

The status and distribution of naturalised alien plants on the islands of the west 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 for Western Australian islands, we assembled a database of all available records of alien plants on these islands. In the second paper in this series, we report on the distribution of records from all islands located along the west coast of Western Australia. We defined the west coast as the coastline within the boundaries of the South West, Swan and Midwest regions of the Department of Parks and Wildlife. This area of coastline stretches from Black Point (near Cape Leeuwin) in the south, to Waroora Station (near Coral Bay) in the north. From 4049 individual records, a total of 317 alien plant species were recorded on the 206 islands with existing weed records. A disproportionately large number of weed species were recorded on islands near Perth, estuarine islands, and islands with a history of intensive human activity. Some of the species recorded as present on the islands are known to be serious environmental weeds, including mother of millions (*Bryophyllum delagoense*), sea spurge (*Euphorbia paralias*), cleavers (*Galium aparine*), African boxthorn (*Lycium ferocissimum*), tree mallow (*Malva arborea*), ice plant (*Mesembryanthemum crystallinum*), common prickly pear (*Opuntia stricta*), sea spinach (*Tetragonia decumbens*), and golden crownbeard (*Verbesina encelioides*). The development of management plans to address these species and the survey of islands adjacent to known infestations should be conservation priorities for the west coast islands. Improved biosecurity procedures and enforcement could prevent the establishment of new weed populations on islands and reduce the future costs associated with the management of infestations.

Keywords: biogeography, distribution, introduced plants, islands, weeds

INTRODUCTION

The deleterious effects of alien plants on native biodiversity and ecosystem function have been documented worldwide (Vila et al. 2011). Introductions of alien species are 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 island conservation reserves as a significant issue affecting island biodiversity. The same report identified a lack of review of weed occurrence and control methods as a major knowledge gap that impairs the

effective management of natural resources on islands (Conservation Commission of Western Australia 2009).

To help address this knowledge gap, we developed a database of all existing records of weed occurrences on all islands along the coast of Western Australia (WA). This database was used in the production of a previous article examining the status and distribution of alien plants on the islands of the south coast of WA (Lohr & Keighery 2014). This (second) paper presents the data for the islands of the west coast of WA.

The surface area, geological origin (e.g. continental vs. estuarine), proximity to human population centres and history of human usage varies markedly amongst the islands along the west coast of WA. We expected that larger islands, islands in estuaries, islands near a major metropolitan centre, and islands with long histories of visitation and use by humans would have higher species richness of recorded weeds.

Islands along the west coast of WA range in area from Dirk Hartog Island (about 63,000 ha) to small, unnamed islets and stacks, and includes rocks that can be intermittently flooded by storm surges. Most of the islands included in this survey were continental islands. However, 23 of the islands with weed records

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occurred within estuaries or at river mouths. Sixteen of these estuarine islands were located in the Peel–Harvey Estuary, six were at the mouth of the Gascoyne River, and one (Thomas Island) was in the Hardy Inlet near the mouth of the Blackwood River.

The degree and duration of human activity and the extent of infrastructure emplaced on the islands in this study was highly variable. Islands and island groups addressed below are treated in an order that is roughly south to north.

On Hamelin Island (north of Cape Leeuwin) a lighthouse was operated from 1937 until 1967 (Cunning et al. 1995). Several islands in the Peel–Harvey Estuary (Mandurah) have been grazed and partially cleared. A flour mill operated on Cooleenup Island from about 1830 to 1834. A road crossed the sandbars at the delta river mouths, allowing wagons to bring grain for milling. This movement of grain may have acted as a source of alien plants that are common as crop contaminants. A small number of houses are present on Cooleenup, Yunderup and Ballee islands (Richards 1978; Rich 1993).

Penguin Island is the most heavily used island in the Shoalwater Bay group, near Rockingham. Seaforth McKenzie lived on Penguin Island from 1918 to 1929. The island was later leased as a recreation reserve (1969–1989) and a caretaker's residence, ablution blocks, a shop and holiday units were constructed. Many exotic species, including Norfolk Island pine (*Araucaria heterophylla*), *Tamarix* and figs (*Ficus* spp.), were planted during this period. Penguin Island is now a conservation reserve and receives 50,000–70,000 visitors per year (Conservation and Land Management 1990).

Garden Island (near Rockingham) was the site of the first European settlement (Sulphur Town) in Western Australia. The settlement was active from 1829 to 1831 but the island remained intermittently inhabited until 1920. In the 1930s, a holiday settlement was established at Careening Bay, holiday shacks were built along the northern coast and the island received about 300–400 visitors per day in summer. Garden Island has been used as a naval base since 1937. Gun positions, submarine pens, roads and barracks were established on the island. Amenity plantings of many exotic species were made at the naval base and at the remaining shacks on the island. The naval base was upgraded between 1971 and 1978 (HMAS Stirling; Department of Defence 1980) when all of the shacks were removed and weed control measures were initiated.

Carnac Island (just north of Garden Island) was first used to hold Aboriginal prisoners in 1832. In about 1836 a whaling station was established on the island, and in 1884 it was designated a quarantine station and at least three buildings were constructed. By 1914, these buildings were in disrepair and day visits became the main human activity on the island (Conservation Commission of Western Australia 2003).

Rottneest Island was first surveyed in 1830. Thompson farmed about 100 acres on the island from 1831 to 1838. From 1838 to 1849, Rottneest Island was used as a penal settlement for Aboriginal prisoners. A central lighthouse

was constructed in 1896 and the Rottneest Island Prison was reinstated until 1903. During the First World War, the island was used to hold German prisoners of war. In 1917, the island was designated as an A-Class Reserve for Recreation. During the Second World War, the Kingston Barracks, gun stations, railroads and new sealed roads were constructed. In 1970, new settlements at Geordie Bay and Longreach Bay were established for tourists (Frewer et al. 1985). During this period, there were indiscriminate ornamental plantings in the settlement. Attempts were also made to replant the native forests of *Callitris preissii* (Rottneest Island pine) and *Melaleuca lanceolata* (Rottneest Island teatree) that originally covered much of the island. Rottneest Island now receives over 500,000 visitors per year (Rottneest Island Authority 2014).

Several islands that are now nature reserves along the Turquoise Coast (from Lancelin to Dongara) have a substantial history of human use. Wedge Island is intermittently accessible from the mainland via a shallow sand bar, as can be seen by the 4WD vehicle tracks along the central ridge of the island. Lancelin Island has numerous informal pedestrian trails across the island. Target Rock was used as a naval gunnery target. Escape Island has an unmanned lighthouse that was established in 1930.

A variety of disturbances and structures have been documented on the islands of the Houtman Abrolhos Archipelago, near Geraldton. A detailed list of disturbances, by island, is available in Harvey et al. (2001). Thirty-eight of the 119 islands have been used for purposes such as guano mining, housing, camps and airstrips.

The islands in, and adjacent to, Shark Bay include Dirk Hartog, Faure, Slope, Bernier and Dorre islands, as well as many other smaller islands. Dirk Hartog Island was leased from 1868 for pearling and limited grazing. From 1880, the whole island was a pastoral lease (Graham-Taylor 2012). In 2009, the island was converted to a national park and de-stocked. Faure Island was leased by pearlmen from 1873, and goats were probably released during this tenure. A pastoral lease was granted to Moor and Company in the late 1880s (Graham-Taylor 2012). Faure Island was purchased by Australian Wildlife Conservancy in 1999 and de-stocked. Slope Island (which is connected to the mainland by a causeway) is now largely occupied by a salt loading area for the Shark Bay Salt production facility. Bernier and Dorre islands were used as Aboriginal Lock Hospitals (Jebb 1984) for leprosy patients from 1908–1918. Goats were introduced to both islands during this period, but have since been eradicated. Most of the other 34 islands of the Shark Bay area are small and have not been continuously used by humans but 15 of these islands have been mined for guano (Keighery et al. 2006).

Babbage Island (at the mouth of the Gascoyne River at Carnarvon) was probably grazed from about 1880, and by 1898 a lighthouse and jetty were built on the island. This island also has a history of industrial usage (Carnarvon Heritage 2015) with associated roads and infrastructure. Industries have included meatworks (1920), a whaling station (1950), and currently a seafood processing factory.

METHODS

We gathered data on the distribution and abundance of weeds on west coast islands from a variety of sources and entered and processed it using Microsoft Access. We defined west coast islands as all islands within the boundaries of Parks and Wildlife's South West, Swan and Midwest regions. This area covers all the islands in Western Australian waters from Black Point along the south coast to the coastline near Warroora Station in the north (Fig. 1). We assembled a list of 294 named and gazetted west coast islands and used it to guide the search for records.

Sources included a direct extract of WA Herbarium records, published journal articles, government and contractor reports, personal accounts from experts

and unpublished surveys. We excluded records that did not contain taxonomic identification to the rank of species (i.e. specimens only identified to genus). We cross-referenced weeds present on the islands against existing weed lists and prioritisation inventories, as listed below, to help clarify the current or potential negative environmental impacts of the weeds.

1. The Department of Parks and Wildlife Regional Weed Prioritization for South West, Swan and Midwest regions (DPAW 2015). Regional Weed Prioritization Codes and Recommended Actions are provided for weeds in these lists (Table 1).
2. The International Union for the Conservation of Nature (Lowe et al. 2000), 100 of the World's Worst Invasive Alien Species List.

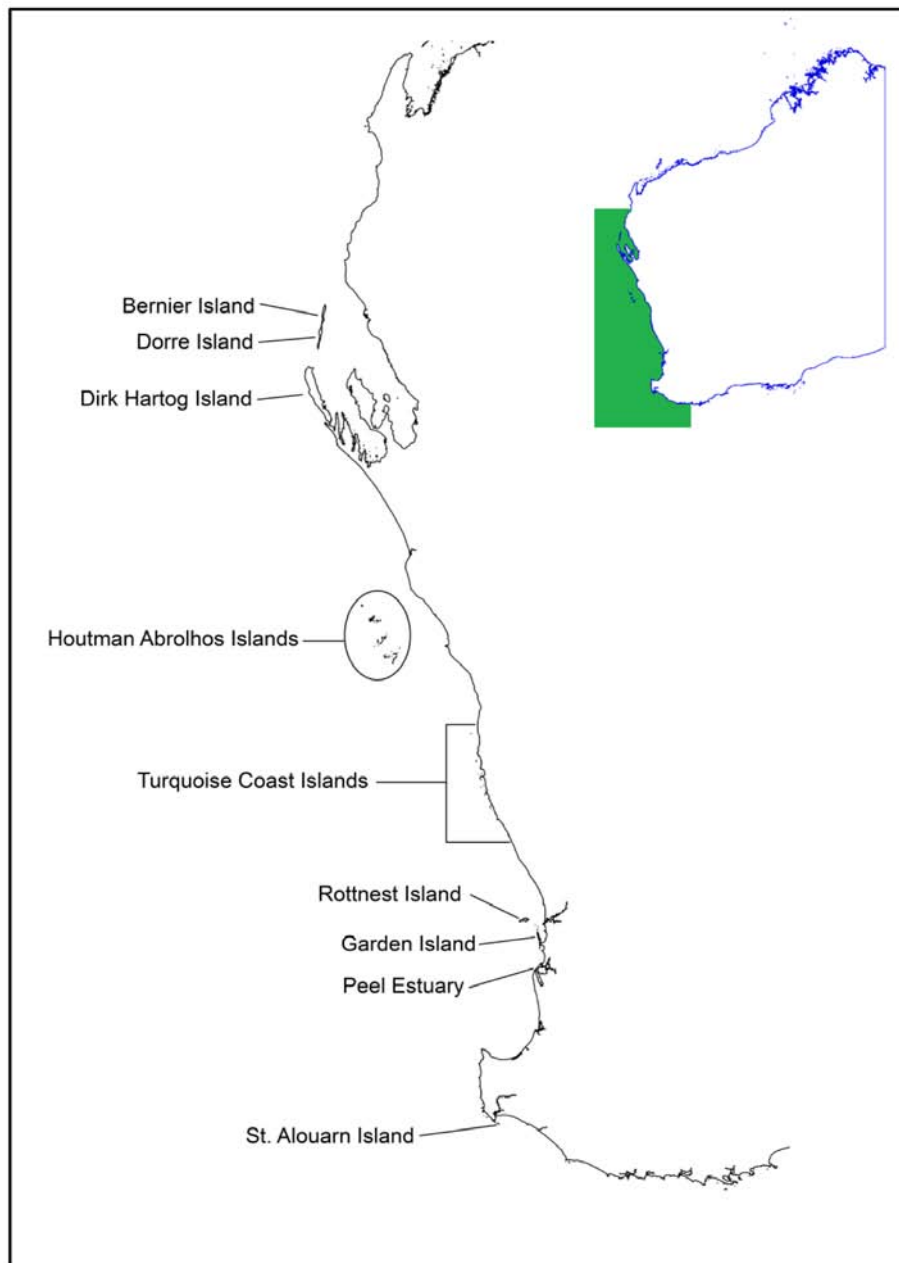


Figure 1. Our study area included all islands within the South West, Swan and Midwest regions of the Department of Parks and Wildlife. This area stretched from Black Point on the south coast to the coastline near Warroora Station and is depicted in green.

3. The Department of Agriculture and Food (2015) Western Australian Organism List (WAOL). This list categorises the status of organisms (including weeds) under the Western Australian Biosecurity and Agriculture Management Act.
4. The Australian Government Department of the Environment (2015) weed lists. These include the Weeds of National Significance (WoNS) for weeds identified due to their invasiveness, potential for spread and environmental, social and economic impacts; the National Environmental Alert List (NEAL) for environmental weeds that are in the early stages of establishment and have the potential to become a significant threat to biodiversity if they are not managed; and Target Species for Biological Control.
5. The Pacific Island Ecosystems at Risk (2013) list of plant species present in Australia (Indian Ocean offshore islands) that are plant threats to Pacific Ecosystems.

Some of the weed records found in the data searches were associated with specific coordinates. However, these coordinates were often so inaccurate that they did not fall within the boundaries of the island named in the record. For this reason, we used island centroid coordinates to depict the known ranges of weeds that

had records on five or more islands within any given region. In instances where weeds occurred in fewer than five islands in any given region, names of specific islands where the plant was recorded were included as part of the annotated list. For each species, we provide data on distribution, plant listings, abundance and the potential ecological threats posed by the plant, when available. Range maps for all weeds were developed using Quantum GIS 1.8.0.

We excluded plant species that were listed in the source material as 'cultivated and with no naturalised individuals' from the weed inventory for each island (in accord with the accepted definition of weeds being only plants that are 'naturalised', i.e. those that persist without human intervention). Thus, species recorded as 'persisting from old plantings' or 'naturalising from cultivated plants' were included in the inventory for each island. Such plants are often called 'escaped garden plants'. They are defined as plants that are currently (or were historically) used in gardens and have now formed self-sustaining populations in natural or other areas (Blood 2006). We did not include weeds in the calculations if their most recent record indicated that the species was extirpated or intentionally eradicated from the island or when they are reported in older literature but were not found in more recent surveys. Weed records that have subsequently been considered

Table 1

Key to the Department of Parks and Wildlife (2015) Regional Weed Prioritization: weed ranking codes and recommended management actions.

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 ability to be managed)
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)

as misidentifications or doubtful in any other way were also not included. Records of species native to Western Australia but outside of their native range were included in the inventory. Records of species formerly considered to be introduced but now considered to be native were excluded. However, records excluded for the reasons above from the total inventory for each island were maintained as part of the database and are referenced in the annotated list.

RESULTS

We collected a total of 4049 individual records of weeds on islands (Table 2). A total of 317 species of introduced plants were recorded as naturalised or persisting on islands along the west coast of WA. Of the 294 named and gazetted islands we searched for, 225 were in the Midwest Region, 62 were in the Swan Region, and seven were in the South West Region. A total of 206 islands had records of introduced plants being present.

Islands with the most weed species recorded were Garden Island (162), Rottnest Island (101), Cooleenup Island (99), Carnac Island (78) and Penguin Island (64; Table 2). Flinders Island (a low-lying island subject to wave action, south of Augusta) was the only island in the region that was specifically reported to be free of weeds; however, there was no terrestrial flora detected on Flinders Island when it was surveyed from a boat in 2009 (A Webb, pers. comm.). *Mesembryanthemum crystallinum* and *Sonchus oleraceus* (found on 142 and 130 islands respectively) were the most commonly recorded weed species. The next most widespread weed species were recorded on fewer than 70 islands.

Annotated List

In the annotated list of weeds below, the region names refer to Parks and Wildlife management regions. The codes used are from the Regional Weed Prioritization and Recommended Management Actions (Table 1). Island distributions of species recorded as present on more than four islands in a given region are depicted in Fig. 2 through 9.

Acacia podalyriifolia (Queensland silver wattle) – Recorded on Cooleenup Island in the Swan Region, where it is prioritised as M (D, E, F). In 1990 it was noted that this plant was slowly increasing in abundance near houses on the eastern end of the island (Hussey et al. 1992). This tree is a native of eastern Australia that has escaped from gardens in WA.

Acetosa vesicaria (rosy dock) – Recorded on Babbage and Whitlock islands near Carnarvon in the Midwest Region, where it is prioritised as N (B). This is a common weed in arid parts of WA.

Acetosella vulgaris (sheep's sorrel) – Recorded on the Peel Inlet islands of Cooleenup and Yunderup in the Swan Region, where it is prioritised as N (A, B). In 1990, it was noted to be occasional in disturbed areas of Cooleenup Island (Hussey et al. 2007). It is a common weed in

disturbed areas in temperate parts of WA (Western Australian Herbarium 1998–).

Aerva javanica (kapok bush) – Recorded on Babbage, Whitmore and Whitlock islands near Carnarvon in the Midwest Region, where it is prioritised as VH (H, I). Widespread and common invasive in the Kimberley and Pilbara regions but not common in the Midwest Region. Populations on these islands should be managed along with potential upstream sources along the Gascoyne River.

Agave americana (century plant) – Recorded on Garden and Rottnest Islands in the Swan Region and on Rat Island in the Houtman Abrolhos Islands in the Midwest Region. On Garden Island, notes with a WA Herbarium specimen state that it was occasional at an old cottage site on the south-east portion of the island in 1996. Records associated with WA Herbarium specimens collected in 1986 refer to several patches of this species along roads on Rottnest Island. On Rat Island, 21–50 plants were recorded near a fisherman's shack in 2003. This popular ornamental has escaped cultivation and poses hazards to both people and biodiversity due to large sharp spines, a tendency to form dense monospecific stands, and sap that can cause contact dermatitis. Prioritised as L (B, C, D) in the Swan Region and N (A, B) in the Midwest Region.

Agave attenuata (fox tail agave) – Recorded as naturalised on Rottnest Island (Rippey et al. 2003) in the Swan Region. Still persists in roadside areas (Cassyanna Thomas, pers. comm.). Common in landscaping around Perth but not currently recognised by the Western Australian Herbarium as naturalised in WA.

Agave sisalana (sisal) – Recorded only on Rottnest Island in the Swan Region, where it is prioritised as N (A, B). Recorded as early as the 1940s and eradicated in 1987 due to the danger posed to visitors by its sharp spines (Rippey et al. 2003). At the time of its eradication, *A. sisalana* had established in dense impenetrable thickets.

