carneipes*) on islands off the coast of South Australia (J Lavers, pers. comm., 5 December 2013). Its threat to marine mammal and seabird populations, coupled with its ability to displace native vegetation in intact bushland, suggests that it should be removed when feasible. Allowing infestations to persist

on islands, or the adjacent mainland, increases the chance of spread to other adjacent islands because seeds are often dispersed by frugivorous birds.

Lysimachia arvensis – Recorded on 16 islands (Fig. 7b). Noted as being common on Goose Island in 1950. Populations of over 50 plants were present on Woody Island in 2003. Prioritized as L (B, C, D) in both Warren and South Coast Regions.

Malva arborea – Recorded entirely from estuarine islands: Green Island in Oyster Harbour as well as Gull Rock and Seal Island in King George Sound. Prioritized as M (D, E, F, G) in the Warren Region and listed as an alert species in the South Coast Region. Known to be a serious weed

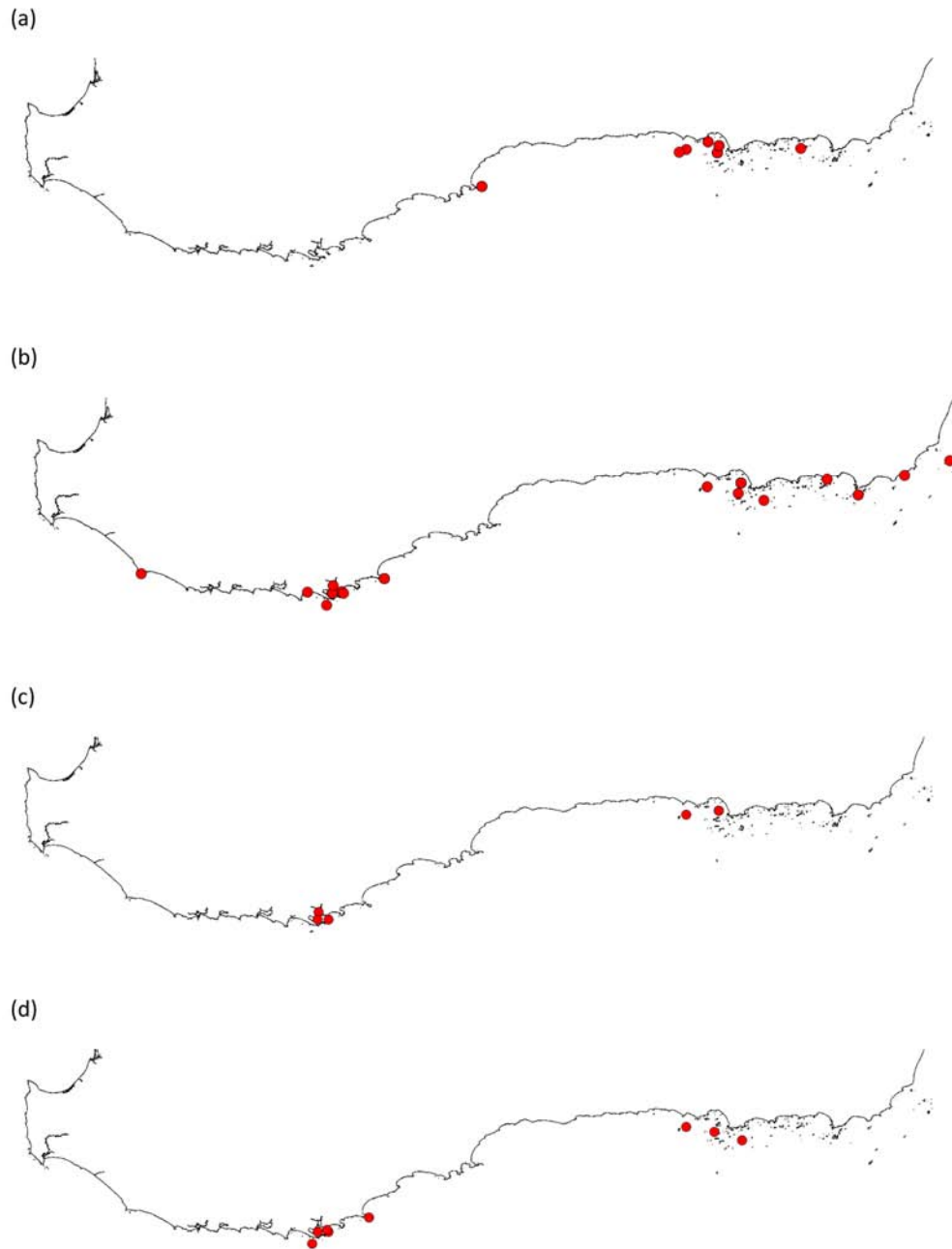


Figure 7. Recorded distribution of (a) *Lycium ferocissimum*, (b) *Lysimachia arvensis*, (c) *Medicago polymorpha* and (d) *Oxalis corniculata* on islands of the south coast of Western Australia.

on islands in Shoalwater Bay and other seabird islands in Victoria and South Australia (Rippey et al. 2002). Outcompetes native plant species, reduces seabird nesting opportunities, and increases erosion (Rippey et al. 2002). Increased nitrogen from guano deposition on seabird islands seems to facilitate growth and increase the invasive properties of *M. arborea*. On Rottnest Island, grazing by quokkas has kept this weed from establishing in all areas except for a small island in a lake and a few offshore islets that are inaccessible to quokkas. When rats established on Penguin Island (about 50 km south of Perth), they seriously damaged or killed most individuals by ring-barking and near-total defoliation. There has been some

suggestion that this species may facilitate the persistence of rats in seabird colonies within its native range by providing an additional water source (Rippey et al. 2002). These anecdotes suggest that this species may be a good candidate for control via the introduction of native mammalian herbivores.

Malva parviflora – Recorded on Gull Rock and Woody Island. Prioritized as FAR in the South Coast Region. Prefers areas with high light and nutrient levels (Western Australian Herbarium 2014). These traits could lead to it becoming problematic on seabird islands.

Medicago polymorpha – Recorded on five islands (Fig.