Agonis flexuosa (peppermint tree) – Native to WA but introduced outside of its range on Garden and Rottnest islands in the Swan Region as an ornamental tree. Individuals on Rottnest Island are identified as *A. flexuosa* var. *flexuosa*. Prioritised as M (D, E, F) in the Swan Region. Keighery (1998) mentioned that it was weedy on Garden Island and recommended its removal.

Aira caryophyllea (silvery hairgrass) – Recorded on Escape Island in the Midwest Region, and Garden Island and five Peel Inlet islands in the Swan Region. Prioritised as N (B) in the Swan Region and L (D, E) in the Midwest Region. Common throughout south-west WA.

Aira cupaniana (silvery hairgrass) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as N (B). A record from Garden Island lists it as a common weed of woodlands (Keighery 1998).

Allium ampeloprasum (broadleaf wild leek) – Recorded on Garden and Rottnest Islands in the Swan Region, where it is prioritised as N (A, B). First recorded on Rottnest Island in 2013. On Garden Island it is noted to

Table 2

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

Island name	No. species recorded	No. weed records	Type of island
Akerstrom (= West Mangrove)	5	6	Continental
Alcatraz (= Lumley)	8	12	Continental
Alexander	15	32	Continental
Arthur	1	3	Continental
Babbage	30	36	Estuarine
Ballee Island	50	50	Estuarine
Barge Rock	7	13	Continental
Basile	25	38	Continental
Baudin	10	12	Continental
Beacon (Abrolhos)	14	29	Continental
Beagle (East)	7	12	Continental
Beagle (North-west)	2	3	Continental
Bernier	14	45	Continental
Bird (Shoalwater Bay)	22	65	Continental
Boodalan	13	17	Estuarine
Boullanger	16	22	Continental
Boullanger (North)	23	31	Continental
Buller	3	5	Continental
Burnett (= Fin)	11	19	Continental
Burton	12	17	Continental
Bushby	9	9	Continental
Bynoe	10	17	Continental
Campbell (Abrolhos)	10	17	Continental
Carnac	78	312	Continental
Central	5	6	Continental
Cervantes (Middle)	2	2	Continental
Cervantes (North)	18	29	Continental
Cervantes (South)	12	22	Continental
Channel	51	54	Estuarine
Charlie	1	1	Continental
Charlie (islet 2 km south-west)	2	2	Continental
Coronation (Abrolhos)	4	4	Continental
Crake	3	3	Continental
Creery (= Long)	35	44	Estuarine
Cooleenup (Cooleenup)	99	188	Estuarine
Dakin	2	3	Continental
Davis	2	5	Continental
Depuch Island North (Shark Bay)	5	5	Continental
Depuch Island South (Shark Bay)	5	5	Continental
Dicks	4	4	Continental
Dirk Hartog	50	116	Continental
Dorre	14	43	Continental
Double (Shark Bay)	2	2	Continental
Drummond Rock	6	7	Continental
Dry	1	1	Continental
Dyer	6	7	Continental
Eagle (= Eagle Bluff)	3	3	Continental
Eagle (islet to South West)	1	1	Continental
Eagle Pt Rock = East Wallabi (islet near jetty)	3	6	Continental
East Mangrove = Marinula (islet to north-east)	2	3	Continental
East Wallabi	25	33	Continental

Island name	No. species recorded	No. weed records	Type of island
Eastern	7	11	Continental
Edwards	1	2	Continental
Egg (= Tetradon)	2	3	Continental
Eight	7	15	Continental
Escape	28	46	Continental
Essex Rocks (Middle)	3	3	Continental
Essex Rocks (North)	5	5	Continental
Essex Rocks (South)	1	1	Continental
Faure	18	32	Continental
Favorite	12	13	Continental
First Sister	3	4	Continental
First Sister, islet 1 to north	1	1	Continental
Fisherman (North)	3	3	Continental
Fisherman (South)	1	1	Continental
Foale	1	1	Continental
Freycinet	10	11	Continental
Friday	1	1	Continental
Garden	162	379	Continental
Geordie Bay (stack in Bay)	4	4	Continental
Gilbert	5	10	Continental
Goongoolup	22	22	Estuarine
Green (Rottnest)	9	11	Continental
Green Islets (North)	5	5	Continental
Green Islets (South)	5	6	Continental
Gull Rock (Shoalwater Bay)	1	1	Continental
Gun	13	21	Continental
Hall	1	1	Continental
Hamelin	15	30	Continental
Hummock	1	1	Continental
Jackson	6	6	Continental
Jeegarnyeejip	47	48	Estuarine
Jennala	35	35	Estuarine
Joe Smith	1	1	Continental
Jon Jim	1	2	Continental
Kangaroo	5	5	Continental
Keru	5	9	Continental
Lagoon	2	4	Continental
Lancelin	32	71	Continental
Landscape = Helms (islet 3 to south-west)	3	3	Continental
Lefebre	1	1	Continental
Leo	9	17	Continental
Lipfert	7	8	Continental
Little Jackson	3	3	Continental
Little North	4	7	Continental
Little Pigeon	18	42	Continental
Little Rat	25	31	Continental
Little Roma	1	1	Continental
Little Yunderup	28	28	Estuarine
Long (Abrolhos)	10	14	Continental
Long (Abrolhos)(islet to north) = Short Island	1	1	Continental
Marinula (= Middle Mangrove)	2	3	Continental
Mary Anne (Shark Bay)	4	5	Continental
Meade	5	5	Continental
Meeyip	54	56	Estuarine

Table 2 (cont.)

Island name	No. species recorded	No. weed records	Type of island
Middle (Abrolhos)	8	9	Continental
Milligan	5	6	Continental
Morley	10	18	Continental
Murray	4	5	Continental
Naturalist = (First Sister, islet 2 to north)	1	1	Continental
Newman	6	9	Continental
Nitraria	3	3	Continental
Nitraria = Helms (islet 4 to south-west)	1	1	Continental
Nook	3	3	Continental
North (Abrolhos)	26	48	Continental
North Guano	3	3	Continental
North Kangaroo	3	3	Continental
North-West Woorallgarook	12	12	Estuarine
One	3	3	Continental
Orton Rock	6	6	Continental
Osprey	1	1	Continental
Oystercatcher (= Middle Seagull)	6	7	Continental
Parrakeet	1	1	Continental
Pelican (Abrolhos)	3	3	Continental
Pelican (Shark Bay)	1	1	Continental
Pelsaert	22	47	Continental
Penguin	64	182	Continental
Pigeon	29	58	Continental
Plover (= South Seagull)	3	6	Continental
Post Office	8	11	Continental
Rat	45	94	Continental
Roma	10	12	Continental
Rotondella	3	3	Continental
Rottnest	101	317	Continental
Saint Alouarn	11	16	Continental
Salutation	15	21	Continental
Salutation (islet to South)	1	1	Continental
Sand Knoll Ledge (North) = North Outer Rocks	2	2	Continental
Sand Knoll Ledge (South) = South Outer Rocks	1	1	Continental
Sandland	8	10	Continental
Sandy (= Graveyard)	1	1	Continental
Sandy (Abrolhos)	3	3	Continental
Saville-Kent	1	1	Continental
Seagull	8	15	Continental
Seal (Abrolhos)	3	4	Continental
Seal (Cape Leeuwin)	21	31	Continental
Seal (Shoalwater Bay)	24	65	Continental
Second Sister	2	3	Continental
Serventy	13	22	Continental
Seven	2	4	Continental
Seven, islet to west	1	1	Continental
Shag Rock (Abrolhos)	1	2	Continental
Shag Rock (Shoalwater Bay)	18	53	Continental
Ship Rock	1	1	Continental
Sid Liddon (= Six)	4	8	Continental
Slope	1	1	Continental
Slope (island to North)	4	4	Continental

Island name	No. species recorded	No. weed records	Type of island
Snag	8	12	Continental
South Channel	1	1	Estuarine
South Guano	3	4	Continental
South-West Woorallgarook	8	8	Estuarine
Square	6	7	Continental
Stick	4	5	Continental
Sunday (Shark Bay)	5	5	Continental
Suomi	5	9	Continental
Sweet	2	7	Continental
Tapani	1	1	Continental
Target Rock	1	1	Continental
Tattler	6	9	Continental
Tectus (= First Sister, islet 3 to north)	1	1	Continental
Tern	7	10	Continental
The Coral Patches	1	1	Continental
Third Islet	3	3	Continental
Third Sister	2	2	Continental
Thomas (Blackwood Estuary)	1	1	Estuarine
Three	5	11	Continental
Three Bays	15	22	Continental
Traitors	1	1	Continental
Traitors (Islet 1)	1	1	Continental
Traitors (Islet 2)	1	1	Continental
Traitors (Islet 3)	1	1	Continental
Traitors (Islet 4)	1	1	Continental
Traitors (Islet 5)	1	1	Continental
Traitors (Islet 6)	1	1	Continental
Trigg	2	2	Continental
Turnstone (= No Name No.6)	8	17	Continental
Two	2	3	Continental
Uncle Margie (= Mangrove)	11	17	Continental
Wann	1	2	Continental
Water Supply	1	1	Estuarine
Webb	5	7	Continental
Wedge	16	26	Continental
West Wallabi	22	28	Continental
West Yunderup	11	11	Estuarine
White (Abrolhos)	9	15	Continental
White (Shark Bay)	7	8	Continental
White Bank	1	2	Continental
Whitlock (near Jurian Bay)	20	29	Continental
Whitlock (Carnarvon)	26	26	Estuarine
Whitmore	11	11	Estuarine
Whitmore (Unnamed island to south-east)	7	7	Estuarine
Whitmore (Unnamed island to south-west)	7	7	Estuarine
Whittell	2	2	Continental
Wooded	11	16	Continental
Worallgarook	24	25	Estuarine
Yunderup	44	46	Estuarine

be an escaped ornamental that is scattered along tracks (Keighery 1998).

Amaranthus albus (tumbleweed) – Recorded on Garden Island in the Swan Region from a single WA Herbarium specimen collected in 1996. Prioritised as N (A, B) in the region.

Amaryllis belladonna (naked lady lily) – Recorded on Cooleenup Island in the Swan Region, where it is prioritised as N (A, B). A garden escape that was noted to be increasing slowly near houses on the island in 1990 (Hussey et al. 1992).

Ammophila arenaria subsp. *arenaria* (marram grass) – One WA Herbarium specimen was collected from Garden Island in the Swan Region in 1996. At the time, this grass was noted to be rare on the island, with several clumps recorded on the dunes. This plant modifies coastal dune landforms and ecosystems by increasing dune stabilization and outcompeting native dune vegetation (Western Australian Herbarium 1998–). If possible, removal of this population would be advisable to prevent degradation of dune ecosystems. Prioritised as L (B, C, D) in the Swan Region.

Anredera cordifolia (Madeira vine) – Recorded only on Garden Island in the Swan Region and noted as present around the old Stirling Base and at Beacon Head. Listed as a Weed of National Significance (DoE 2015). *A. cordifolia* is capable of invading intact bushland, can smother mature vegetation, and is believed to be toxic to livestock (Western Australian Herbarium 1998–). It has officially been targeted for biocontrol. The beetle *Plectonycha correntina* is thought to contribute to the control of this weed through defoliation (Palmer & Senarante 2012), and was approved for release in Australia in 2011, but has not been released in WA yet. This plant is prioritised as L (B, C, D) in the Swan Region and is listed as a permitted species by DAFWA. We recommend that these statuses be changed to reflect the potentially severe environmental and agricultural damage that could be caused by *A. cordifolia* in the wetter coastal areas and waterways of south-west WA, and to prevent further spread of this weed by ornamental plantings. Attempts should be made to eradicate this weed in WA while populations are still relatively small and isolated. Releases of the biocontrol insect should be considered.

Araucaria heterophylla (Norfolk Island pine) – Noted as being present in plantings on Garden Island but apparently not naturalised (Keighery 1998). Also present as plantings on Rottnest.

Arctotheca calendula (cape weed) – Recorded on 10 islands in the Swan Region, four in the Midwest Region and one in the South West Region (Fig. 2a). This is a common weed of disturbed temperate areas but it can compete with native vegetation if it becomes established (Western Australian Herbarium 1998–). Prioritised as L (D, E) in the Swan Region, L (D) in the Midwest Region, and N (B) in the Southwest Region.

Arctotheca populifolia (dune arctotheca) – Recorded on five islands in the Swan Region, three in the Midwest Region and one in the South West Region (Fig. 2b). It is now presumed extinct on Rottnest Island in the Swan Region (Rippey et al. 2003). It is an invader of coastal dunes that is capable of spreading by wind and ocean currents. Prioritised as L (B, C) in the Swan Region, N (A, B) in the Midwest Region, and N (B) in the Southwest Region. Higher priority for islands with dunes.

Arenaria leptoclados (lesser thyme-leaved sandwort) – Recorded on Garden and Rottnest Islands in the Swan Region. Prioritised as FAR in the Swan and South West regions. Hussey et al. (2007) regard it as a common weed on sandy soils between Bunbury and Perth but only three specimens are currently present in the WA Herbarium. Of these three specimens, two are from Garden and Rottnest islands. Both island specimens are from inside fences designed to exclude native grazers (quokkas on Rottnest Island and tammars on Garden Island). Grazing by these species may suppress or eliminate this weed outside the enclosures.

Argemone mexicana (Mexican prickly poppy) – Recorded on Garden Island in the Swan Region, based on a WA Herbarium specimen collected north of the settlement in 1978. Not mentioned in a later annotated weed list from Garden Island (Keighery 1998). A prohibited species on the Western Australian Organism List with a management category of C1 (exclusion). High PIER rating of 18 for Australia. Presumably eradicated state-wide.

Argemone ochroleuca (Mexican prickly poppy) – Recorded on Babbage and Whitlock Islands near Carnarvon in the Midwest Region and on Garden Island in the Swan Region. Known on Garden Island from two WA Herbarium specimens collected on road verges in 1996 and 2002. A declared species on the Western Australian Organism List with a management category of C3. Prioritised as L (D) in the Midwest Region and N (A, B) in the Swan Region. Primarily an agricultural weed but as a declared species it should be controlled on islands where it occurs.

Argyranthemum frutescens (marguerite) – Recorded on Rottnest Island in the Swan Region, where it is prioritised as N (A, B). A garden escape that had begun to naturalise on cliffs near Bathurst Point. Keighery (1986) recommended that it be removed and it was subsequently eradicated.

Arundo donax (giant reed) – Recorded on Garden Island in the Swan Region, where it is prioritised as N (A, B). Listed by the IUCN as one of the world's 100 worst invasive species. An aggressive invader of wetlands, where it can form dense, monospecific stands. Keighery (1998) noted that this species is considered to be extirpated on the island and was referred to inaccurately as 'bamboo' in previous literature.

Asparagus asparagoides (bridal creeper) – Recorded on Garden Island and Jeegarnyeejip Island (Peel-Harvey) in the Swan Region, where it is prioritised as L (D).

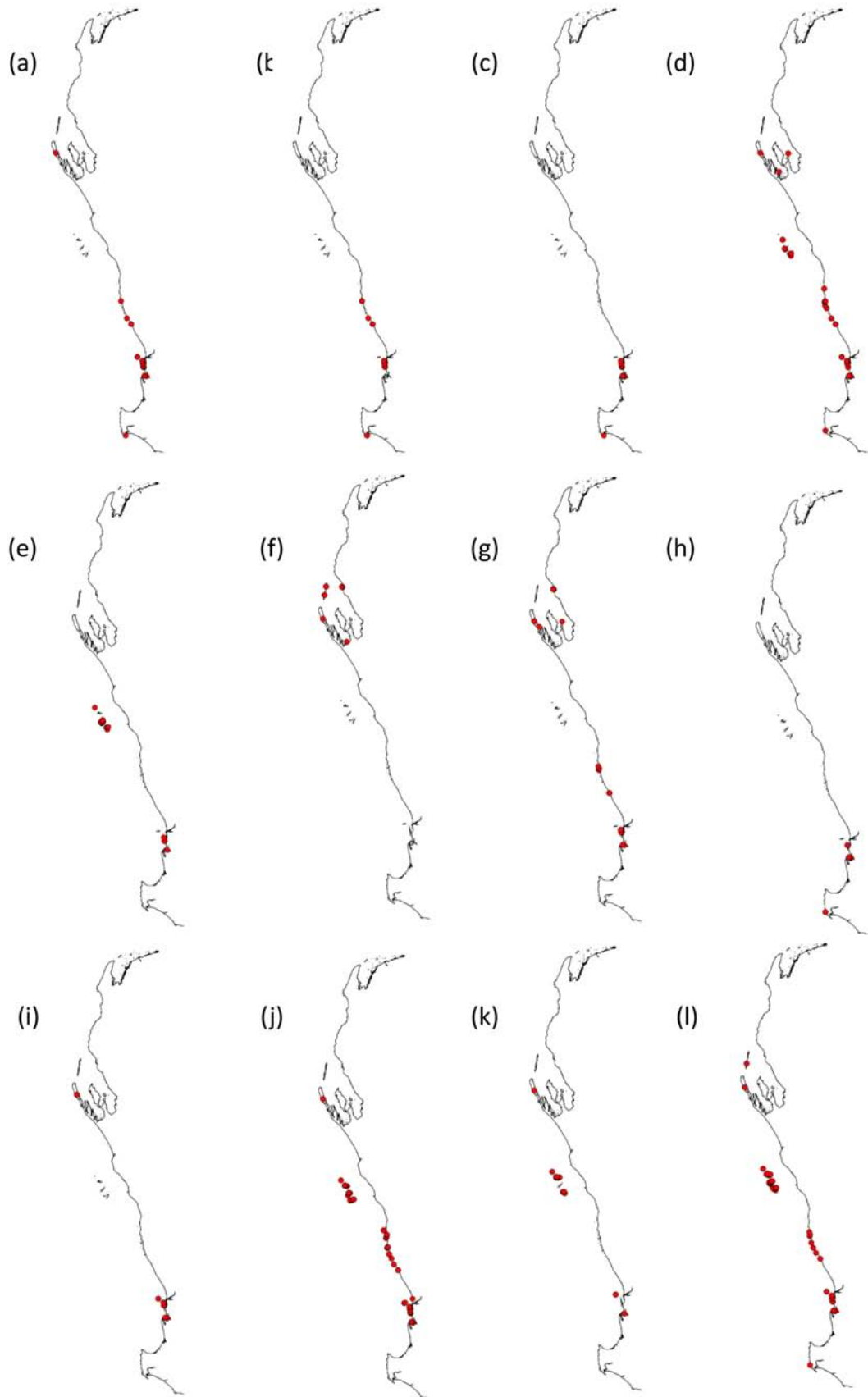


Figure 2. Distribution of (a) *Arctotheca calendula*, (b) *Arctotheca populifolia*, (c) *Atriplex prostrata*, (d) *Avena barbata*, (e) *Avena fatua*, (f) *Bidens bipinnata*, (g) *Brassica tournefortii*, (h) *Briza maxima*, (i) *Briza minor*, (j) *Bromus diandrus*, (k) *Bromus hordeaceus* and (l) *Cakile maritima* on islands of the west coast of Western Australia.

Bridal creeper is listed as a WONS and as a declared pest organism in WA. It is officially listed as a biocontrol target. This low ranking is 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. On Garden Island, this species appears to be heavily grazed by tammar wallabies and is only prevalent inside a fenced area that excludes these animals.

Asphodelus fistulosus (onion weed) – Recorded on Boullanger and Dirk Hartog islands in the Midwest Region and Garden and Rottnest islands in the Swan Region. Common weed in disturbed areas across WA, particularly on the coast. Keighery (1993) stated that this species occurs on 16 islands on the west coast. Recorded on Rottnest Island and Garden Island as early as 1950 and 1960, respectively. It has invaded heathlands on Rottnest following serious disturbance and has the potential to become a major problem there because it is not grazed by quokkas (Keighery 1993). Prioritised as L (D) in the Midwest and Swan regions.

Atriplex prostrata (hastate orache) – Recorded on 20 islands in the Swan Region and Seal Island (south of Augusta) in the South West Region (Fig. 2c). Common weed of sandy saline coastal areas in south-west WA. Prioritised as L (B, C, D) in the Swan Region and N (B) in the South West Region.

Avellinia michelii (avellinia) – Recorded on North Cervantes Island in the Midwest region and Rottnest Island in the Swan Region. Notes with a WA Herbarium specimen collected on Rottnest Island in 1995 state that this species was very common. A widespread weed in south-west WA (Hussey et al. 2007). Prioritised as L (D, E) in the Midwest Region and L (C) in the Swan Region.

Avena barbata (bearded oat) – Recorded on 14 islands in the Swan Region, 22 islands in the Midwest Region, and one island in the South West Region (Fig. 2d). Common throughout all of south-west WA. An allelopathic competitor with native grasses but possibly requires disturbance to establish (Western Australian Herbarium 1998–). Prioritised as L (D, E) in the Swan Region and L (D) in the Midwest and South West regions.

Avena fatua (wild oat) – Recorded on three islands in the Swan Region and 13 islands in the Midwest Region (Fig. 2e). Similar to *A. barbata* but more commonly a weed of crops (Hussey et al. 2007). Prioritised as L (D, E) in the Swan and Midwest regions.

Avena ludoviciana – One specimen collected on Freycinet Island in the Midwest Region in 1989, which is the only specimen from WA currently housed at the WA Herbarium. Information associated with this specimen noted that it was mostly within a single patch with about 60% cover on the east side of the island. Prioritised as an alert species for the Midwest Region. Further investigation of this population is warranted to determine its status and whether control is necessary.

Avena sativa (common oat) – Recorded on Basile Island (Houtman Abrolhos) in the Midwest Region in 1987 and Hamelin Island in the South West Region in 1959. Typically a cereal crop that is occasionally found growing on roadsides as a result of spilled grain. Prioritised as N (A, B) in the Midwest Region.

Avena sterilis (sterile oat) – Recorded on Charlie, Freycinet and Sunday islands in the Midwest Region. It is not clear whether the record for Freycinet Island refers to the population of *A. ludoviciana* also recorded there as both species are listed as subspecific groups within *A. sterilis* by some authorities. Prioritised as N (A, B) in the Midwest Region.

Babiana angustifolia (baboon flower) – Recorded on Cooleenup Island (Peel–Harvey Estuary) in the Swan Region. One record from 1990 (originally misidentified as *B. stricta*) noted that it was locally dominant in two dense clumps near houses. A common garden escape that is spreading in the south-west of WA (Hussey et al. 2007). Prioritised as L (D, E) in the Swan Region.

Bartsia trixago (bellardia) – Recorded on Carnac, Garden and Penguin islands in the Swan Region, sometimes by the synonym *Bellardia trixago*. Widespread weed in south-west WA that can parasitise native vegetation. Prioritised as L (B, C) in the Swan Region.

Bidens bipinnata (Spanish needles) – Recorded on nine islands in the Midwest Region, where it is prioritised as M (D, E, F) (Fig. 2f). Barbed seeds attach to fur and clothing and can be dispersed long distances by humans and wildlife. Widespread in northern WA.

Brachypodium distachyon (false brome) – Recorded on Garden, Penguin and Rottnest islands in the Swan Region. Recorded on Penguin Island as early as 1959. Capable of surviving in a variety of conditions and displacing native vegetation (Western Australian Herbarium 1998–). Prioritised as M (D, E, F) in the Swan Region.

Brassica rapa (wild turnip) – Recorded on Penguin Island and Shag Rock in the Swan Region and Beacon Island in the Midwest Region. On Shag Rock it is known from a single WA Herbarium specimen. The specimen label indicates that only a single plant was present (and was presumably collected) so the current status of *B. rapa* on this island is not clear. Prioritised as L (D) in the Midwest Region.

Brassica tournefortii (wild turnip) – Recorded on 12 islands in the Midwest Region and four islands in the Swan Region (Fig. 2g). Trudgen and Keighery (1995) refer to it as a 'widespread and serious weed' on Dirk Hartog Island. Notes with a WA Herbarium specimen collected from Lancelin Island in 1998 described it as rare at this location. The most recent record from Garden Island (a WA Herbarium specimen collected in 2002) is from inside a fenced area that excludes tammar wallabies. A common weed across WA. Prioritised as L (D) in the Midwest and Swan regions.

Briza maxima (blowfly grass) – Recorded on Hamelin Island in the South West Region and 12 islands in the Swan Region (Fig. 2h). All records of *B. maxima* from islands in the Swan Region (except for those from Garden Island) are from the Peel Inlet. Known from Hamelin Island as early as 1959. Prioritised as N (B) in the South West Region and L (B, C) in the Swan Region. A common weedy grass in south-west WA.

Briza minor (shivery grass) – Recorded on Dirk Hartog Island in the Midwest Region and ten islands in the Swan Region (Fig. 2i). Prioritised as L (D) in the Midwest Region and L (B, C) in the Swan Region. A common weedy grass in south-west WA.

Bromus diandrus (ripgut brome) – Recorded on 34 islands in the Midwest Region (mostly in the Houtman Abrolhos Archipelago) and 21 Islands in the Swan Region (Fig. 2j). No available records identified the particular variety of *B. diandrus* present on west 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). Prioritised as L (D) in the Midwest and Swan regions.

Bromus hordeaceus (soft brome) – Recorded on 16 islands in the Midwest Region and Rottnest and Cooleenup Islands in the Swan Region (Fig. 2k). Prioritised as N (A, B) in the Midwest Region and L (D) in the Swan Region. A common weedy grass found on damp soils across south-west WA (Hussey et al. 2007).

Bromus madritensis (Madrid brome) – Recorded on North Island in the Houtman Abrolhos Archipelago in the Midwest Region and Garden and Rottnest islands in the Swan Region. The Garden Island record is from a single WA Herbarium specimen collected in 2003, which was part of a population of 6–20 plants growing in recently disturbed soil near the jetty. *B. madritensis* was collected only once on Rottnest Island in 1956 and is thought to be extirpated from the island. Prioritised as N (A, B) in the Midwest Region and L (D) in the Swan Region. Typically associated with highly disturbed sites (Hussey et al. 2007).

Bromus rubens (red brome) – Recorded on Basile, Burnett (also known as Fin), Cervantes North and Uncle Margie (also known as Mangrove) islands in the Midwest Region and on Garden and Rottnest islands in the Swan Region. Keighery (1998) noted that it was previously recorded for Garden Island but its status was unknown. Prioritised as L (D) in the Midwest and Swan regions. Highly invasive in dry open areas but less prevalent in coastal WA (Western Australia Herbarium 1998–).

Bryophyllum delagoense (mother-of-millions) – Recorded on Rat and Pigeon islands in the Houtman Abrolhos in the Midwest Region. Originally planted as an ornamental, it apparently escaped cultivation and produced large populations that covered half of both islands by 1999, and negatively impacted native vegetation (Longman et al. 2000). Mother-of-millions appears to benefit from the natural disturbance caused by nesting seabirds as well as high nutrient levels associated with seabird guano

(Longman et al. 2000). This plant is a serious agricultural and environmental weed in eastern parts of Australia but is not common in WA. Mother-of-millions is toxic to livestock and may pose a threat to native tammar wallabies present on adjacent islands (Longman et al. 2000). Prioritised as H (H, I) in the Midwest Region. No status is listed on DAFWA's Western Australian Organism List. This plant should be listed as a declared plant to prevent its importation to and sale within WA and to facilitate state-wide eradication. It is listed as an official biocontrol target but no biocontrol species are currently approved for release (Palmer & Rafter 2012). A population of South African citrus thrips (*Scirtothrips aurantii*), which appears to feed exclusively on plants in the genus *Bryophyllum*, has suppressed mother-of-millions populations in Queensland (Palmer & Rafter 2012). However, other populations of this insect are known to cause economic damage to mango and citrus crops overseas (Palmer & Rafter 2012) and as a result, it is a prohibited species in WA. *B. delagoense* should be eradicated on all islands where it occurs.

Caesalpinia gilliesii (bird of paradise) – Recorded only on Rottnest Island in the Swan Region, where it is prioritised as N (A, B). Naturalised from ornamental plantings at the lighthouse keeper's cottage at Bathurst Point. Collection notes from a WA Herbarium specimen collected in 1998 stated that it only occurred in one patch but was locally common. Keighery (1986) noted that it was planted in several other gardens as well and recommended its removal. Rippey et al. (2003) referred to this species as an eradication target.

Cakile maritima (sea rocket) – Recorded on Hamelin Island in the South West Region, 13 islands in the Swan Region, and 46 islands in the Midwest Region (Fig. 2l). Invades bare sandy beaches not frequently inhabited by native species (Western Australia Herbarium 1998–). Prioritised as L (D) in the Swan Region and N (B) in the Midwest and South West regions.

Callitriche stagnalis (common starwort) – Recorded on Rottnest Island in the Swan Region, where it is prioritised as M (D, E, F, G). Widespread in freshwater wetlands in WA. Notes with a WA Herbarium specimen collected in 1999 stated that this plant achieved 98% cover in a localised area west of Lake Timperley. Management of this population is recommended.

Capsella bursa-pastoris (shepherd's purse) – Recorded once on Carnac Island in the Swan Region in 1958 (Abbott et al. 2000). Not currently prioritised in the Swan Region but prioritised as N (A, B) in the adjacent South West and Midwest regions. Primarily a weed of disturbed areas.

Carpobrotus aequilaterus (angular pigface) – Recorded once on Garden Island in the Swan region, where it is prioritised as FAR. A weed of sandy coastal areas (Hussey et al. 2007).

Carpobrotus edulis (Hottentot fig) – Recorded on 15 islands in the Swan Region, 13 of which are in the Peel Inlet (Fig. 3a). Prioritised as M (D, E, F, G) in the

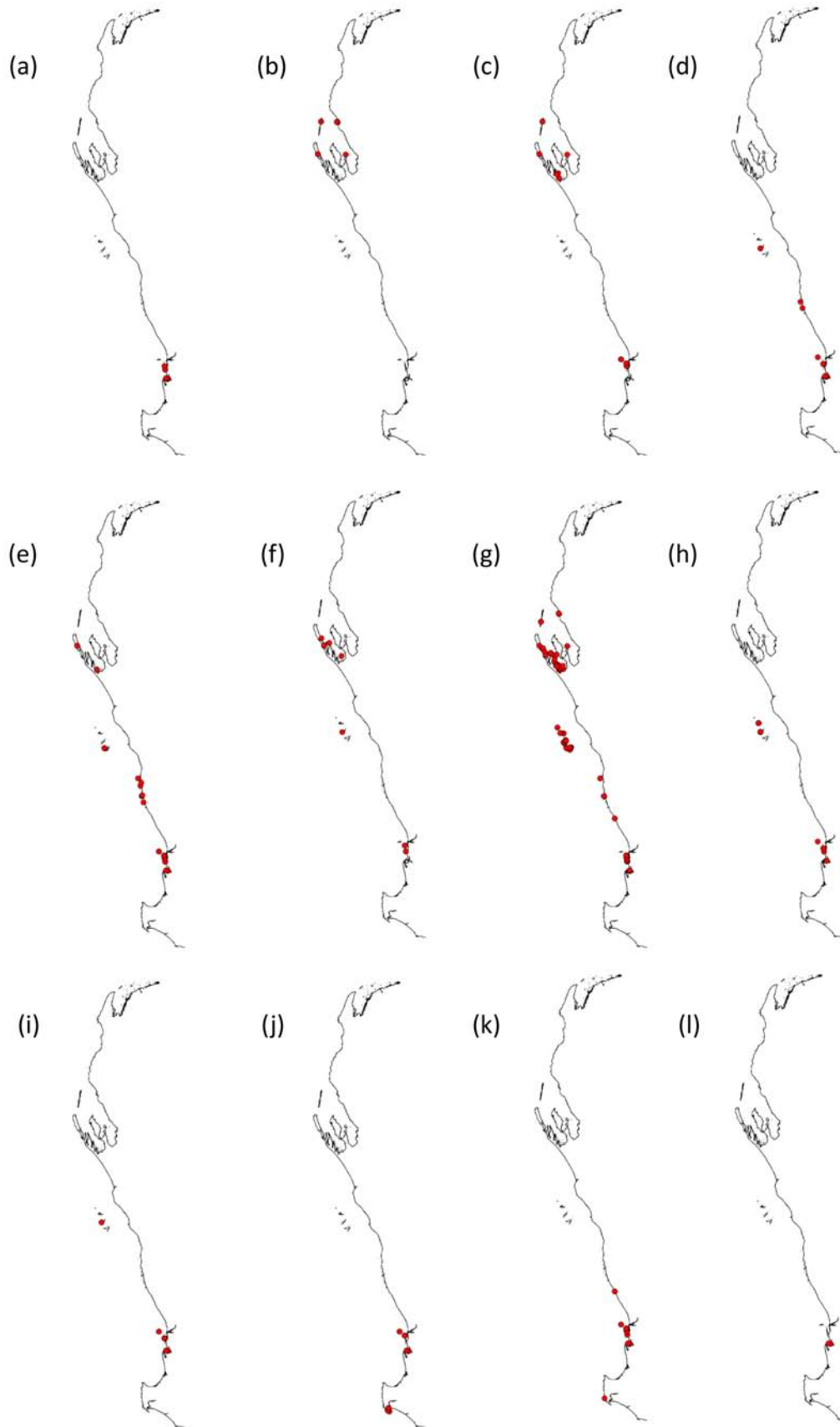


Figure 3. Distribution of (a) *Carpobrotus edulis*, (b) *Cenchrus ciliaris*, (c) *Centaurea melitensis*, (d) *Centaurium erythraea*, (e) *Cerastium glomeratum*, (f) *Chenopodium album*, (g) *Chenopodium murale*, (h) *Conyza bonariensis*, (i) *Conyza sumatrensis*, (j) *Cotula coronopifolia*, (k) *Crassula glomerata* and (l) *Crassula natans* on islands of the west coast of Western Australia.

region. Invasive in coastal habitats and can smother native vegetation and hybridise with native congeners (Western Australia Herbarium 1998–).

Carduus pycnocephalus (slender thistle) – Recorded on Carnac, Garden and Rottnest Islands in the Swan Region, where it is prioritised as L (D, E). Now presumed to be extinct on Rottnest Island (Rippey et al. 2003) possibly as a result of grazing by quokkas. Problematic weed in pastures. A registered biological control target. A strain of the rust fungus *Puccinia cardui-pycnocephali* was released in southern Australia to target this species and appears to reduce seed production (Groves & Sheppard 2012). Efforts should be made to determine whether the rust is present on island populations and any uninfected populations should be treated.

Carduus tenuiflorus (sheep thistle) – Recorded on Garden and Penguin islands in the Swan Region, where it is prioritised as H (G, H, I). Problematic weed in pastures. A registered biological control target. A strain of the rust fungus *Puccinia cardui-pycnocephali* was released in southern Australia to target this species and appears to reduce seed production (Groves and Sheppard 2012). Efforts should be made to determine whether the rust is present on island populations and any uninfected populations should be treated.

Casuarina equisetifolia (horsetail sheoak) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as FAR. Plants on Rottnest Island are cultivated and not apparently naturalised. The WA Herbarium record for Garden Island specifies that the 2–5 plants present were *C. equisetifolia* subsp. *equisetifolia* and that the infestation covered 11–100 m² at Colpoys Point, implying a naturalised population.

Casuarina glauca (swamp sheoak) – Recorded on Rottnest Island in the Swan Region, where it is prioritised as L (B, C, D). Notes with a WA Herbarium specimen from 2000 stated that a few young plants were naturalising around a cultivated tree along a roadside west of Lake Baghdad and north-east of Little Island.

Casuarina obesa (swamp sheoak) – Recorded on Rottnest Island in the Swan Region as cultivated but not naturalised. Native to WA but introduced on Rottnest Island.

Catapodium rigidum (rigid fescue) – Recorded on Carnac, Garden and Rottnest islands in the Swan Region as well as Geordie Bay Island (a small stack off Rottnest Island). Now considered to be extinct on Rottnest Island (Rippey et al. 2003), possibly due to quokka grazing. Naturalised along the south-west coast of WA in disturbed areas. Prioritised as L (B, C, D) in the Swan Region.

Catharanthus roseus (pink periwinkle) – Recorded on Garden Island in the Swan Region. The only record on Garden Island is from a WA Herbarium specimen collected in 1997 from disturbed scrub at a cottage site near Pig Trough Bay. Probably a naturalised garden escape. Not prioritised in the Swan Region but prioritised as N (A, B) in the Midwest Region.

Cenchrus ciliaris (buffel grass) – Recorded on eight Islands in the Midwest Region, where it is prioritised as L (D, E) (Fig. 3b). Introduced in many areas as forage for cattle, this plant has become a major weed north of Geraldton (Hussey et al. 2007). It is known to increase fire frequency and displaces native vegetation (Hussey et al. 2007). Control is desirable but difficult.

Cenchrus clandestinus (Kikuyu grass) – Recorded on Little Rat Island in the Midwest Region, Seal Island in the South West Region, and Cooleenup, Garden, Meeyip, Rottnest and Yunderup islands in the Swan Region. However, it now appears to be extinct on Rottnest Island (Rippey et al. 2003) where Keighery (1986) had previously recommended containment followed by active management. Commonly used in lawns and pastures but can be highly invasive along the edges of wetlands and is known to have allelopathic properties (Hussey et al. 2007). Prioritised as M (D, E, F) in the Midwest Region, L (D, E) in the South West Region, and L (C) in the Swan Region.

Cenchrus longispinus (spiny burr grass) – Recorded on Faure Island in the Midwest Region, where it is prioritised as M (D, E, F). This record is substantially farther north than any specimens presently recorded in Florabase (Western Australian Herbarium 1998–). Produces spiny animal-dispersed burrs that make it an amenity weed in areas used by humans. Eradication of the Faure Island population is recommended.

Cenchrus echinatus (burr grass) – Recorded on Babbage and Whitlock islands near Carnarvon in the Midwest Region, where it is prioritised as L (D). Spiny burrs attach to clothing and animals and can be spread long distances. Known to cause serious environmental degradation on islands with seabird colonies (Flint & Rehkemper 2002). Eradication of this weed on seabird islands should be a high priority.

Cenchrus setaceus (fountain grass) – Recorded on Garden Island in the Swan Region and Pigeon Island in the Midwest Region. The Garden Island record is from a single WA Herbarium specimen that came from a population of 21–50 plants in recently disturbed soil at the base of the jetty at Colpoys Point. On Pigeon Island, a single clump was removed by a local resident (Keighery 2012). Outcompetes native vegetation and increases fire risk. Prioritised as H (H, I) in the Swan Region and L (D, E) in the Midwest Region. Eradication of the Garden Island population and further monitoring on Pigeon Island is recommended.