7c). Prioritized as L (B, C) in the South Coast Region. It was noted as being present on Woody Island in 1950 (Willis 1953) but it was not detected in a later, more intensive survey of the island's flora (Goodsell et al. 1976). This probably reflects the fact that there had been a major fire on the island prior to the earlier expedition. The fire would have created an open disturbed area for *Medicago polymorpha* to establish, while subsequent regrowth could have limited its ability to persist in most areas.

Melilotus indicus – Recorded on Boxer and Woody islands. Prioritized as L (B, C) in the South Coast Region. Very common on Boxer in 1950 according to Willis (1953). A WA Herbarium specimen from 1998 notes it was locally common on Woody Island.

Oxalis corniculata – Recorded on eight islands (Fig. 7d). Prioritized as N (B) in the South Coast Region. Usually a weed in lawns and gardens (Western Australian Herbarium 2014).

Oxalis pes-caprae – Recorded only once from a small unnamed islet off Mistaken Island. Prioritized as N (B) in the South Coast Region.

Parapholis incurva – Recorded on Bellinger, Boxer, Figure of Eight and Woody islands. Prioritized as L (C) in the South Coast Region. Common weed of offshore islands and other areas with highly saline soil (Hussey et al. 2007).

Parentucellia latifolia – Two WA Herbarium specimens from granite areas on Bald Island in 2003. Prioritized as N (B) in the South Coast Region. Widespread weed on granite outcrops throughout the south-west of WA (Hussey et al. 2007).

Parentucellia viscosa – One record on Mistaken Island. Widespread weed in south-west WA. Prioritized as N (B) in the South Coast Region.

Pelargonium capitatum – Recorded on Saddle Island and Quagering Island (also known as Flat Island). Notes with a 2005 WA Herbarium specimen record indicate that its occurrence on Saddle Island was frequent. Prioritized as L (B, C, D) in the South Coast Region and L (B, C) in the Warren Region. A major weed of coastal heathland and beach dunes that is facilitated by disturbance (Western Australian Herbarium 2014).

Petrorhagia dubia – Recorded on West Doubtful Island. Prioritized as L (B, C) in the South Coast Region. Known to be a weed of granite rocks (Hussey et al. 2007).

Phytolacca octandra – Recorded on Green and Honeymoon islands. Notes with a 1992 WA Herbarium sample state that it was common on Honeymoon Island at the time. Prioritized as N (A, B) in the South Coast Region and L (B, C, D) in the Warren Region. A weed of disturbed areas. Could potentially colonize other islands as its seeds are dispersed by frugivorous birds.