Cenchrus setiger (birdwood grass) – Recorded on Dirk Hartog and Faure islands in the Midwest Region, where it is prioritised as M (D, E, F, G). Notes with a WA Herbarium record state that it was common around the Faure Island homestead in 2000. Recorded from river islands (not included in this study) just upstream from the estuarine islands around Carnarvon in 1989 (Keighery, unpublished data). Likely to now be present on nearby downstream islands. Widespread and serious weed in the northern half of WA (Hussey et al. 2007).

Centaurea melitensis (Maltese cockspur) – Recorded on six islands in the Midwest Region and three islands in the Swan Region (Fig. 3c). Common and widespread weed in disturbed areas. Prioritised as M (D, E, F) in both the Midwest and Swan regions.

Centaureum erythraea (common centaury) – Recorded on four islands in the Midwest Region and nine islands in the Swan Region (Fig. 3d). A common weed throughout the south-west of WA. Prioritised as L (B, C) in the Midwest Region and L (C) in the Swan Region.

Centaureum pulchellum (lesser centaury) – Recorded on Escape Island in the Midwest Region and Garden and Rottnest islands in the Swan Region. Conflicting information exists about the presence of this species on Rottnest Island. Rippey et al. (2003) note that this species no longer occurs on Rottnest Island and suggest that previous records may be the result of misidentifications. However, two specimens from Rottnest Island from 1956 and 1995 that are lodged at the WA Herbarium are both presently identified as *C. pulchellum*. A weed of coastal sites between Jurien Bay and Perth (Hussey et al. 2007). Prioritised as N (A, B) in the Midwest Region and L (D) in the Swan Region.

Centaureum tenuiflorum (branched centaury) – Recorded on Carnac, Garden and Rottnest islands in the Swan Region, where it is prioritised as L (D). Notes with WA Herbarium specimens collected from Carnac and Rottnest islands describe it as common. Common across south-west WA.

Centranthus macrosiphon (pretty betsy) – Recorded on Garden Island in the Swan Region, where it is prioritised as H (H, I). The most recent record is a 1998 WA Herbarium specimen, where it was described as 'common in patches'. Older literature incorrectly referred to this species as *C. ruber* (Keighery 1998). Eradication of the Garden Island population is recommended.

Cerastium balearicum (Balearic mouse-ear chickweed) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as L (D). Localised weed of coastal areas in south-west WA (Hussey et al. 2007).

Cerastium glomeratum (sticky mouse-ear chickweed) – Recorded on 11 islands in the Midwest Region and eight islands in the Swan Region (Fig. 3e). Primarily in disturbed areas. Minor weed of woodlands on Garden Island (Keighery 1998). Prioritised as L (B, C, D) in the Midwest Region and L (D) in the Swan Region.

Cerastium pumilum (Curtis' mouse-ear chickweed) – Recorded on Escape and Whitlock islands in the Midwest Region, both from WA Herbarium specimens collected in 1985. Noted to be common on Escape Island and scattered on Whitlock Island. Prioritised as L (B, C, D) in the Midwest Region.

Ceratonia siliqua (carob tree) – Recorded on Rottnest Island in the Swan Region as a cultivated plant (Rippey et al. 2003). Plantings of this species should be monitored as this species has naturalised in California (Sanders 1996) in areas with a similar climate to Perth.

Chamaecytisus palmensis (tagasaste) – Recorded on Cooleenup Island in the Swan Region, where it is prioritised as L (C). In 1990 it was said to be increasing around houses from a single introduction. Highly invasive in disturbed bushland and has naturalised in most areas where it has been planted.

Chenopodium album (fat hen) – Recorded on five islands in the Midwest Region and Carnac Island and Shag Rock in the Swan Region (Fig. 3f). Carnac Island specimens came from dried out dead individuals that had been killed by cormorant nesting activity. Highly allelopathic and prefers high-nitrogen soils and heavy disturbance (Western Australia Herbarium 1998–). These conditions are commonly found on islands with large colonies of seabirds. Prioritised as L (B, C, D) in the Midwest Region and L (B, C) in the Swan Region.

Chenopodium glaucum (glaucous goosefoot) – Recorded on Seal Island in the South West Region. A record noted that it was absent from Cooleenup Island in the Swan Region in 1990 surveys (Hussey et al. 1992), which implies that it was previously found on the island, though no available records showed it as definitively present. Typically found in eutrophic muddy areas. It is not entirely clear whether this plant is native or naturalised in WA (Hussey et al. 2007), and both native and naturalised forms may be present. Prioritised as N (B) in the South West Region and FAR in the Swan Region.

Chenopodium murale (nettle-leaf goosefoot) – Recorded on 52 islands in the Midwest Region and 13 islands in the Swan Region (Fig. 3g). Common weed throughout WA. Prioritised as L (B, C, D) in the Midwest Region and L (B, C) in the Swan Region.

Cicendia filiformis (slender cicendia) – Recorded on Cooleenup and Jeegarnyeejip islands in the Swan Region, where it is prioritised as N (B). Described as abundant on winter wet areas on Cooleenup Island (Hussey et al. 1992). Because of its small size it is easy to overlook and may have escaped detection on other islands where it occurs.

Cirsium vulgare (spear thistle) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as L (D). Single plant collected on Rottnest Island in 2000 between garden golf and Catholic Church. On Garden Island, only small populations of a few plants have been reported.

Citrullus lanatus (pie melon) – Recorded on Garden Island in the Swan Region, where it is prioritised as N (A). WA Herbarium specimen collected in 1998 from the fire training area. Common weed along roadsides throughout WA.

Clitoria ternatea (butterfly pea) – Recorded on Babbage and Whitlock islands near Carnarvon in the Midwest Region, where it is prioritised as an alert species. Escaped garden ornamental that is naturalising in creeklines and wetland edges in drier portions of WA (Hussey et al. 2007). Control of these populations is recommended.

Conium maculatum (poison hemlock) – Recorded on Garden Island in the Swan Region, where it is prioritised as N (A, B). One WA Herbarium specimen collected outside perimeter fence in 1994. Keighery (1998) noted that it was uncommonly found on roadsides inside the Naval Base. This species is a candidate for control on a public safety basis because it is extremely toxic to humans.

Conyza bonariensis (flaxleaf fleabane) – Recorded on six islands in the Midwest Region and five islands in the Swan Region (Fig. 3h). Commonly found as a weed of horticulture, roadsides and other disturbed areas. Prioritised as L (B, C) in the Midwest Region and N (A) in the Swan Region.

Conyza canadensis (Canadian fleabane) – Recorded on Carnac and Penguin islands in the Swan Region, where it is prioritised N (A). Mostly restricted to disturbed areas around Perth.

Conyza parva (smooth fleabane) – Recorded on Garden Island in the Swan Region, where it is prioritised as N (A). All records from Garden Island describe it as abundant in dune areas.

Conyza sumatrensis (tall fleabane) – Recorded on Rat Island in the Midwest Region and nine islands in the Swan Region (Fig. 3i). Records on Garden Island from as early as 1948. Occasionally recorded by the synonym *C. albida*. Widespread weed in disturbed areas throughout the south-west of WA. Prioritised as L (B, C) in the Midwest Region and L (D) in the Swan Region.

Coprosma repens (mirror plant) – Recorded once on Seal Island in the South West Region in 2009. Prioritised as L (B, C) in the South West Region but considered a serious environmental weed in several other states. Can be invasive in coastal areas. Eradication on Seal Island should be considered.

Corrigiola litoralis (strapwort) – Recorded on Jennala Island in the Swan Region, where it is prioritised as L (B, C). Weed of roadsides and disturbed areas across south-west WA (Hussey et al. 2007).

Cortaderia selloana (pampas grass) – Recorded on Rottnest Island, and Channel and Meeyip islands in the Peel Inlet in the Swan Region, where it is prioritised as L (D, E). Plants on Rottnest are cultivated and noted to be in several gardens. A serious weed in wetland areas. Often planted as an ornamental but is sometimes considered an amenity weed due to its sharp saw-like leaves. Because of its invasive tendencies and its potential as an amenity weed, plantings on Rottnest Island should be removed.

Cotula bipinnata (fernny cotula) – Recorded on Garden Island in the Swan Region, where it is prioritised as M (D, E, F). Found on road verges around the naval base (Keighery 1998).

Cotula coronopifolia (waterbuttons) – Recorded on three islands in the South West Region and ten islands in the Swan Region (Fig. 3j). Often on edges of wetlands. Prioritised as N (B) in both regions.

Cotula turbinata (funnel weed) – Recorded on Carnac and Cooleenup islands in the Swan Region, where it is prioritised as N (A, B). Found in disturbed sandy areas on Cooleenup.

Cotyledon orbiculata (pig's ear) – Recorded on Pigeon and Rat islands in the Houtman Abrolhos in the Midwest Region, where it is prioritised as an alert species. Notes with a WA Herbarium specimen from 2003 state that 6–20 plants were recorded near the research hut on Rat Island. This species has become invasive on Breaksea Island in the South Coast Region where it has proved difficult to control. It should be monitored closely if not removed on Pigeon and Rat islands.

Crassula glomerata (stonecrop) – Recorded on Lancelin Island in the Midwest Region, Hamelin Island in the South West Region and 10 islands in the Swan Region (Fig. 3k). Records from WA islands note that it occurs on beaches, firebreaks, foredunes and tidal wetlands. Prioritised as L (B, C) in the Midwest Region and FAR in the Swan Region.

Crassula natans (swamp stonecrop) – Recorded on six islands in the Swan Region (Fig. 3l). A 1956 specimen from Rottnest Island was identified as *C. natans* var. *minus*; however, this species is now presumed extinct on Rottnest Island. Incorrectly recorded as absent on Cooleenup Island in 1990 (Hussey et al. 1992) but later described as present (Keighery & Muir 2010).

Crassula thunbergiana subsp. *thunbergiana* (flyweed) – Recorded on Rottnest Island in the Swan Region, where it is prioritised as N (A). Notes with a WA Herbarium specimen collected at the junction of Lancier and Macedon Streets in 1999 state that it was 'quite frequent'.

Crepis foetida (stinking hawksbeard) – Recorded on Carnac Island in the Swan Region, where it is prioritised as L (B, C, D). Only one record from 1975. Primarily a weed of disturbed areas (Hussey et al. 2007).

Cucurbita pepo (pumpkin) – Recorded on Rat Island in the Midwest Region. A low-risk garden escape. Not prioritised in the Midwest Region, but prioritised as N (A, B) in the adjacent Swan Region.

Cuscuta epithymum (lesser dodder) – Recorded on Babbage, Baudin, Freycinet and Whitlock islands in the Midwest Region and Garden Island in the Swan Region. Records from Carnarvon estuarine islands are among the northernmost records of this species in WA. A parasite on native and naturalised vegetation. Prioritised as N (B) in the Midwest and Swan regions.

Cuscuta planiflora (red dodder) – Recorded on Bernier and Dorre islands in the Midwest Region and Garden Island in the Swan Region. Occasionally a parasite on native perennials (Hussey et al. 2007). Prioritised as N (B) in the Midwest Region.

Cymbalaria muralis (ivyleaf toadflax) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as L (B, C, D). The Garden Island record may be the result of a misidentification of *Maurandya barclayana*. On Rottnest Island, a WA Herbarium

specimen was collected in 2001 from a population of several plants growing on a limestone wall near Cottage 436 on 16 Kitson Way.

Cynodon dactylon (couch) – Recorded on 10 islands in the Midwest Region, 13 islands in the Swan Region, and Seal Island near Cape Leeuwin in the South West Region (Fig. 4a). Records from Seal Island may be the result of misidentification of kikuyu grass. Frequently planted as a lawn grass. Often invasive near edges of wetlands. Reported to be smothering native herbs and shrubs in *Melaleuca lanceolata* woodlands on Rottnest Island (Keighery 1993). Prioritised as L (D) in the Southwest Region, L (D, E) in the Swan Region, and M (D, E, F, G) in the Midwest Region.

Cyperus tenellus (tiny flatsedge) – Recorded on Ballee, Channel, Jeegarnyeejip and Yunderup islands in Peel Inlet in the Swan Region, where it is prioritised as N (B). Common weed in the south-west of WA.

Cyperus tenuiflorus (scaly sedge) – Recorded on Garden Island in the Swan Region, where it is prioritised as N (B). A single record from a WA Herbarium specimen collected in 1999 notes that it was present near the car wash. Usually found in disturbed wetlands.

Datura leichhardtii (Leichhardt's thornapple) – Recorded on Babbage and Whitlock islands near Carnarvon in the Midwest Region, where it is prioritised as L (D, E). Previously considered to be native to WA but actually native to Mexico (Hussey et al. 2007). A declared pest organism in WA. Highly toxic to livestock and humans.

Delairea odorata (cape ivy) – Recorded on Garden Island in the Swan Region, where it is listed as an alert species. Persisting from old plantings around Beacon Head. Occasional garden escape around Perth area (Hussey et al. 2007).

Delosperma vinaceum (ice plant) – Recorded on Rat Island in the Midwest Region, where it is prioritised as M (D, E, F, G). Specimens from Rat Island have not been definitively identified. Regardless, the eradication of this population was recommended on the basis of its rapid spread and the invasive tendencies of congeners in New Zealand (Keighery 2005).

Digitaria sanguinalis (crab grass) – Recorded on Garden Island in the Swan Region, where it is prioritised as FAR. Only record on Garden Island is from tracks inside the Stirling base. Common weed in lawns and gardens.

Diplotaxis muralis (wall rocket) – Recorded on Dirk Hartog Island in the Midwest Region and Rottnest Island in the Swan Region. A WA Herbarium specimen was collected on Rottnest Island in 1956 but it is now considered to be extirpated on the island (Rippey et al. 2003). Prioritised as N (A, B) in the Swan and Midwest regions.

Disa bracteata (African weed orchid) – Recorded on Ballee, Channel, Cooleenup and Jeegarnyeejip islands in Peel Inlet in the Swan Region, where it is prioritised as N (B). On Cooleenup Island it is locally common

around houses on the eastern end of the island (Hussey et al. 1992).

Dischisma arenarium (Dischisma) – Recorded on seven islands in the Midwest Region and eight islands in the Swan Region (Fig. 4b). Island records typically from dunes and sandy areas. Prioritised as N (B) in the Swan Region and L (D) in the Midwest Region.

Dittrichia graveolens (stinkwort) – Recorded on eight islands in the Swan Region, where it is prioritised as M (D, E, F) (Fig. 4c). Common in disturbed areas in the south-west of WA. Toxic to livestock and can cause contact dermatitis. Control of this species on Rottnest Island is warranted to protect visitors and native wildlife.

Dysphania ambrosioides (Mexican tea) – Recorded on Garden and Penguin islands in the Swan Region. It tends to form dense stands and grows particularly well in disturbed areas with highly organic, nitrate-rich soil (Western Australia Herbarium 2014–). These traits suggest a potential to invade seabird rookeries and degrade nesting habitat. Prioritised as FAR in the Swan Region.

Dysphania multifida (scented goosefoot) – Recorded on Boodalan Island in the Swan Region, where it is prioritised as M (D, E, F, G). One record describes it as locally common. Occurs in disturbed wetlands from Perth to Bunbury (Hussey et al. 1992).

Echium plantagineum (Paterson's curse) – Recorded on East Wallabi Island in the Midwest Region, where it is prioritised as L (D, E). A single plant was reported on the airstrip in 2012 but this species was previously recorded as present on the island by Harvey et al. (2001). A declared pest organism in WA and a registered biological control target. A serious weed of cropping and pastures, which displaces native annuals in the mulga belt in WA (Hussey et al. 2007). Seven biological control agents have been released in Australia, with three of the agents considered to be successful (Sheppard & Smyth 2012). Efforts should be made to eradicate any remaining individuals on East Wallabi Island. This may require long-term monitoring, as *E. plantagineum* is documented to persist in the seedbank for up to six years (Western Australia Herbarium 1998–) and may persist for substantially longer.

Ehrharta brevifolia (annual veldt grass) – Recorded on seven islands in the Midwest Region and Carnac and Rottnest islands in the Swan Region (Fig. 4d); however, this species is now believed to have been extirpated on Rottnest Island. One WA Herbarium specimen from Dirk Hartog Island was identified as *E. brevifolia* var. *cuspidata*. Prioritised as L (D) in the Midwest Region and L (N, A) in the Swan Region. A common weed on coastal dunes.

Ehrharta calycina (perennial veldt grass) – Recorded on Basile Island in the Midwest Region and ten islands in the Swan Region, all of which are in the Peel Inlet (Fig. 4e). Usually found in sandy areas and was noted to be

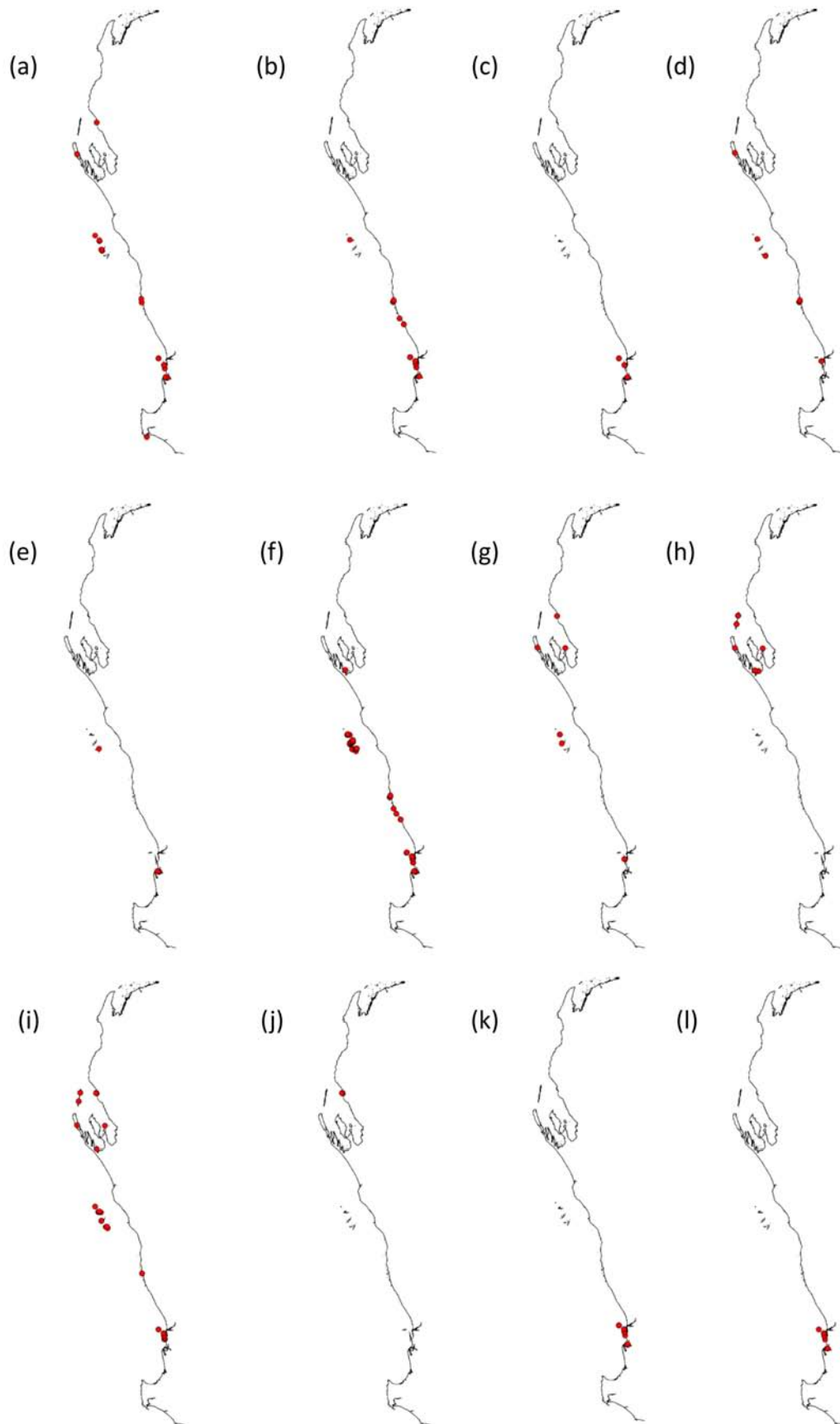


Figure 4. Distribution of (a) *Cynodon dactylon*, (b) *Dischisma arenarium*, (c) *Dittrichia graveolens*, (d) *Ehrharta brevifolia*, (e) *Ehrharta calycina*, (f) *Ehrharta longiflora*, (g) *Emex australis*, (h) *Eragrostis barrelieri*, (i) *Erodium cicutarium*, (j) *Euphorbia hirta*, (k) *Galium murale* and (l) *Geranium molle* on islands of the west coast of Western Australia.

common in sandy portions of Cooleenup Island. Serious bushland weed that increases fire risk and is facilitated by disturbance (Hussey et al. 2007). Prioritised as VH (H, I) in the Midwest Region and L (D, E) in the Swan Region.

Ehrharta longiflora (annual veldt grass) – Recorded on 36 islands in the Midwest Region and 16 islands in the Swan Region (Fig. 4f). Hussey et al. (2007) specifically note that it is a widespread weed of offshore islands and dunes in WA. Notes with a WA Herbarium specimen collected in 1999 state that it was common inside of a fenced revegetation area, suggesting that it is probably controlled by quokka grazing in other areas of the island. Prioritised as N (B) in the Midwest Region and L (D) in the Swan Region.

Ehrharta villosa (pyp grass) – Recorded on Lancelin Island in the Midwest Region, where it is prioritised as FAR. It was originally introduced to stabilise dunes (Western Australia Herbarium 1998–). It is an aggressive colonizer of highly-mobile dunes and can outcompete native vegetation (Western Australia Herbarium 1998–).

Emex australis (doublegee) – Recorded on eight islands in the Midwest Region and Garden Island in the Swan Region (Fig. 4g). A declared species on the Western Australian Organism List. Prioritised as L (D) in the Midwest Region and L (C) in the Swan Region. Targeted for biological control but attempted introductions of control organisms have not succeeded (Yeoh et al. 2012). A native pathogen and an accidentally introduced aphid have, however, reduced the impacts of this weed in some areas (Yeoh et al. 2012). Spiny fruits are harmful when stepped on by humans and animals. Detrimental to both grain and livestock agriculture. Rapidly colonizes bare soil but is a relatively weak competitor (Western Australia Herbarium 1998–).

Eragrostis barrelieri (pitted lovegrass) – Recorded on six islands in the Midwest Region, where it is prioritised as L (D) (Fig. 4h). Mostly restricted to the Shark Bay area in WA.

Eragrostis curvula (African lovegrass) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as L (D). Historically recorded on Garden Island but its current status is unknown (Keighery 1998). Targeted for eradication on Rottnest Island (Ripley et al. 2003). Allelopathic and fire-tolerant invader of a variety of disturbed and intact habitats (Western Australia Herbarium 1998–).

Erigeron karvinskianus (Mexican fleabane) – Recorded on Gun and Murray islands in Houtman Abrolhos in the Midwest Region, where it is prioritised as an alert species. Usually a garden escape recorded near habitation (Hussey et al. 2007). Gun and Murray islands are not inhabited and the origin of these populations is not clear. This species grows readily from seed and could potentially be the result of dumping of garden waste from inhabited islands in the Abrolhos Group.

Erodium aureum (storksbill) – Recorded on Bernier Island

in the Midwest Region, where it is prioritised as L (B, C). Widespread in the southern half of WA.

Erodium botrys (long storksbill) – Recorded on Cooleenup, Garden and Yunderup islands in the Swan Region, where it is prioritised as N (B). Primarily found in disturbed areas in the southwest of WA (Hussey et al. 2007).

Erodium cicutarium (common storksbill) – Recorded on 20 islands in the Midwest Region and six islands in the Swan Region (Fig. 4i). Many island records are from areas of disturbed soil. Found in gull rookeries in the Shoalwater Bay islands. Records from Carnarvon estuarine islands are located north of any specimens of this species held at the WA Herbarium. Prioritised as L (B, C) in the Midwest Region and L (B, C) in the Swan Region.

Erodium moschatum (musky crowfoot) – Recorded on Garden and Penguin islands in the Swan Region, where it is prioritised as N (A, B). The sole WA Herbarium specimen collected from Garden Island in 2002 was found on a road verge near a picnic area.

Eucalyptus camaldulensis subsp. *obtusata* (blunt-budded river red gum) – Recorded on Rottnest Island in the Swan Region as a cultivated plant (Ripley et al. 2003). Native to WA but has naturalised from garden plantings in some areas outside of its native range. Prioritised as L (C) in the Swan Region.

Eucalyptus decipiens (limestone marlock) – Recorded on Rottnest Island in the Swan Region as a cultivated plant (Ripley et al. 2003). Native to WA but not Rottnest Island.

Eucalyptus erythrocorys (illyarrie) – Recorded on Rottnest Island in the Swan Region as a cultivated plant (Ripley et al. 2003). Native to WA but has naturalised from garden plantings in some areas outside of its native range. Prioritised as N (A, B) in the Swan Region.

Eucalyptus gomphocephala (tuart) – Recorded on Garden and Rottnest islands in the Swan Region. Native to WA but has naturalised from garden plantings in some areas outside of its native range. Cultivated on Rottnest Island (Ripley et al. 2003). Garden Island records are of persisting individuals from old plantings, and Keighery (1998) suggested that these plants would not spread unless facilitated by fire. Seedlings and young trees were recorded after a wild fire at Little Armstrong Bay (Rottnest) after the burnt area was fenced to exclude quokkas.

Eucalyptus platypus (moort) – Recorded on Garden Island in the Swan Region. Keighery (1998) noted that this species was recorded on Garden Island in older literature but he was not certain of the current status. Cultivated material collected on Garden Island and labelled as *E. platypus* was later determined to be *E. utilis*, suggesting that older records of *E. platypus* may be erroneous. Native to the south coast of WA.

Eucalyptus spathulata (swamp mallet) – Recorded on Rottnest Island in the Swan Region as a cultivated plant (Ripley et al. 2003). Native to wheatbelt area in WA.

Eucalyptus utilis (coastal moort) – Recorded as naturalised on Rottnest and Garden islands in the Swan Region. Apparently naturalised on Rottnest Island after wildfire. Native to WA but has naturalised from garden plantings in some areas outside of its native range.

Euphorbia cyathophora (painted spurge) – Recorded on Rat Island in the Midwest Region, where it is prioritised as L (C). Notes with a WA Herbarium specimen collected in 2003 recorded a population of 21–50 plants. Probably a garden escape from plantings around fishing shacks.

Euphorbia dendroides (tree spurge) – Recorded on Garden Island in the Swan Region, where it is prioritised as N (A, B). Uncommon on the island. Originated as a garden escape (Hussey et al. 2007).

Euphorbia helioscopia (sun spurge) – Recorded on Garden Island in the Swan Region from a single WA Herbarium specimen. The specimen came from a population of 6–20 plants on a road verge near Pig Trough Bay. Prioritised as L (C) in the Swan Region.

Euphorbia hirta (asthma plant) – Recorded on five islands in the Midwest Region, where it is prioritised as L (D) (Fig. 4j). All five islands are estuarine islands near Carnarvon. Widespread weed in the Kimberley Region but records from Carnarvon estuarine islands are among the southernmost records of this species in WA.

Euphorbia paralias (sea spurge) – Recorded on Seal Island near Cape Leeuwin in the South West Region and Garden and Rottnest islands in the Swan Region. A serious invader of dune ecosystems that is capable of displacing native species. Large infestations can alter sand movement and dune morphology (Scott 2012). Like many spurges, its sap is toxic and can cause dermatitis. Capable of dispersal via seeds and root fragments in ocean currents, and seeds can remain viable for over two years in seawater (Western Australia Herbarium 1998–). This species could potentially spread to the Midwest Region at least as far as the Jurien Bay islands (Keighery & Dodd 1997). As a result, *E. paralias* is listed as an alert species for the Midwest Region. Prioritised as N (A, B) in the Swan Region and L (B, C) in the South West Region. Currently targeted for eradication on Rottnest Island. *E. paralias* was nominated as a target for biological control in 2010 but the program is still in its early stages (Scott 2012). Previous success of biological control programs for closely related species overseas suggest that further development of this program is likely to lead to successful control of *E. paralias* in the future (Scott 2012).

Euphorbia peplus (petty spurge) – Recorded on Carnac, Garden, Penguin and Rottnest islands in the Swan Region, where it is prioritised as N (A, B). Records for all islands except Penguin Island explicitly state that it occurs frequently. Common weed in disturbed areas and degraded natural lands across south-west WA.

Euphorbia prostrata (red caustic creeper) – Recorded on Garden Island in the Swan Region from a single WA Herbarium specimen collected in 2003. The specimen

was from a population of two plants growing along the northern end of the causeway.

Euphorbia terracina (Geraldton carnation weed) – Recorded on Little Rat, Pigeon and Rat islands in the Midwest Region and Garden and Penguin islands in the Swan Region. Referred to as ‘frequent’ on Rat Island and Little Rat Island and ‘common’ on Garden Island. Rapidly colonises disturbed areas and is capable of invading intact native vegetation once established (Western Australia Herbarium 1998–). An allelopathic competitor that can form dense stands (Western Australia Herbarium 1998–). Sometimes considered an amenity weed due to its toxic sap which can cause contact dermatitis. Prioritised as M (D, E, F, G) in the Swan Region and L (D, E) in the Midwest Region.

Ferraria crispa (black flag) – Recorded on Ballee, Cooleenup, Meeyip and Rottnest islands in the Swan Region, where it is prioritised as M (D, E, F). Identified as *F. crispa* subsp. *crispa* on Cooleenup and Rottnest islands. Originated as a garden escape. Recorded as occurring only in two areas of Cooleenup Island in 1986 but by 1990 was very common in disturbed sand. Invading heathlands on Rottnest Island with the potential to become a major weed there as it is not controlled by quokkas (Keighery 1993). Difficult to control due to formation of dormant corms.

Ficus carica (common fig) – Recorded on Garden, Penguin and Rottnest islands in the Swan Region, where it is prioritised as L (D). Listed as cultivated on Rottnest Island. Garden Island population seems to be made up of individuals persisting from old plantings. On Penguin Island, notes with a WA Herbarium specimen collected in 1987 documented seven or eight plants growing on a beach at the base of a cliff. This record probably represents a naturalised population.

Ficus elastica (Indian rubber tree) – Recorded on Rottnest Island in the Swan Region. Listed as cultivated.

Ficus macrophylla (Moreton Bay fig) – Recorded on Rottnest Island in the Swan Region. Listed as cultivated.

Ficus microcarpa (Chinese banyan) – Recorded on Rottnest Island in the Swan Region by the synonym *F. microcarpa* var. *hillii*. Listed as cultivated.

Ficus rubiginosa (Port Jackson fig) – Listed as naturalised from cultivated specimens on Rottnest Island in the Swan Region (Rippey et al. 2003) but not currently recognised as naturalised in WA. A WA Herbarium specimen of a naturalised plant was collected from Mount Hershel on Rottnest Island in 2001.

Freesia alba x *leichtlinii* (freesia) – Recorded on Cooleenup Island in the Swan Region, where it is prioritised as L (D, E). A record from 1990 notes that it was uncommon around houses. A garden escape that has become a serious weed in a variety of natural areas (Hussey et al. 2007).

Fumaria capreolata (whiteflower fumitory) – Recorded on Carnac and Penguin islands in the Swan Region, where it is prioritised as L (D). Common in disturbed

areas and shrublands on the Swan Coastal Plain (Hussey et al. 2007).

Fumaria densiflora (denseflower fumitory) – Recorded on Garden Island in the Swan Region from one plant that was collected in 2002 as a WA Herbarium specimen. The plant was found on a roadside just south of Cliff Head.

Fumaria muralis (wall fumitory) – Recorded on Garden and Penguin islands in the Swan Region, where it is prioritised as L (D). On Garden Island, it was recorded in older literature but its present status on the island is not clear (Keighery 1999).

Galenia pubescens (coastal galenia) – Recorded on Garden and Penguin islands in the Swan Region, where it is prioritised as FAR. Notes with a Western Australia Herbarium specimen collected in 1997 state that it was occasional in a disturbed area of Camp Markham Picnic Ground.

Galium aparine (cleavers) – Recorded on North Boullanger and Whitlock islands in the Midwest Region. Categorized on the Western Australia Organism List as a prohibited species. Some uncertainty exists about the identity of WA specimens that have been designated as *G. aparine* or *G. spurium*. A specimen lodged at the Western Australia Herbarium was collected from the Whitlock Island population in 1985 and should be useful in determining which species this population belongs to. Regardless, both species are prioritised as M (D, E, F, G) in the Midwest Region. Surveys should be undertaken to positively identify the plants on North Boullanger Island. Because of the potential threat to both agriculture and native vegetation, populations on both islands should be eradicated as a proactive measure.

Galium divaricatum (slender bedstraw) – Recorded on Cooleenup Island in the Swan Region, where it is prioritised as N (B). Recorded in 1990 as being common in winter-wet areas of the island (Hussey et al. 1992). Common throughout the south-west of WA.

Galium murale (small bedstraw) – Recorded on seven islands in the Swan Region, where it is prioritised as N (B) (Fig. 4k). Keighery (1998) noted that it was a widespread weed in woodlands on Garden Island. Notes with WA Herbarium specimens from Rottnest Island suggest that its abundance ranges from rare to very common at locations across the island.

Gamochaeta calviceps (cudweed) – Recorded on Rottnest Island in the Swan Region, where it is prioritised as N (A, B). Mostly a weed of lawns and occasionally wetlands (Hussey et al. 2007).

Gamochaeta coarctata (gray everlasting) – Recorded on Garden Island in the Swan Region, where it is prioritised as N (A, B). A WA Herbarium specimen was collected from a population of 2–5 plants near a car wash on the island in 2003. Common in lawns and disturbed areas in the Perth metropolitan area (Hussey et al. 2007).

Geranium molle (dove's foot cranebill) – Recorded on six islands in the Swan Region, where it is prioritised as N (B) (Fig. 4l). On Rottnest Island it was presumed

extinct from 1998 to 2001 but was collected again in 2002 (Rippey et al. 2003). Similarly, on Garden Island, it was recorded as unknown in 1998 (Keighery 1998) but a WA Herbarium specimen was collected on a road verge in 2002. A weed of disturbed areas.

Gladiolus undulatus (wild gladiolus) – Recorded on seven islands in the Peel Inlet in the Swan Region, where it is prioritised as M (D, E, F, G). In 1990 it was noted to be occasional in non-saline wet areas on Cooleenup Island (Hussey et al. 1992). Rapidly invading disturbed wetlands (like those present on the Peel Inlet islands) among other habitats in the south-west of WA (Hussey et al. 2007).

Gomphocarpus fruticosus (narrowleaf cottonbush) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as L (D, E). A declared pest under the Western Australia Organism Act. Most records from Garden and Rottnest islands are from disturbed areas. Recorded as common or abundant in some areas of Rottnest Island. Unlikely to be controlled by the grazing of native herbivores present on these islands due to the toxic latex produced by *G. fruticosus*. On Rottnest Island, it was eradicated in all but one area where it was maintained as a food plant for the introduced monarch butterfly (*Danaus plexippus*) and the native lesser wanderer (*Danaus chrysippus*; Rippey et al. 2003).

Hedera helix (English ivy) – Recorded on Garden Island in the Swan Region. Older literature states that it is present, but the current status of this species on Garden Island is not known (Keighery 1998).

Helichrysum luteoalbum (Jersey cudweed) – Recorded on 11 islands in the Midwest Region and five islands in the Swan Region (Fig. 5a). Often recorded by the synonym *Pseudognaphalium luteoalbum*. Currently listed as native to WA but its status is ambiguous. Common in disturbed areas throughout the south-west of WA (Hussey et al. 2007).

Heliophila pusilla (heliophila) – Recorded on Rottnest Island in the Swan Region from a single WA Herbarium record. Currently believed to be extirpated from the island. Prioritised as N (B) in the Swan Region.

Hibbertia cuneiformis (cutleaf hibbertia) – Recorded on Garden Island in the Swan Region. Native to WA but not to Garden Island. Naturalising in disturbed bushland (Keighery 2013).

Holcus setiger (annual fog) – Recorded on Garden Island in the Swan Region, where it is prioritised as L (B, C). The record is from a single WA Herbarium specimen collected in 2003 from a population of 2–5 plants near an old cottage site.

Hordeum leporinum (barley grass) – Recorded on 25 islands in the Midwest Region, Saint Alouarn Island and Seal Island near Cape Leeuwin in the South West Region, and 13 islands in the Swan Region (Fig. 5b). In older literature, it was reported as present on Garden Island but its status as of 1998 was unknown (Keighery

1998). Capable of tolerating extremely high nutrient levels (Western Australia Herbarium 1998–). Many island records are from guano deposits in bird rookeries. Prioritised as L (B, C) in the Midwest Region and N (B) in the South West and Swan regions.

Hordeum vulgare (barley) – Recorded on Garden Island in the Swan Region. Records are from older literature and the current status of this species on Garden Island is not known (Keighery 1998). Grain crop that probably originated from farming that occurred historically on the island.

Hornungia procumbens (oval purse) – Recorded on 31 islands in the Midwest Region; Hamelin Island, Saint Alouarn Island and Seal Island near Cape Leuwin in the South West Region; and five islands in the Swan Region (Fig. 5c). Often recorded by the synonym *Hymenolobus procumbens*. A common weed in coastal areas and islands throughout south-west WA (Hussey et al. 2007). Prioritised as L (B, C) in the Swan Region and L (C) in the South West and Midwest regions.

Hydrilla verticillata (water thyme) – Recorded on Rottnest Island in the Swan Region. Native in the Kimberley but naturalised in wetlands around the Perth metropolitan area.

Hypochaeris glabra (smooth catsear) – Recorded on nine islands in the Midwest Region and 15 islands in the Swan Region (Fig. 5d). Common weed throughout the south-west of WA. Island records are from both bushland and disturbed areas. Prioritised as N (B) in the Midwest Region and L (D) in the Swan Region.

Hypochaeris radicata (flat weed) – Recorded on Penguin Island in the Swan Region, where it is prioritised as L (D). This species hybridises with *H. glabra* and many individuals in WA show characteristics of both species (Hussey et al. 2007).

Ipomoea cairica (coast morning glory) – Recorded on Little Rat Island in the Midwest Region, where it is prioritised as L (B, C, D). Probably naturalised from ornamental plantings around fishing shacks.