Poa annua – Recorded on six islands (Fig. 8a). Prioritized as L (C) in the South Coast Region. Usually present in disturbed areas and has little impact on native vegetation (Hussey et al. 2007).

Polycarpon tetraphyllum – Recorded on ten islands, including one small islet (Fig. 8b). Prioritized as L (C) in the South Coast Region. Several records note that it was growing in disturbed soil. On Daw Island it was recorded as common near the camp site. Multiple records from Woody Island describe it as locally common.

Polypogon maritimus – One record on Eclipse Island. Prioritized as an alert species for the South Coast Region. No other records for the south coast. Possibly a misidentification of *P. monspeliensis* but needs confirmation.

Polypogon monspeliensis – Recorded on five islands (Fig. 8c). Notes with a WA Herbarium specimen record from 1998 state that it was locally common in areas about 20 m from the shoreline on Woody Island. Prioritized as L (C) in the South Coast Region and L (B, C) in the Warren Region. Common weed in fresh and brackish wetlands that have been disturbed (Hussey et al. 2007).

Raphanus raphanistrum – Recorded on Green Island in Oyster Harbour. One WA Herbarium record notes that it was common on the island. Prioritized as N (B) in the South Coast Region. Significant agricultural weed in WA.

Romulea rosea – Recorded on Mistaken Island. Prioritized as L (B, C) in the South Coast Region and N (B) in the Warren Region. Common weed across south-west WA.

Rostraria cristata – Recorded on seven islands (Fig. 8d). Prioritized as L (B, C) in the South Coast Region. Weedy grass found on coastal heath and offshore islands.

Rumex crispus – Recorded on Woody Island and Sandy Island in Windy Harbour. Prioritized as N (B) in the South Coast Region and L (B, C, D) in the Warren Region. Has been officially targeted for biocontrol and has a moderate to high PIER ranking of 16. Both the Woody Island and Sand Island records are from prior to the release of a biocontrol moth (*Pyropteron chrysidiformis*), which has caused substantial reductions in the density of *R. crispus* across WA (Strickland et al. 2012). Surveys to investigate whether or not *R. crispus* populations are still present and whether the moth has already established could be helpful in determining whether translocation is necessary.

Sagina apetala – Recorded on seven islands (Fig. 9a). Prioritized as L (B, C) in the South Coast Region. Notes with a WA Herbarium specimen collected on Middle Island in 1978 state that it was 'apparently rare' but it was subsequently collected on Middle Island again at two different locations in 2004.

Silene gallica – Three records from Woody Island. The most recent, WA Herbarium specimen from 2003, indicates that 2–3 plants were present and that they were of the variety *Silene gallica* var. *gallica*. Prioritized as L (C) in the South Coast Region.

Silene nocturna – A single record from Middle Doubtful Island. Prioritized as L (B, C, D) in the South Coast Region. Typically found in disturbed areas (Hussey et al. 2007).