Ipomoea indica (blue morning glory) – Recorded on Garden Island in the Swan Region, where it is prioritised as L (B, C, D). Occasional garden escape that can grow over and smother adjacent vegetation (Western Australia Herbarium 1998–). Keighery (1998) described the population on Garden Island as persisting around the old settlement at Beacon Head.

Iris germanica (flag iris) – Recorded on Garden Island in the Swan Region, where it is prioritised as N (A, B). An *Iris* of unknown species was recorded as naturalised on Rottnest Island and is probably *I. germanica*. Populations on Garden Island are found around Beacon Head and in valleys to the west of Stirling Base, and originated as garden escapes (Keighery 1998). Plants on Rottnest Island are also naturalising from cultivated specimens.

Isolepis marginata (coarse club-rush) – Recorded as naturalised on Lancelin, East Wallabi and West Wallabi islands in the Midwest Region and nine islands in the

Swan Region. Widespread throughout south-west WA. Previously listed as naturalised in WA; however, Hussey et al. (2007) state that it is often considered native to WA and it has recently been reclassified as native by FloraBase (WA Herbarium 1998–). Prioritised as L (B, C) in the Midwest Region and N (B) in the Swan Region.

Ixia maculata (yellow ixia) – Recorded on Cooleenup Island in the Swan Region, where it is prioritised as H (I). Hussey et al. (1992) reported a small population near a house in 1990. Garden escape that is spreading into bushland (Hussey et al. 2007). The Cooleenup Island population should be removed as it is highly prioritised in the Swan Region.

Juncus acutus (spiny rush) – Recorded on Ballee Island (Peel–Harvey Estuary) and Garden Island in the Swan Region, where it is prioritised as H (G, H, I). One WA Herbarium specimen from Garden Island is identified as *J. acutus* subsp. *acutus*. This specimen was from a population of over 50 plants that was sprayed in 2002 near Colpoys Point as part of an eradication program. Can block waterways and cause flooding (Western Australia Herbarium 1998–). Also an amenity weed and problematic for livestock due to its sharp spines (Western Australia Herbarium 1998–). Eradication of this species from Ballee Island and continued control and monitoring on Garden Island are recommended.

Juncus bufonius (toad rush) – Recorded on seven islands in the Midwest Region and Channel, Cooleenup and Rottnest islands in the Swan Region (Fig. 5e). It is currently presumed to be extinct on Rottnest Island. Both native and naturalised forms may be present in WA (Hussey et al. 2007). Prioritised as N (B) in both regions.

Juncus capitatus (capitate rush) – Recorded on Cooleenup Island in the Swan Region, where it is prioritised as N (B). Described as common on winter-wet soil in 1990 (Hussey et al. 1992).

Lactuca saligna (wild lettuce) – Recorded on Pigeon Island in the Midwest Region and Channel and Penguin islands in the Swan Region. On Channel Island (Peel–Harvey Estuary), scattered individuals were present in an interdunal wetland (Western Australia Herbarium 1998–). Prioritised as M (D, E, F, G) in the Midwest Region and M (D, E, F) in the Swan Region.

Lactuca serriola (prickly lettuce) – Recorded on Carnac and Garden islands in the Swan Region, where it is prioritised as M (D, E, F). A WA Herbarium specimen from Garden Island was identified as *L. serriola* forma *serriola*. This specimen was taken from a population of 6–20 individuals that were found at the beginning of the causeway (Western Australia Herbarium 1998–).

Lagunaria patersonia (Norfolk Island hibiscus) – Recorded as naturalised on Seal Island near Cape Leuwin in the South West Region in 2009. Cultivated on Rottnest Island. Prioritised as N (A, B) in both the Swan and South West Regions. Seed pods are covered with hairs that can cause serious skin irritation and itching (Western Australia Herbarium 1998–). This, coupled

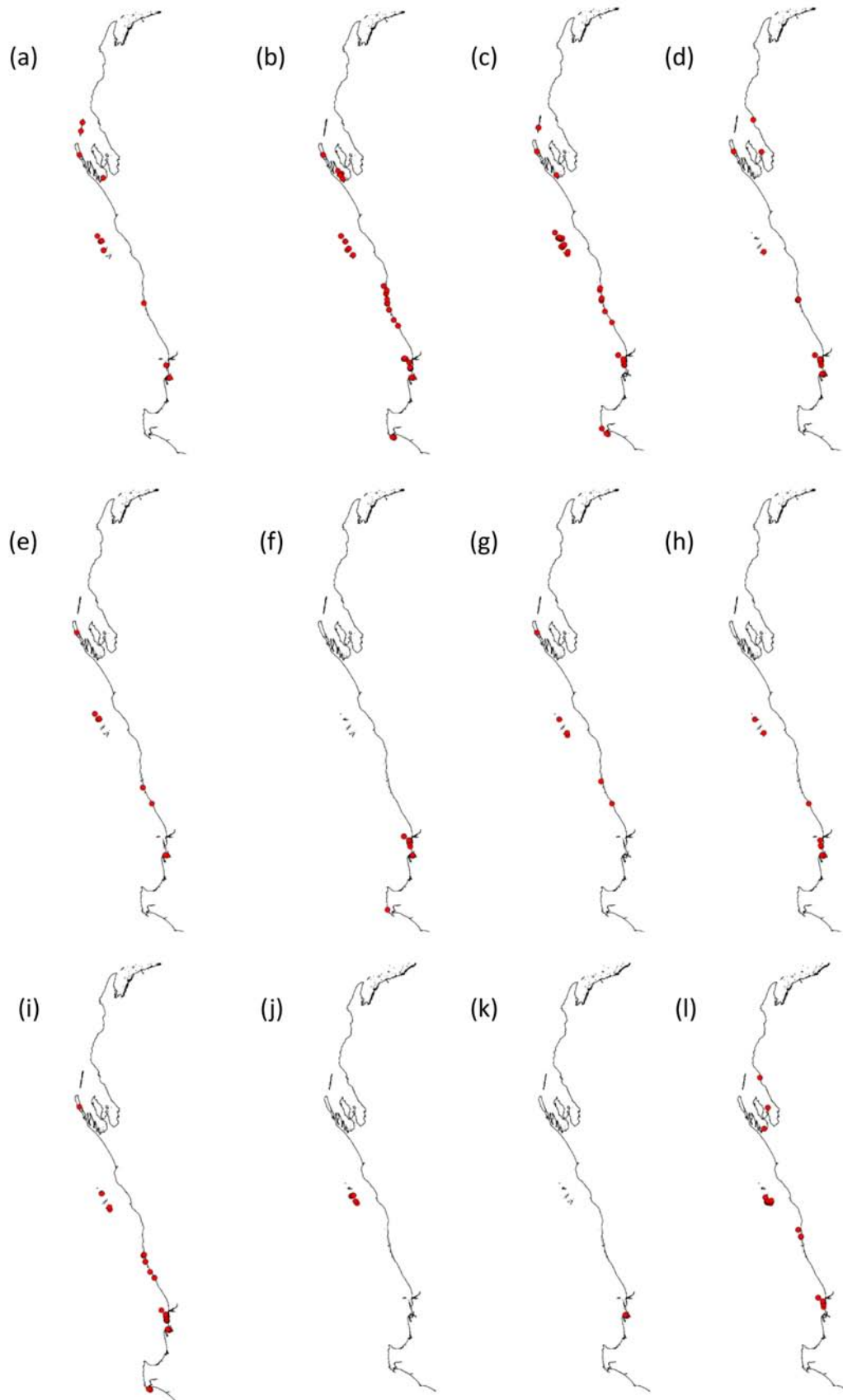


Figure 5. Distribution of (a) *Helichrysum luteoalbum*, (b) *Hordeum leporinum*, (c) *Hornungia procumbens*, (d) *Hypochaeris glabra*, (e) *Juncus bufonis*, (f) *Lagurus ovatus*, (g) *Lolium loliaceum*, (h) *Lolium perenne*, (i) *Lolium rigidum*, (j) *Lolium temulentum*, (k) *Lotus angustissimus* and (l) *Lycium ferocissimum* on islands of the west coast of Western Australia.

with its observed ability to naturalise in areas around Perth, suggests that removal of existing plantings on Rottnest Island may be advisable.

Lagurus ovatus (hare's tail grass) – Recorded on Hamelin Island in the South West Region and nine islands in the Swan Region (Fig. 5f). Several island records indicate that it is common in sandy areas. Capable of decreasing native plant diversity and increasing fire risk (Western Australia Herbarium 1998–). Prioritised as N (B) in the South West Region and L (D) in the Swan Region.

Lamarckia aurea (goldentop) – Recorded on Baudin and Salutation islands in the Midwest Region, where it is prioritised as L (B, C, D). On Salutation Island it was recorded as only occurring in pockets of soil on limestone boulders on the south-west corner of the island in 1989 (Western Australia Herbarium 1998–).

Lantana camara (common lantana) – Recorded on Worallgarook Island (Peel–Harvey Estuary) in the Swan Region, where it is prioritised as L (B, C, D). Noted as being uncommon as of 1997 (Western Australia Herbarium 1998–). Listed as a Weed of National Significance. Included in the IUCN's list of the world's 100 worst invasive species. Listed on the Western Australia Organism List as a declared species. Officially targeted for biological control in Australia with 31 agents released and 18 established (Day 2012). A serious environmental and agricultural weed with allelopathic properties that allow it to suppress and outcompete native species and displace preferred forage in grazing systems. Nonetheless, numerous cultivars are still common as ornamentals in WA. Naturalising populations should be removed.

Leontodon rhagadioloides (Cretan weed) – Recorded on Garden and Rottnest islands in the Swan Region by the synonym *Hedypnois rhagadioloides* subsp. *cretica*. Mostly a weed of roadsides and disturbed areas (Hussey et al. 2007). WA Herbarium specimens from Garden and Rottnest islands come from a beach access track and a cricket ground, respectively. Prioritised as L (B, C, D) in the Swan Region.

Lepidium didymum (lesser swine-cress) – Recorded on Carnac and Rottnest islands in the Swan Region, where it is prioritised as FAR. Sometimes recorded by the synonym *Coronopus didymus*. Typically found in disturbed sites.

Leptospermum laevis (coast teatree) – Recorded on Cooleenup Island in the Swan Region, where it is prioritised as H (H, I). An escaped ornamental from eastern Australia that has become a serious bushland weed in WA (Hussey et al. 2007). A record from 1990 reported a few plants spreading from a garden at the eastern end of the island. Plants in bushland areas should be removed.

Leucojum aestivum (snowflake) – Recorded on Garden and Rottnest islands in the Swan Region, where it is listed as an alert species. On Rottnest Island it was naturalised from plantings at Bathurst Point but appears

to now be extirpated from the island. A single record from Garden Island describes it as spreading slowly from bulb divisions at Beacon Head. Garden Island population should probably be controlled.

Lolium loliaceum (stiff ryegrass) – Recorded on seven islands in the Midwest Region (Fig. 5g). Prioritised as L (B, C) in the Swan Region. Occurs sporadically along the west coast of WA.

Lolium multiflorum (Italian ryegrass) – Recorded on West Wallabi Island in the Midwest Region and Channel Island in the Swan Region. Notes with a WA Herbarium specimen collected in 2000 record it as common on Channel Island. Prioritised as L (B, C) in the Midwest Region. Primarily a weed of disturbed coastal areas.

Lolium perenne (perennial ryegrass) – Recorded on Basile, Lancelin and West Wallabi islands in the Midwest Region and 10 islands in the Swan Region (Fig. 5h). Prioritised as L (B, C) in the Midwest Region. Common grass in lawns and pastures (Hussey et al. 2007).

Lolium perenne x *rigidum* (perennial ryegrass) – Recorded on Garden Island in the Swan Region. Records with a WA Herbarium specimen collected in 2002 noted a population of over 50 plants on a dune 150 m from the boat sheds.

Lolium rigidum (Wimmera ryegrass) – Recorded on 11 islands in the Midwest Region; Hamelin, Saint Alouarn and Seal islands near Cape Leeuwin in the South West Region; and 18 islands in the Swan Region (Fig. 5i). *L. rigidum* is believed to be extirpated on Rottnest Island. Prioritised as L (B, C) in the Midwest Region and L (D) in the South West Region. A serious and common agricultural weed as well as a widely-distributed weed of coastal areas and islands.

Lolium temulentum (drake) – Recorded on five islands in the Midwest Region, where it is prioritised as L (B, C) (Fig. 5j). Primarily a weed of sandy coastal areas and islands (Hussey et al. 2007).

Lolium x *hybridum* (ryegrass) – Recorded on North Boullanger Island in the Midwest Region and Garden Island in the Swan Region. Prioritised as L (B, C) in the Midwest Region. A hybrid between *L. multiflorum* and *L. perenne*.

Lotus angustissimus (narrowleaf trefoil) – Recorded on seven islands in the Swan Region, all of which are in Peel Inlet (Fig. 5k). Prioritised as L (D) in the region.

Lotus subbiflorus (hairy birdsfoot trefoil) – Recorded on Cooleenup and Garden islands in the Swan Region, where it is prioritised as L (B, C). Records from Cooleenup Island use the synonym *L. suaveolens*. A record from 1990 on Cooleenup Island describes it as common on disturbed areas of winter-wet soil.

Lupinus angustifolius (narrowleaf lupin) – Recorded on Cooleenup Island in the Swan Region, where it is prioritised as H (G, H, I). A record from 1990 on Cooleenup Island describes it as common on sandy soil at the eastern end of the island. Individuals in

bushland should be removed. Its ability to fix nitrogen can facilitate the growth of other introduced plants (Western Australia Herbarium 1998–).

Lupinus cosentinii (sandplain lupin) – Recorded on Faure Island (Shark Bay area) in the Midwest Region and Channel, Creery, Cooleenup and Little Yunderup islands in the Peel–Harvey Estuary of the Swan Region. Prioritised as H (G, H, I) in the Swan Region and L (B, C) in the Midwest Region. A record from 1990 states that it was occasional on sandy soil at the eastern end of Cooleenup Island. Plants should be removed from natural areas of the Peel Inlet Islands.

Lupinus luteus (yellow lupin) – Recorded on Cooleenup Island in the Swan Region, where it is prioritised as L (B, C, D). A record from 1990 states that it was uncommon on sandy soil at the eastern end of the island.

Lupinus mutabilis (pearl lupin) – Recorded only on Cooleenup Island in the Swan Region. It was noted to be uncommon on the eastern end of the island in 1990. Not recognized as naturalised in WA.

Lycium ferocissimum (African boxthorn) – Recorded on 22 islands in the Midwest Region and Carnac, Garden, Penguin and Rottnest Islands in the Swan Region (Fig. 5l). Keighery (1993) noted that the worst infestations occurred on East Beagle Island, Lipfert Island and Orton Rock. Prioritised as L (D, E) in the Midwest Region and L (B, C, D) in the Swan Region. Listed as a Weed of National Significance. *L. ferocissimum* is an aggressive invader that negatively impacts native plant biodiversity. Its sharp thorns are known to injure and kill nesting seabirds (J Lavers, pers. comm.) and can disrupt seal and sea lion breeding (Western Australian Herbarium 1998–). This species should be removed from islands where it occurs. Care should be taken to survey islands adjacent to both infested islands and mainland populations of *L. ferocissimum* because its seeds are often dispersed by frugivorous birds. Control efforts during the 1990s reduced the abundance of *L. ferocissimum* on islands in the Houtman Abrolhos Archipelago (Harvey et al. 2001).

Lycopersicon esculentum (tomato) – Recorded on 5 islands in the Midwest Region and Carnac, Garden and Rottnest islands in the Swan Region (Fig. 6a). Prioritised as L (B, C, D) in the Midwest Region. Not currently prioritised in the Swan Region. Records are frequently of a single plant. The Rottnest Island record is suspected to have arrived in mulch. Seeds are transported in the guts of birds and humans. Seldom a problematic invasive.

Lysimachia arvensis (pimpernel) – Recorded on 13 islands in the Midwest Region, Hamelin and Seal islands near Cape Leeuwin in the South West Region, and 15 islands in the Swan Region (Fig. 6b). Prioritised as L (B, C) in the Midwest Region and N (B) in the Swan Region. Both blue and red-flowered forms are recorded. A common and widespread low-impact weed across south-west WA.

Lysimachia linum-stellatum (asterolinon) – Recorded on

Garden Island in the Swan Region by the synonym *Asterolinon linum-stellatum*. Prioritised as FAR in the region. Garden Island is one of only two locations where this weed is known to occur in WA but it could easily be overlooked in other locations due to its small size (Hussey et al. 2007). Most records are from a fenced area near Stirling's Well, suggesting that grazing by tammar wallabies may control the spread of this weed elsewhere on the island.

Malva arborea (tree mallow) – Recorded on nine islands in the Swan Region, where it is prioritised as L (B, C, D) (Fig. 6c). Known to be a serious weed on the Shoalwater Bay islands 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). Displacing native *M. preissiana* on islands in the Perth area (Keighery 1993). Increased nitrogen and phosphorus levels in soil resulting from guano deposition on islands with nesting seabirds benefits *M. arborea* to the detriment of native vegetation (Rippey et al. 2002). Manual and chemical control methods for this species have been trialled on Shag Island with mixed results. On Rottnest Island, grazing by quokkas has kept this weed from establishing in all areas except a small island in Lake Baghdad and a few offshore islets which are inaccessible to quokkas. When rats established on Penguin Island, they seriously damaged or killed most individuals by ringbarking 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 (marshmallow) – Recorded on 14 islands in the Midwest Region and six islands in the Swan Region (Fig. 5d). Prioritised as N (A) in the Midwest Region and N (B) in the Swan Region. Often found in association with seabird rookeries. Though previously recorded on Rottnest Island, it is now believed to be extirpated (Rippey et al. 2003), probably as a result of grazing by quokkas. Common weed in disturbed areas across south-west WA.

Malva pseudolavatera (Cretan mallow) – Recorded on five islands in the Midwest Region and Carnac, Garden and Penguin islands in the Swan Region (Fig. 6e). Prioritised as L (B, C, D) in the Swan Region and an alert species for the Midwest Region. Especially abundant on Carnac Island. Notes with a WA Herbarium record from Carnac Island in 2000 state that it was the dominant species in a former cormorant rookery. Records on islands in the Midwest region need to be evaluated given the alert status of this species.