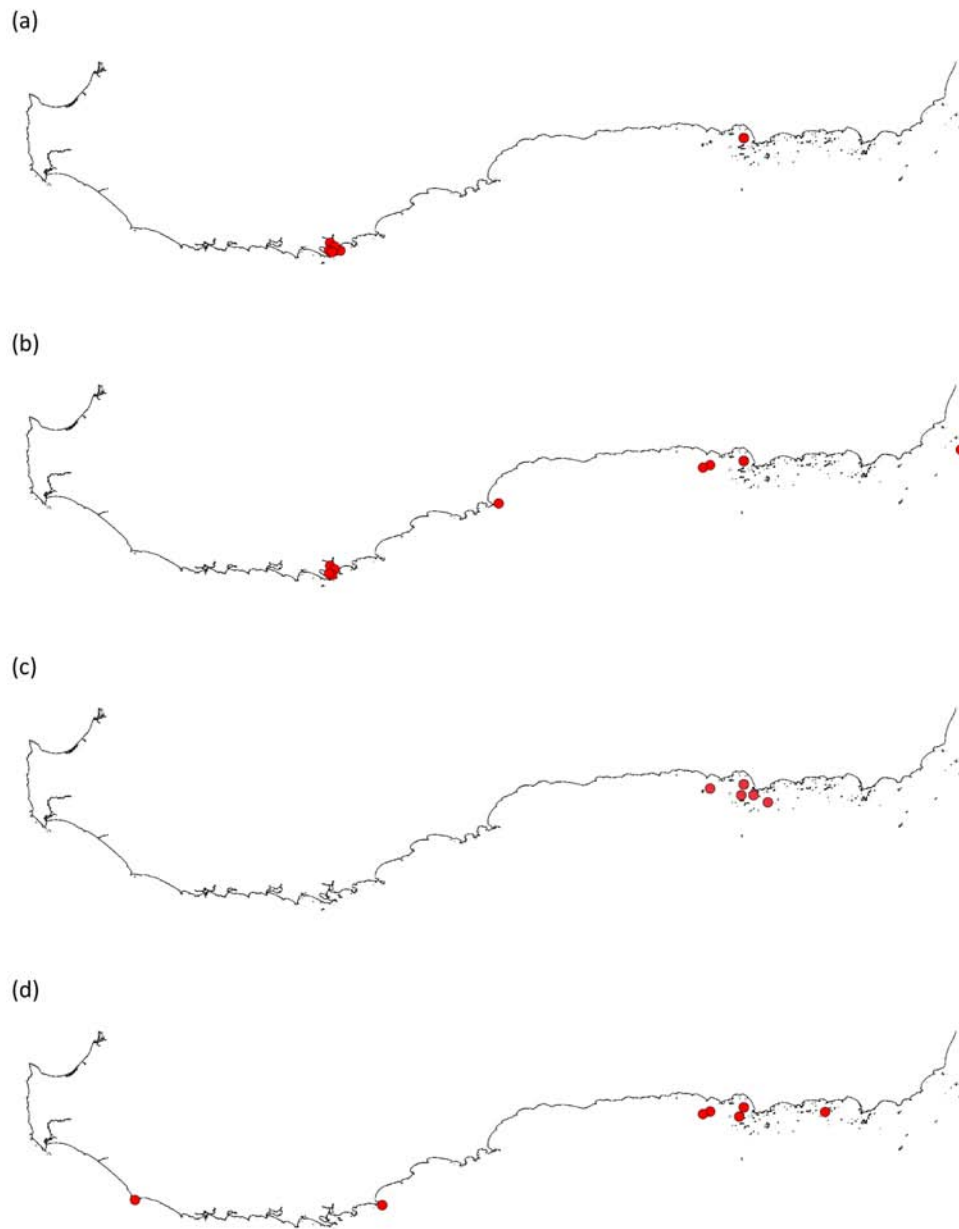


Figure 8. Recorded distribution of (a) *Poa annua*, (b) *Polycarpon tetraphyllum*, (c) *Polypogon monspeliensis* and (d) *Rostraria cristata* on islands of the south coast of Western Australia.

Sisymbrium orientale – A single record from Green Island in Oyster Harbour. Prioritized as L (B, C) in the South Coast Region.

Solanum nigrum – Recorded on 18 islands (Fig. 9b). Notes with a 2005 specimen collected on Saddle Island state that it was locally abundant, but another 2005 specimen from Woody Island was recorded as being the only individual present. However, this species was recorded on Woody Island as early as 1950 and is likely to still be present on the island. Prioritized as L (B, C) in the South Coast Region. Dispersal by frugivorous birds is probably responsible for this species' presence on many south coast islands. Common weed in bushland across many parts of WA.

Sonchus asper – Recorded on six islands (Fig. 9c). Referred to as common on Goose Island in 1950 (Willis 1953). Prioritized as L (B, C) in the South Coast Region. Groves et al. (2003) assign rankings of 3 and 4 to the two subspecies of *Sonchus asper*, however, these subspecies are no longer recognized as valid in Western Australia. Although not an official biocontrol target, this species is closely related to the agricultural weed *Sonchus oleraceus*. Biocontrol techniques in development for *S. oleraceus* are likely to be effective at controlling *S. asper* as well (Scott & McCarren 2012).

Sonchus oleraceus – Recorded on 31 islands (Fig. 9d). Extremely common weed across WA. Long distance dispersal of seeds by wind and an early introduction date

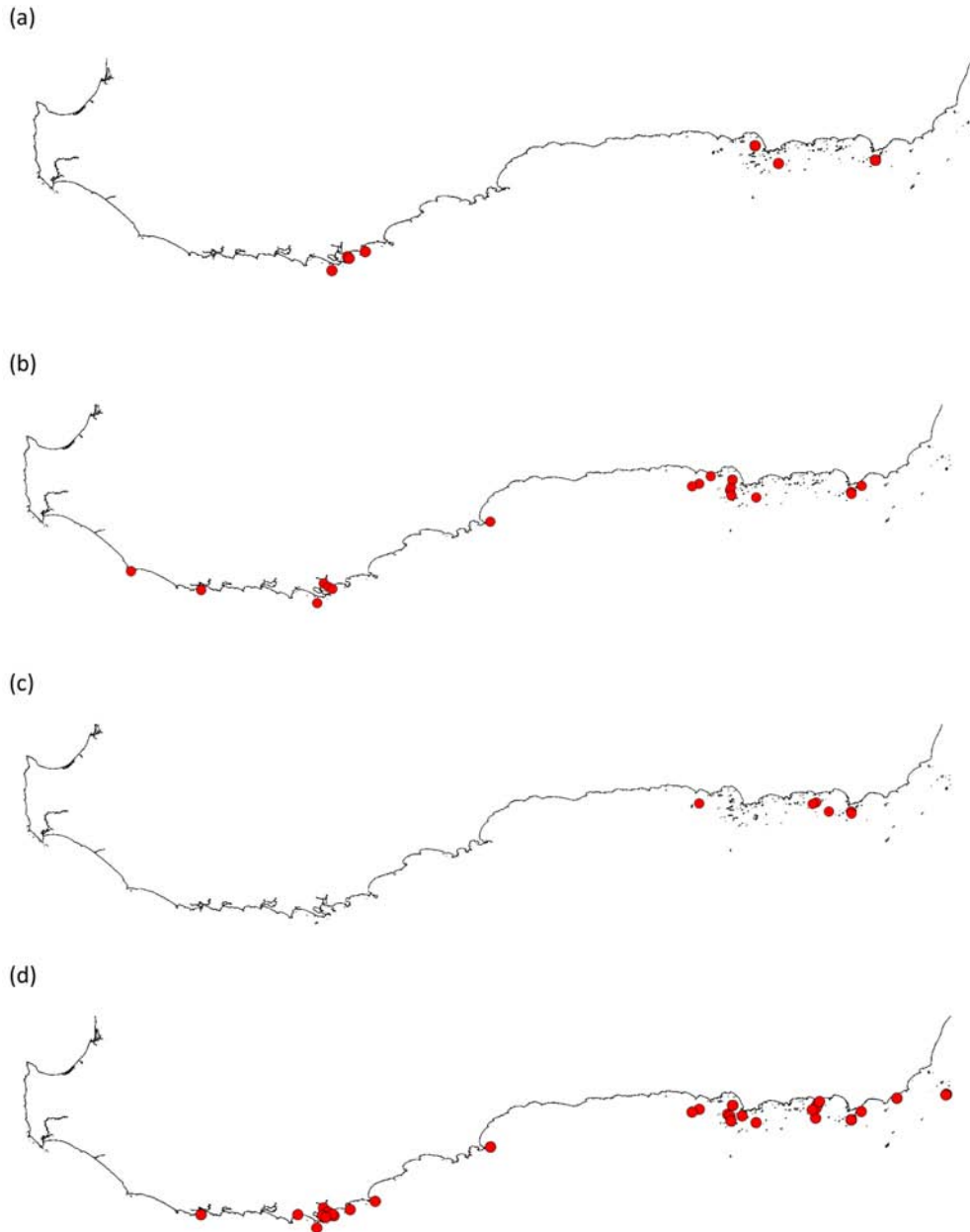


Figure 9. Recorded distribution of (a) *Sagina apetala*, (b) *Solanum nigrum*, (c) *Sonchus asper* and (d) *Sonchus oleraceus* on islands of the south coast of Western Australia.

to WA has probably allowed it to colonize more south coast islands than any other weed. Already known from 12 islands by 1950 (Willis 1953). Surprisingly, it was listed as absent on Woody Island by Goodsell et al. (1976), but was listed as present in 1950 (Willis 1953) and recorded as common on Woody Island in the notes with a WA Herbarium specimen from 1998. Prioritized as L (B, C) in the South Coast Region. Although not officially listed as a biocontrol target, a mycoherbicide is in development overseas and several potentially useful agents have already been identified within Australia (Scott & McCarren 2012).