Malvastrum americanum (spiked malvastrum) – Recorded on five islands in the Midwest Region, all of which are estuarine islands near Carnarvon (Fig. 6f). Common weed in the Kimberley and Pilbara regions

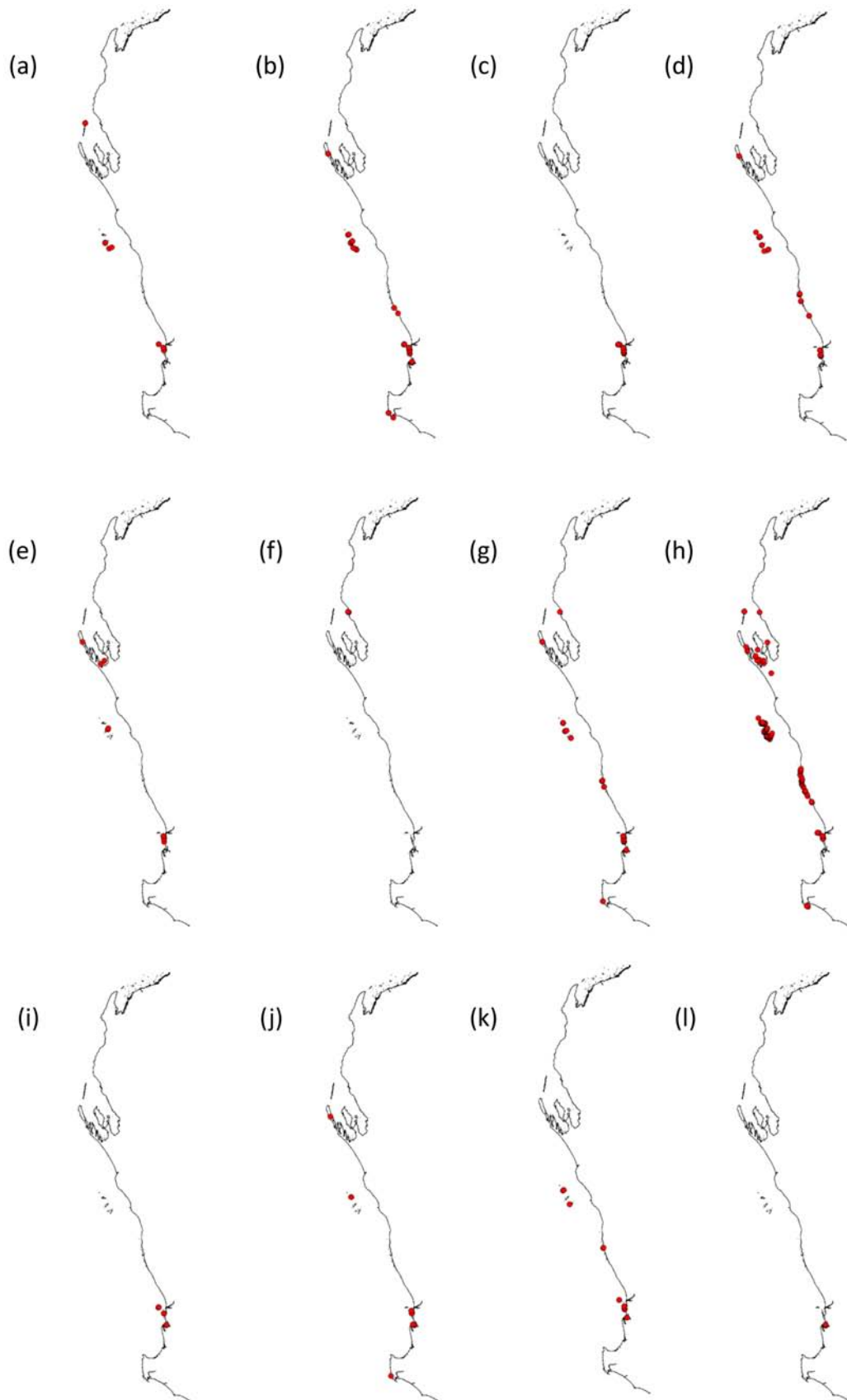


Figure 6. Distribution of (a) *Lycopersicon esculentum*, (b) *Lysimachia arvensis*, (c) *Malva arborea*, (d) *Malva parviflora*, (e) *Malva pseudolavatera*, (f) *Malvastrum americanum*, (g) *Medicago polymorpha*, (h) *Mesembryanthemum crystallinum*, (i) *Moraea flaccida*, (j) *Orobanche minor*, (k) *Oxalis corniculata* and (l) *Oxalis glabra* on islands of the west coast of Western Australia.

but not known from many locations in the Midwest Region. Prioritised as VH (H, I) in the Midwest Region. These populations should be controlled and adjacent mainland areas of the One Tree Point Nature Reserve should be surveyed.

Matthiola incana (common stock) – Recorded on Trigg Island in the Swan Region, where it is prioritised as N (A, B). A WA Herbarium record from 1998 notes that it was common on Trigg Island. Garden escape with limited invasive potential.

Maurandya barclayana (Mexican viper) – Recorded on Garden Island in the Swan Region. Prioritised as M (D, E, F, G) in the Swan Region. The only naturalised specimens collected to date in WA are from Garden Island (Western Australia Herbarium 1998–). A garden escape that is likely to naturalise elsewhere from other horticultural plantings (Hussey et al. 2007). Garden Island population should be controlled.

Medicago polymorpha (burr medic) – Recorded on 11 islands in the Midwest Region, Hamelin Island in the South West Region, and eight islands in the Swan Region (Fig. 6g). Prioritised as L (B, C) in the Midwest Region and N (B) in the Swan Region. Presumed to be extirpated from Rottnest Island (Rippey et al. 2003). It was recorded as historically present on Garden Island (Marchant & Abbott 1981), but more recent literature described its status on the island as unknown (Keighery 1998). A subsequent collection of this species was made in 2002 in an area of recently disturbed soil. The extirpation or reduction in abundance below detectable levels of *M. polymorpha* on Rottnest and Garden islands is likely to be related to the palatability of the plant and the presence of native grazers (quokkas and tammar wallabies, respectively) on these islands.

Medicago sativa (alfalfa) – Recorded on Rat Island (Houtman Abrolhos) in the Midwest Region, where it is prioritised as N (A). The record is of a single plant that was collected as a WA Herbarium specimen in 2003. Commonly cultivated pasture plant with low invasive potential.

Melaleuca armillaris (bracelet honeymyrtle) – Recorded on Rottnest and Garden islands in the Swan Region. Only known from cultivation on Rottnest Island. On Garden Island, in 2002, a WA Herbarium specimen was taken from a population of 2–5 plants near Colpoys point. Notes associated with the specimen refer to it as a weed and note that the infestation area was 1–10 m², implying that the individuals described were naturalised. The Garden Island specimen was determined to the subspecific level as *M. armillaris* subsp. *armillaris*. Not prioritised in the Swan Region.

Melaleuca huegelii (chenille honeymyrtle) – Recorded as cultivated on Rottnest Island in the Swan Region. Native to the adjacent mainland in WA but listed as an introduced species in cultivation by Rippey et al. (2003).

Melaleuca nesophila (mindiyed) – Recorded as cultivated on Rottnest Island in the Swan Region (Rippey et al.

2003). Native to WA but naturalised in some areas outside its natural range.

Melia azedarach (cape lilac) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as N (A, B). Native to the Kimberley Region of WA but naturalised in other areas. Garden Island plants are noted to be persisting from old plantings (Keighery 1998). Rottnest Island plants appear to be naturalising from cultivated individuals (Rippey et al. 2003).

Melianthus major (cape honey flower) – Recorded on Rottnest Island in the Swan Region. Notes with a WA Herbarium specimen collected in 1998 state that this species appears to be persisting on Rottnest Island from old plantings.

Melilotus indicus (King Island melilot) – Recorded on 16 islands in the Midwest Region and 11 islands in the Swan Region. Records from Babbage Island and Whitlock Island near Carnarvon are among the northernmost records of this species in WA. Prioritised as L (B, C, D) in the Midwest Region and M (D, E, F) in the Swan Region. Widespread weed of coastal dunes and islands, particularly the Abrolhos Islands (Hussey et al. 2007).

Mesembryanthemum crystallinum (iceplant) – Recorded on 134 islands in the Midwest Region, Saint Alouarn Island and Seal Island near Cape Leeuwin in the South West Region, and five islands in the Swan Region (Fig. 6h). Prioritised as L (D, E) in the Midwest Region, L (D) in the South West Region, and VH (H, I) in the Swan Region. Outcompetes native herbs in bird rookeries, possibly by altering soil chemistry (Keighery 1993). On Rottnest Island, the only WA Herbarium specimen collected is from a small island within a lake. Removal from islands in the Swan Region is recommended.

Minuartia mediterranea (fine-leaved sandwort) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as N (B). Both islands have records from inside fenced native mammal exclosures, suggesting potential suppression by quokka and tammar grazing elsewhere on the island. Limited coastal distribution in WA from Busselton to Perth.

Mirabilis jalapa (four o'clock plant) – Recorded on Garden Island in the Swan Region, where it is prioritised as N (A, B). Garden escape with low invasive potential.

Monoculus monstrosus (stinking roger) – Recorded on Carnac and Garden islands in the Swan Region, where it is prioritised as L (B, C). Marchant and Abbott (1981) reported an earlier record of this plant from Garden Island but it was not noted on a later survey (Keighery 1998) and is assumed extirpated.

Monopsis debilis (pansy lobelia) – Recorded on Ballee, Cooleenup and Jeegarnyeejip islands (Peel–Harvey Estuary) in the Swan Region, where it is prioritised as L (B, C). Common in areas of winter-wet soil on Cooleenup Island (Hussey et al. 1992).

Moraea flaccida (one-leaf cape tulip) – Recorded on six

islands in the Swan Region, where it is prioritised as L (D, E) (Fig. 6i). A declared pest species in WA with a control category of C3. First collected on Rottnest Island in 1994. Notes with a WA Herbarium specimen collected in 1999 describe it as fairly common locally between the road to the airport and Government House Lake. Invading heathlands on Rottnest Island with the potential to become a major weed there, as it is not controlled by quokkas (Keighery 1993).

Moraea miniata (two-leaf cape tulip) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as L (D, E). A declared pest species in WA with a control category of C3. Keighery (1986) recommended its removal from Rottnest Island but noted that it was apparently decreasing near the settlement.

Morus alba (white mulberry) – Recorded as cultivated on Rottnest Island in the Swan Region. Only two recorded naturalised populations in WA are spreading from suckers. Unlikely to become invasive.

Musa acuminata (banana) – Recorded on Garden Island in the Swan Region around a bore. Population apparently died out when a water overflow system was turned off and allowed the soil in the area to dry out (Keighery 1998; Keighery 2005).

Narcissus papyraceus (paperwhite) – Recorded on Rottnest Island in the Swan Region from a single WA Herbarium specimen collected in 2000. A few clumps were present on both sides of the road near the former commanding officers house. Plants were partially eaten by quokkas. Prioritised as N (A, B) in the Swan Region.

Narcissus tazetta (jonquil) – Recorded on Cooleenup, Garden and Rottnest islands in the Swan Region, where it is prioritised as N (A, B). On Cooleenup Island it was reported to be increasing slowly near houses in 1990 (Hussey et al. 1992). Removal of the population at the Rottnest Island cemetery was considered but did not occur because plants were determined to be of a rare 19th century cultivar (Keighery 1986). A low-risk garden escape.

Nerium oleander (oleander) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as L (B, C, D). The Garden Island population consists of a few persisting plants between Dance Head and Beacon Head (Keighery 1998). On Rottnest Island, cultivated plants were present along access roads on the east end of the island (Keighery 1986). Records with a WA Herbarium specimen from 1998 noted that only three plants had naturalised from these plantings. Keighery (1986) recommended the removal of the cultivated trees due to risks posed by their toxicity.

Nicotiana glauca (tree tobacco) – Recorded on Babbage, Dirk Hartog, Pigeon and Whitlock (near Carnarvon) islands in the Midwest Region and Garden and Rottnest islands in the Swan Region. Keighery (1993) stated that individuals on Garden Island had been removed to prevent a serious invasion similar to what has occurred

in woodland on the adjacent mainland. Keighery (1998) reported that *N. glauca* was known from previous literature on the island but that its status was unknown, implying possible eradication. However, records with a WA Herbarium specimen collected in 2002 noted a population of 21–50 plants on the north side of Sewage Pond Road. Keighery (1986) recommended that the population of *N. glauca* on Rottnest Island be contained to the settlement area and suggested the possibility of total removal. Two subsequent WA Herbarium records from 1998 noted a single plant around the bus workshop and store compound and a mature plant surrounded by seedlings halfway out to the main jetty. Five years later it was still listed as an eradication target (Rippey et al. 2003). Prioritised as L (B, C, D) in the Midwest Region and M (D, E, F, G) in the Swan Region.

Oenothera drummondii subsp. *drummondii* (beach evening primrose) – Recorded on Garden Island in the Swan Region, where it is prioritised as M (D, E, F). The record is from a single specimen collected on the causeway on the south end of the island in 1996. The specimen appears to have been the only individual present and was removed.

Olea europaea (olive) – Recorded on Carnac and Rottnest islands in the Swan Region, where it is prioritised as H (H, I). A major invader of bushland in South Australia (Hussey et al. 2007). Notes with a WA Herbarium specimen state that two plants were observed on the east side of Carnac Island in 2008 and were subsequently treated with herbicide. Rippey et al. (2003) only recorded *O. europaea* as cultivated on Rottnest Island but records with a WA Herbarium specimen collected in 1999 noted naturalised trees in fenced regeneration plots on the golf course near Garden Lake. All naturalised plants should be eradicated and consideration should be given to removing cultivated plants from Rottnest Island, particularly those in bushland areas away from the main settlement.

Opuntia stricta (common prickly pear) – Recorded on Basile and Rat islands in the Midwest Region, where it is prioritised as M (D, E, F, G). A Declared Pest Species in WA with a control category of C3. Listed as a Weed of National Significance. Included as one of the IUCN's 100 World's Worst Invasive Species. *O. stricta*, along with most other *Opuntia* species, is listed as an official target for biological control. Cochineal insects (*Dactylopius* spp.) and cactus-feeding moths (*Cactoblastis cactorum*) have been used independently or together to successfully control *O. stricta* in numerous locations in Australia and overseas (Hosking 2012). A WA Herbarium record from Rat Island collected in 2003 came from a single plant on the east side of the research hut accommodation. This species should be removed from both Basile and Rat islands.

Ornithogalum arabicum (lesser cape lily) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as an alert species. Garden escape with small localised populations on both islands. First

recorded on Rottnest Island from a WA Herbarium specimen collected in 2004 that was taken from a group of 6–20 plants near Thompson Bay. These populations should be evaluated for potential eradication.

Ornithopus compressus (yellow serradella) – Recorded on Channel, Cooleenup and Meeyip islands in the Swan Region, where it is prioritised as L (B, C). All three islands are in Peel Inlet. A weed of disturbed areas and wetlands (Hussey et al. 2007).

Orobanche minor (lesser broomrape) – Recorded on Dirk Hartog and East Wallabi islands in the Midwest Region, Hamelin Island in the South West Region, and nine islands in the Swan Region (Fig. 6j). Recorded in older literature but now presumed extirpated from Rottnest Island (Rippey et al. 2003). Prioritised as L (B, C) in the Midwest Region, N (B) in the South West Region, and N (B) in the Swan Region. Can negatively impact adjacent plants through direct parasitism of the roots.

Oxalis corniculata (yellow wood sorrel) – Recorded on five islands in the Midwest Region and five islands in the Swan Region (Fig. 6k). Prioritised as N (A, B) in the Midwest Region and N (A, B) in the Swan Region. Primarily a low-risk weed of lawns and gardens.

Oxalis glabra (finger-leaf oxalis) – Recorded on five islands in Peel Inlet in the Swan Region, where it is prioritised as L (C) (Fig. 6l). Common in disturbed bushland in coastal south-west WA.

Oxalis pes-caprae (soursob) – Recorded on 11 islands in the Swan Region, where it is prioritised as L (C) (Fig. 7a). Only recorded once on Rottnest Island at Bathurst Point in 1990. Keighery (1998) noted that it was known from previous literature on Garden Island and had the potential to become a serious weed but its status at the time was unknown. Noted as being common in disturbed areas of Cooleenup Island (Hussey et al. 1992). Control of *O. pes-caprae* should be a priority on islands like Rottnest and Garden where infestations are small and localised but is probably not warranted on islands with established populations.

Oxalis purpurea (largeflower wood sorrel) – Recorded on Cooleenup and Yunderup islands in the Swan Region, where it is prioritised as L (C). Hussey et al. (1992) noted that it was common in sandy soil near houses on Cooleenup island in 1990.

Parapholis incurva (coast barbgrass) – Recorded on 15 islands in the Midwest Region, Hamelin Island in the South West Region, and 10 islands in the Swan Region (Fig. 7b). Prioritised as L (D) in the Midwest Region, N (B) in the South West Region, and L (C) in the Swan Region. Common grassy weed in saline soils in south-west WA.

Parentucellia latifolia (common bartsia) – Recorded on Carnac, Garden and Rottnest islands in the Swan Region but may be extirpated from all three. *P. latifolia* has records from Carnac Island from 1958 and 1966 but was not observed on two more recent surveys (Abbott et al. 2000). Similarly, it was recorded in older literature

as being present on Garden Island, but Keighery (1998) listed its status as unknown and it is now believed to be extirpated on Rottnest Island (Rippey et al. 2003). Prioritised as N (B) in the Swan Region.

Parentucellia viscosa (sticky bartsia) – Recorded on Channel, Cooleenup and Jeegarnyeejip islands in Peel Inlet in the Swan Region, where it is prioritised as N (B). Described as ‘occasional in disturbed areas’ on Cooleenup Island in 1990 (Hussey et al. 1992). Primarily found in winter-wet areas like those present on the Peel Inlet islands and unlikely to invade most other west coast islands that lack similar habitat.

Paspalum distichum (water couch) – Recorded on Meeyip Island in the Swan Region, where it is prioritised as L (D, E). Notes with a WA Herbarium specimen collected in 2000 describe this species as abundant on the island. Populations in south-west WA are naturalised but the status of the Kimberley populations is ambiguous (Hussey et al. 2007).

Paspalum vaginatum (salt water couch) – Recorded on nine islands in the Swan Region, all of which are in Peel Inlet (Fig. 7c). Prioritised as L (D, E) in the region. Primarily found on saline mudflats and is not likely to invade other west coast islands outside of Peel Inlet. The status of this plant in Australia is uncertain in some regions but it is believed to be naturalised in the south-west of WA (Hussey et al. 2007).

Pelargonium capitatum (rose pelargonium) – Recorded on Carnac, Garden, Penguin and Rottnest islands in the Swan Region, where it is prioritised as L (D, E). A fairly serious weed of dunes and coastal heathland in south-west WA that is capable of invading relatively undisturbed bushland. Despite being listed as present on Carnac Island since 1951 (Abbott et al. 2000) notes with a WA Herbarium specimen collected in 2000 indicate that there was only one patch of *P. capitatum* present on the island. If the population on Carnac is still small and localised, eradication might be advisable.

Pelargonium x domesticum (garden geranium) – Recorded on Cooleenup Island in the Swan Region. Hussey et al. (1992) documented a single small population near houses in 1990. Prioritised as N (A, B) in the Swan Region. A low-risk garden escape.

Petrorhagia dubia (wild pink) – Recorded on Rat Island in the Midwest and 10 islands in the Swan Region (Fig. 7d). Sometimes recorded by the synonym *Petrorhagia velutina*. Prioritised as L (B, C) in the Midwest Region and L (D) in the Swan Region. Common weed throughout south-west WA.

Petroselinum crispum (parsley) – Recorded on Little Rat, Rat and Roma islands in the Houtman Abrolhos in the Midwest Region, where it is prioritised as N (A, B). Garden escape, probably previously cultivated by resident fishermen. Only known to be naturalised at one other site in WA (Hussey et al. 2007).