Sparaxis bulbifera – A population of 4–5 plants recorded on Green Island in Oyster Harbour from a WA Herbarium collection. Serious invader of clay wetlands (Hussey et al.

2007). Prioritized as L (B, C, D) in the South Coast Region and L (B, C, D) in the Warren Region.

Spergularia diandra – Recorded once on Saddle Island. Prioritized as L (B, C) in the South Coast Region. Scattered weed of disturbed wetlands (Hussey et al. 2007).

Spergularia marina – One WA Herbarium specimen collected on Woody Island in 2003. The record noted that it was from a population of 2–5 plants in a small oily puddle near the jetty. While previously listed as an alien species, *Spergularia marina* is now considered to be native to WA.

Spergularia rubra – Recorded on seven islands. Although it was listed as present on Woody Island in 1950 (Willis

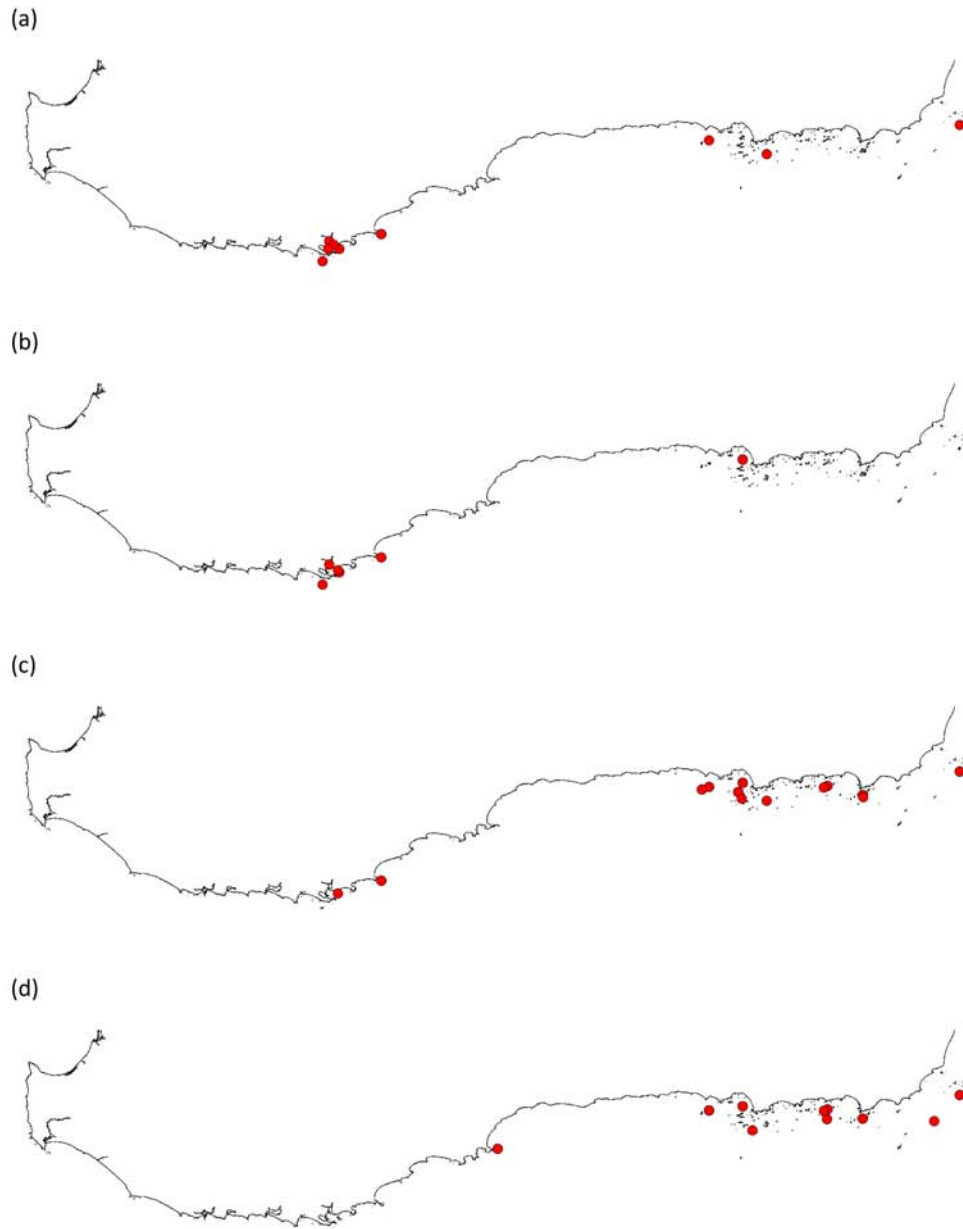


Figure 10. Recorded distribution of (a) *Stellaria media*, (b) *Urtica urens*, (c) *Vulpia bromoides* and (d) *Vulpia fasciculata* on islands of the south coast of Western Australia.

1953) it was said to be absent during a later survey (Goodsell et al. (1976). Prioritized as L (B, C) in the South Coast Region.

Sporobolus africanus – One WA Herbarium collection from Honeymoon Island in Wilson Inlet in 1992. Invades wet swampy areas and outcompetes other vegetation (Western Australian Herbarium 2014). Currently an official biocontrol target. Two potential control agents were identified but not found to be suitable for introduction to Australia (Palmer 2012). Prioritized as L (C) in the Warren Region.

Stellaria media – Recorded on nine islands (Fig. 10a). Prioritized as L (B, C) in the South Coast Region. A WA Herbarium specimen from Bald Island describes it as being in disturbed areas.

Stellaria pallida – One WA Herbarium specimen from Woody Island in 2003. Prioritized as L (B, C) in the South Coast Region. The sample came from a population of 21–50 plants growing in the camp.

Trachyandra divaricata – One record from Michaelmas Island. Prioritized as N (B) in the South Coast Region and M (D, E, F) in the Warren Region. A problematic weed in areas with coastal dunes (Western Australian Herbarium 2014).

Triticum aestivum – Two records from Eclipse Island. Important crop plant that is not usually considered a weed. Possibly from feed used for chickens during operation of the lighthouse.

Trifolium campestre – One record on Woody Island.

Prioritized as N (B) in the South Coast Region. Widespread in a variety of disturbed habitats (Hussey et al. 2007).

Trifolium cernuum – One WA Herbarium specimen collected on Woody Island in 2003 from a population of over 50 plants in a disturbed area near the restaurant. Prioritized as N (B) in the South Coast Region.

Trifolium glomeratum – Recorded on Woody Island and West Doubtful Island. Prioritized as N (B) in the South Coast Region.

Trifolium tomentosum – One record from Woody Island. Prioritized as N (B) in the South Coast Region. Found in waterlogged and moderately saline soils and around granite rocks (Hussey et al. 2007), habitat present on many south coast islands.

Tropaeolum majus – Recorded only on Green Island in Oyster Harbour. Notes with a WA Herbarium specimen from 1986 describe it as abundant on Green Island. Prioritized as FAR in the South Coast Region and N (A, B) in the Warren Region. Garden escape that is only likely to colonize estuarine islands.

Urtica urens – Recorded on six islands (Fig. 10b). A serious amenity weed covered in hairs that produce a painful stinging or burning sensation with light contact. Often associated with high-nutrient soils such as in seabird colonies (Hussey et al. 2007). A 2003 WA Herbarium specimen was taken from a population of 6–20 plants in a disturbed area near the restaurant on Woody Island. This population probably warrants some degree of control to prevent negative impacts on user experience of the island. Prioritized as L (B, C, D) in the South Coast Region and FAR in the Warren Region.

Vellereophyton dealbatum – Recorded on Mondrain, Wickham and Woody islands. Notes with WA Herbarium specimens state that it was locally common near the shoreline on the west end of Woody Island in 1998, and a population of 2–5 plants was recorded from the east end in 2003. One WA Herbarium specimen was collected on Mondrain Island in 2004. Prioritized as L (B, C) in the South Coast Region.

Vulpia bromoides – Recorded on 13 islands (Fig. 10c) with records on eight islands as early as 1950 (Willis 1953). Prioritized as N (B) in the South Coast Region. Common weed of coastal areas along the south coast (Hussey et al. 2007).

Vulpia fasciculata – Recorded on 10 islands (Fig. 10d). Records on nine islands as early as 1950 (Willis 1953). Prioritized as N (B) in the South Coast Region.

Vulpia muralis – One WA Herbarium specimen from Woody Island from a population of 21–50 plants near a path. Prioritized as N (B) in the South Coast Region.

Vulpia myuros – Recorded on Breaksea, Michaelmas, Woody and Observatory islands. One WA Herbarium specimen collected on Observatory Island in 1974 was noted to be of the form *Vulpia myuros* forma *myuros*.

Other specimens from islands could belong to *Vulpia myuros* forma *megalura* as both forms are common throughout the south-west of WA. Groves et al. (2003) assign a rank of 5 to *Vulpia myuros* forma *myuros* and a rank of 4 to *Vulpia myuros* forma *megalura*. Prioritized as N (B) in the South Coast Region.

Zantedeschia aethiopica – Recorded on Breaksea, Eclipse, Green and Shelter islands. Eclipse Island, in particular, has dense monotypic stands of this plant (Abbott 1981). A single dead specimen was observed on Shelter Island in 2014 and its fruit was removed. A declared pest in WA with a control category of C3 and moderately high PIER ranking of 13. Prioritized as L (B, C, D) in the South Coast Region and L (D) in the Warren Region. Although it is not an official biocontrol target, some work has been done toward developing a mycoherbicide to help control this species (Scott 2012). A serious invader of freshwater wetlands that should be removed wherever possible to prevent formation of dense monocultures.

DISCUSSION

The five islands with the highest number of recorded weed species all exhibit attributes we expected would facilitate weed invasion. Woody Island had the largest number of recorded weed species and is the only island in the Recherche Archipelago with public access. It is also a popular recreational location, and it has had extensive botanical surveys. The second, third, and fifth largest counts came from Boxer, Bald and Middle islands, respectively. All three of these islands are large relative to other islands along the south coast. Boxer and Middle islands both have a history of human use and occupation and have been the focus of several biological surveys. Though small, Green Island (ranked fourth) is located in an estuary near a major population centre and has been farmed in the past. The high proportion of weeds exclusively present on estuarine islands is probably partially due to differences in soil and other abiotic factors. Easier colonisation of weeds from mainland source populations probably plays an important role as well. Maintaining the integrity of natural barriers to weed dispersal via improved biosecurity protocols and enforcement will help to minimize new anthropogenic weed introductions to continental islands and decrease future costs associated with active management of established populations.

Due to practical difficulties in accessing many islands in the Recherche Archipelago, as well as an historical focus on native plants in flora surveys, there are probably many populations of weeds present on islands that have not yet been recorded. Some islands in the Recherche Archipelago have never been formally surveyed by biologists and represent a gap in our knowledge of the alien flora of the area. Efforts should be made to assess populations of weeds on islands that have not been surveyed or lack recent data. Priority should be given to islands of high conservation value and islands adjacent to areas known to harbor dangerous high-priority weeds.

The weeds that pose the greatest threat to the integrity of south coast island ecosystems are bridal creeper (*Asparagus asparagoides*), pig's ear (*Cotyledon orbiculata*), sea spurge (*Euphorbia paralias*), cleavers (*Galium aparine*), African boxthorn (*Lycium ferocissimum*), tree mallow (*Malva arborea*), arum lily (*Zantedeschia aethiopica*), and the annual grasses *Avena*, *Bromus*, *Ehrharta*, *Hordeum*, *Lolium* and *Vulpia*. These species have already been observed substantially impacting some islands along the south coast or, in the case of *Asparagus asparagoides* and *Galium aparine*, are known to be serious environmental weeds in similar habitats on mainland Australia. Developing management plans for these species and further clarifying their distributions will be an important step in mitigating the impacts of introduced plants on south coast islands.

The Conservation Commission Island Management Audit recommended that an online database system be developed for recording and extraction of information on biodiversity and management issues on islands (Conservation Commission of Western Australia 2009). The database of introduced plants on the islands of Western Australia that was created as part of this assessment of south coast islands substantially contributes to this goal. Efforts are currently underway to make this database more readily available to conservation professionals in Western Australia.

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