Phalaris canariensis (canary grass) – Recorded on Post Office Island in the Midwest Region, where it is

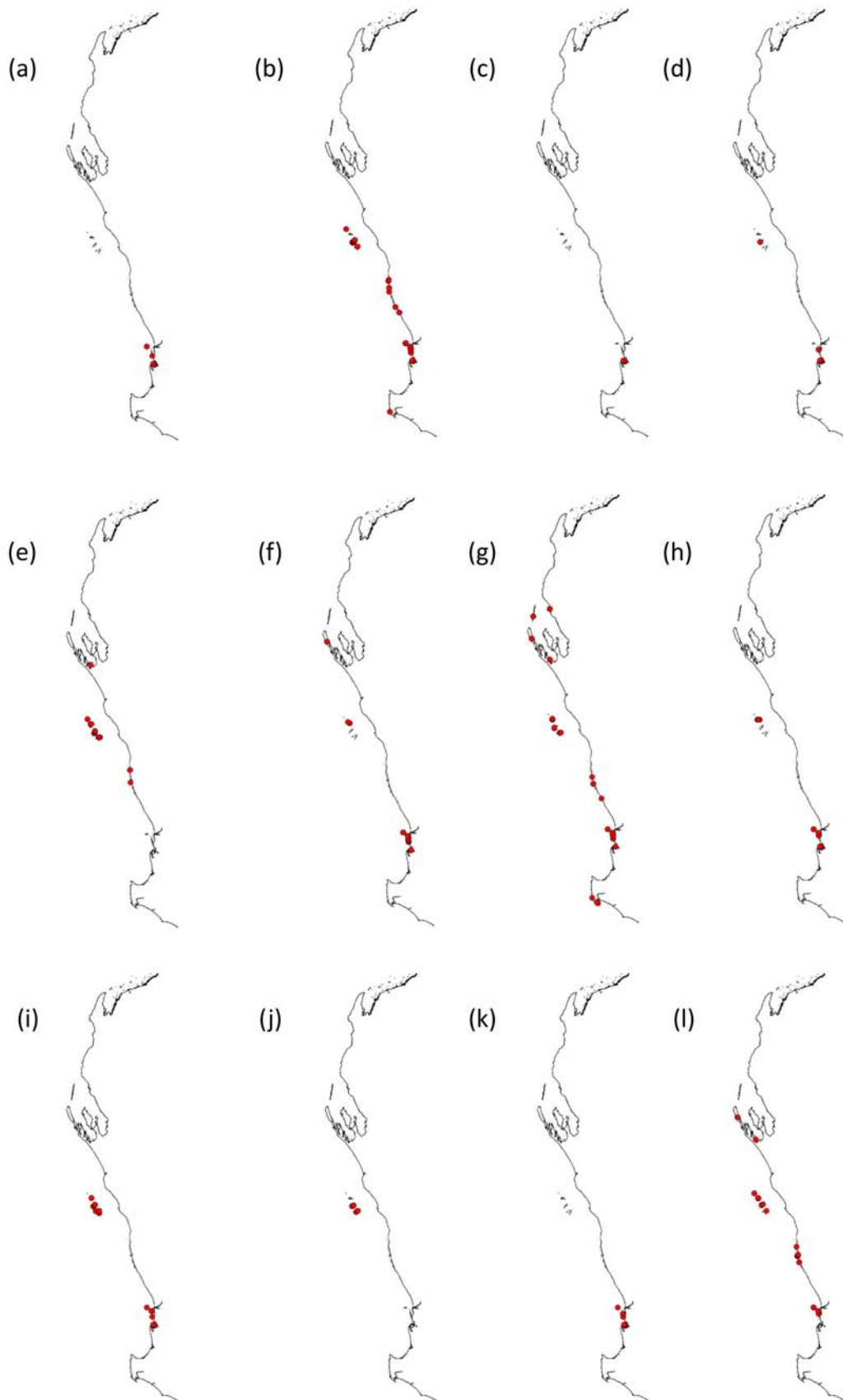


Figure 7. Distribution of *Oxalis pes-caprae*, (b) *Parapholis incurva*, (c) *Paspalum vaginatum*, (d) *Petrorhagia dubia*, (e) *Phalaris minor*, (f) *Poa annua*, (g) *Polycarpon tetraphyllum*, (h) *Polypogon monspeliensis*, (i) *Raphanus raphanistrum*, (j) *Reichardia tingtana*, (k) *Romulea rosea* and (l) *Rostraria cristata* on islands of the west coast of Western Australia.

prioritised as N (A, B). Cultivated crop that is raised for birdseed.

Phalaris minor (lesser canary grass) – Recorded on 16 islands in the Midwest Region, where it is prioritised as N (A, B) (Fig. 7e). Records with a WA Herbarium specimen collected in 1987 note that it was common on Alexander Island. Resistant to some herbicides (Western Australia Herbarium 1998–).

Phalaris paradoxa (paradoxa grass) – Recorded on Garden Island in the Swan Region, where it is prioritised as L (B, C, D). Only reported occurrence on Garden Island is from a WA Herbarium specimen collected in 1978.

Phleum pratense (timothy) – Recorded on Gun Island in the Midwest Region, where it is prioritised as an alert species. Cultivated for hay and as a pasture grass. All WA Herbarium records of naturalised populations are from the south coast of WA (Western Australia Herbarium 1998–). The current status of this population and its impacts should be evaluated in light of its alert status in the region.

Phoenix canariensis (Canary Islands date palm) – Recorded on Carnac Island in the Swan Region in 1975 but not on subsequent surveys in 1995 and 1996 (Abbott et al. 2000). Cultivated on Rottnest Island. WA Herbarium records show it is naturalised at one location in the Swan Region.

Phoenix dactylifera (date palm) – Recorded as cultivated on Rottnest Island in the Swan Region. Problematic weed around lakes in arid parts of WA (Hussey et al. 2007).

Phormium tenax (New Zealand flax) – Recorded as cultivated on Rottnest Island in the Swan Region. Not prioritised in WA because only one specimen from a naturalised population exists at the WA Herbarium and it was not collected on Parks and Wildlife tenure. Probably low risk on Rottnest Island.

Phytolacca octandra (pokeweed) – Recorded on Garden Island in the Swan Region, where it is prioritised as L (B, C). Records with a WA Herbarium specimen collected in 1992 noted that it was common in a deep, interdunal valley near Luscombe Bay. Rapidly colonises disturbed areas via bird-dispersed fruit and can shade out adjacent vegetation.

Pinus halepensis (Aleppo pine) – Recorded as cultivated on Rottnest Island in the Swan Region, where it is listed as an alert species. Removal of cultivated plants from Rottnest Island should be considered.

Pinus radiata (radiata pine) – Recorded as cultivated on Rottnest Island in the Swan Region, where it is prioritised as L (B, C). Invading bushland and edges of roads from commercial plantations in the Perth area (Hussey et al. 2007). Any seedlings should be controlled and mature trees that are removed should not be replaced.

Piptatherum miliaceum (rice millet) – Recorded on Cooleenup Island in the Swan Region, where it is

prioritised as L (B, C). Described as ‘occasional on disturbed channel bank near houses’ in 1990 (Hussey et al. 1992).

Plantago coronopus (buckshorn plantain) – Recorded on Little Rat Island in the Midwest Region and Garden Island in the Swan Region. Prioritised as M (D, E, F, G) in the Midwest Region and L (B, C) in the Swan Region. Notes with a WA Herbarium specimen collected in 1999 record it as ‘occasional’ on Little Rat Island. This species should be managed on Little Rat Island to prevent spread to adjacent Abrolhos islands.

Poa annua (winter grass) – Recorded on Beacon, Dirk Hartog and East Wallabi islands in the Midwest Region and nine islands in the Swan Region (Fig. 7f). Prioritised as L (B, C, D) in the Midwest Region and L (B, C) in the Swan Region. A component of lawns in several parts of Rottnest Island. Low risk to native ecosystems.

Polycarpon tetraphyllum (fourleaf allseed) – Recorded on 16 islands in the Midwest Region; Hamelin, Saint Alouarn and Seal islands near Cape Leeuwin in the South West Region; and five islands in the Swan Region (Fig. 7g). Prioritised as L (B, C, D) in the Midwest Region and L (B, C) in the Swan Region. Widespread weed along the south and west coasts of WA.

Polypogon maritimus (coast beardgrass) – Recorded on Rottnest Island in the Swan Region, where it is prioritised as N (B). All specimens from Rottnest Island were recorded from lake edges.

Polypogon monspeliensis (annual beardgrass) – Recorded on Little Pigeon, Long and West Wallabi islands in the Midwest Region and 13 islands in the Swan Region (Fig. 7h). Prioritised as L (D) in the Midwest Region and L (B, C) in the Swan Region. Common weed in disturbed wetlands (Hussey et al. 2007). Keighery (1998) noted that it was known on Garden Island from previous literature but the current status on the island was unknown. Subsequent collection of a WA Herbarium specimen in 2002 showed it to be present in at least one part of the island in a patch of recently disturbed soil.

Portulaca oleracea (common purslane) – Recorded on Salutation, Freycinet and White islands, all of which are in Shark Bay in the Midwest Region, as well as on Rottnest Island in the Swan Region. This plant has both native and naturalised forms in WA but plants in the south-west are generally thought to be weedy. Rippey et al. (2003) recorded this plant as native on Rottnest Island but note that it is believed to be extinct on the island. Populations on the three islands in Shark Bay were specifically listed as naturalised and probably are weedy forms based on their distribution. Prioritised as L (C) in the Swan Region and N (A, B) in the Midwest Region.

Portulacaria afra (dwarf jade plant) – Recorded on Rat Island in the Midwest Region from a WA Herbarium specimen collected in 2003. Popular ornamental that escapes cultivation via establishment of cuttings in dumped garden waste. The Rat Island population

probably originated from ornamentals planted near fishing shacks. Prioritised as L (B, C, D) in the Midwest Region, but Hussey et al. (2007) caution that it could become a serious weed in arid areas.

Prosopis pallida (mesquite) – Recorded on Babbage and Water Supply islands in the Midwest Region, where it is prioritised as VH (H, I). Notes with a WA Herbarium specimen collected in 1993 record a single tree on Water Supply Island. Listed as a Weed of National Significance. A prohibited species in WA with a control category of C2. Target of a state-wide eradication program. An official target for biological control. Several biological control insects have been released, with one moth species (*Evippe* sp.) causing significant defoliation of all *Prosopis* species in the Pilbara region (van Klinken 2012). The tree on Water Supply Island has likely already been removed but all populations of this tree on WA islands should be actively controlled with the ultimate goal of complete eradication.

Punica granatum (pomegranate) – Recorded as present on Garden Island by Marchant and Abbot (1981) but later described as extinct (Keighery 1998). Probably from an old garden planting. Only known to have naturalised in one inland location in WA (WA Herbarium 1998–).

Raphanus raphanistrum (wild radish) – Recorded on 10 islands in the Midwest Region and eight islands in the Swan Region (Fig. 7i). A serious agricultural weed but mostly found at highly disturbed sites. Prioritised as L (D, E) in the Midwest Region and N (B) in the Swan Region. Noted as common on many islands where it occurs. Only one specimen has been recorded on Rottnest Island in 1999. Possibly extirpated on Rottnest Island.

Raphanus sativus (radish) – Recorded on Alexander, Basile and Burnett (also known as Fin) islands in the Midwest Region, where it is prioritised as N (A, B). Notes with a WA Herbarium specimen collected from Alexander Island state that it was common in a patch near an old dwelling. Possibly naturalised from an old vegetable patch.

Rapistrum rugosum (turnip weed) – Recorded on Carnac Island in the Swan Region. Not prioritised for the region. A serious agricultural weed in some parts of Australia (Hussey et al. 2007). Risk to natural areas in the Swan Region needs to be evaluated.

Reichardia tingitana (false sowthistle) – Recorded on five islands in the Midwest Region, all of which are part of the Abrolhos Archipelago (Fig. 7j). Common in Geraldton and other mainland areas adjacent to the Abrolhos Islands. Prioritised as L (B, C) in the region.

Reseda alba (white mignonette) – Recorded on Rottnest Island in the Swan Region. Collected around 1928 and now presumed to be extirpated from Rottnest Island (Rippey et al 2003).

Reseda luteola (wild mignonette) – Recorded on Rottnest Island in the Swan Region. Collected once in 1951 and now presumed to be extirpated from Rottnest Island (Rippey et al. 2003).

Rhamnus alaternus (buckthorn) – Recorded on Rottnest Island in the Swan Region, where it is prioritised as H (G, H, I). Ornamental shrub that is naturalising in the Swan Region (Hussey et al. 2007). Naturalised on Rottnest Island from garden plantings and now targeted for eradication (Rippey et al. 2003). This species spreads rapidly due to its bird-dispersed fruit and is difficult to control.

Ricinus communis (castor oil plant) – Recorded on Dirk Hartog Island in the Midwest Region and Carnac, Garden and Rottnest Islands in the Swan Region. Prioritised as H (G, H, I) in the Midwest Region and M (D, E, F) in the Swan Region. Its seeds are highly toxic to humans and livestock. Capable of forming monospecific stands and shading out adjacent vegetation, particularly in disturbed areas. Cultivated on Rottnest Island in 1884 for the production of castor oil, it is now naturalised and targeted for eradication (Rippey et al 2003). Eradication from other islands where it is present is also recommended.

Romulea flava (yellow onion grass) – Recorded on Cooleenup and Meeyip islands in the Swan Region, where it is prioritised as N (B). It was noted to be uncommon in areas with sandy soil on Cooleenup Island in 1990 (Hussey et al. 1992).

Romulea rosea (Guildford grass) – Recorded on 13 islands in the Swan Region, where it is prioritised as N (B) (Fig. 7k). Identified as *R. rosea* var. *australis* on Garden and Rottnest islands. A common weed of agricultural and bushland areas throughout south-west WA (Hussey et al. 2007). The only record from Garden Island is a WA Herbarium specimen from a population of 2–5 plants collected in 2002 from recently disturbed soil near Stirling's Well. If this population remains small, controlling it before it can establish is advisable.

Rorippa nasturtium-aquaticum (watercress) – Recorded on Garden Island in the Swan Region, where it is prioritised as L (B, C, D). Recorded as present on Garden Island by Marchant and Abbott (1981) but believed by Keighery (1998) to be extinct on the island. Edible garden plant that has occasionally escaped into wetlands.

Rostraria cristata (annual cat's tail) – Recorded on 14 islands in the Midwest Region and Carnac, Garden and Rottnest islands in the Swan Region (Fig. 7l). Sometimes recorded by the synonyms *Trisetaria cristata* and *Lopochloa cristata*. Prioritised as L (B, C, D) in the Midwest Region and FAR in the Swan Region. Common grassy weed of coastal heath and offshore islands (Hussey et al. 2007).

Rostraria pumila (tiny bristle-grass) – Recorded on nine islands in the Midwest Region, where it is prioritised as L (B, C, D) (Fig. 8a). Island records are frequently from dunes.

Rumex conglomeratus (clustered dock) – Recorded on Garden Island in the Swan Region, where it is prioritised as L (B, C). Keighery (1998) noted that previous literature stated that *R. glomeratus* was present at Beacon Head

and probably referred to *R. conglomeratus*. No recent records of this plant are known from Garden Island.

Rumex crispus (curled dock) – Recorded on 10 islands in the Swan Region, all of them in Peel Inlet (Fig. 8b). Prioritised as L (B, C) in the region. Targeted for biological control along with several other introduced *Rumex* species considered to be agricultural weeds. Introduction of a biological control moth (*Pyropteron chrysidiformis*) has caused substantial reductions in the density of several introduced dock species across WA (Strickland et al. 2012). *Rumex* populations on the Peel Inlet islands should be surveyed for the presence of *P. chrysidiformis*. If not already present, introduction of this moth could provide a cost-effective method of reducing *Rumex* populations.

Rumex pulcher (fiddle dock) – Recorded on Carnac, Jeegarnyeejip, Meeyip and Yunderup islands in the Swan Region, where it is prioritised as L (B, C). A WA Herbarium specimen from Carnac Island was identified as *R. pulcher* subsp. *pulcher*. One of the most problematic of the introduced *Rumex* species in agricultural systems. Like *R. crispus*, *R. pulcher* is also targeted for biological control and is impacted by the moth *P. chrysidiformis*.

Sagina apetala (annual pearlwort) – Recorded on 12 islands in the Midwest Region and Bird, Carnac, Garden and Rottneest islands in the Swan Region (Fig. 8c). Prioritised as N (B) in the Midwest and Swan regions. Minor weed throughout south-west WA.

Sagina maritima (sea pearlwort) – Recorded on Saint Alouarn and Seal islands (south of Augusta) in the South West Region and Bird, Carnac, Garden and Rottneest islands in the Swan Region. Individuals on Seal and Saint Alouarn islands were misidentified as *S. apetala* when first recorded in 1959. Prioritised as L (C) in the South West Region and N (B) in the Swan Region.

Salsola australis (prickly saltwort) – Recorded as a weed on 21 islands in the Midwest Region. Now considered a native plant.

Schenkia australis (spike centaury) – Recorded as a weed on ten islands in the Midwest Region and Cooleenup Island in the Swan Region. Often recorded by the misapplied name *Cantaurium spicatum*. Surveys in 1990 failed to find this plant on Cooleenup Island (Hussey et al. 1992). Now considered native to WA.

Schinus terebinthifolius (Brazilian pepper tree) – Recorded on Garden and Rottneest islands in the Swan Region, where it is prioritised as M (D, E, F). Keighery (1998) described the Garden Island population as a few individuals persisting at Beacon Head. Reported to be cultivated on Rottneest Island (Ripley et al. 2003). Listed by the IUCN as one of the world's 100 worst invasive species. Common ornamental that has escaped cultivation and is capable of aggressively invading undisturbed bushland. Toxic to some livestock (Morton 1978). Exposure to pollen can cause flu-like symptoms and sap can cause severe contact dermatitis in susceptible individuals (Morton 1978). All populations

on islands should be removed. Islands close to mainland source populations may require occasional surveys because *S. terebinthifolius* produces fruits that are eaten and dispersed by birds.

Schinus molle var. *areira* (pepper tree) – Recorded on Bernier Island in the Midwest Region, where it is prioritised as M (D, E, F, G). A single plant documented as persisting at the old hospital site. There is the potential for more plants to be found and the sole tree should be removed.

Secale cereale (rye) – Recorded on Garden Island in the Swan Region. Known on Garden Island from a WA Herbarium specimen collected in 1996. Specimen notes indicate that it was collected in a highly disturbed development zone and suggested it was a contaminant in seed mix used in the area. Hussey et al. (2007) note that sterile hybrids of this species are commonly used as a sand stabiliser in construction areas around Perth, which may explain the origin of this specimen and its apparent failure to persist.

Senecio angulatus (scrambling groundsel) – Recorded on Penguin Island in the Swan Region under the synonym *S. tamoides*. Prioritised as N (A, B) in the region. Grows as a vine and smothers adjacent vegetation (WA Herbarium 1998–). Should be removed from Penguin Island.

Senecio elegans (purple groundsel) – Recorded on Hamelin Island (north of Cape Leeuwin), Saint Alouarn Island, and Seal Island (south of Augusta) in the South West Region, where it is prioritised as N (B). Believed to only persist at disturbed sites (WA Herbarium 1998–).

Senecio vulgaris (common groundsel) – Recorded on Garden Island in the Swan Region, where it is prioritised as L (B, C, D). On road verges around Stirling Base (Keighery 1998). Found primarily in disturbed areas and gardens (Hussey et al. 2007). Low threat to intact bushland.

Setaria verticillata (whorled pigeon grass) – Recorded on Bernier and Dorre islands in the Midwest Region, where it is prioritised as N (A, B). Common weed in disturbed areas across WA but most common in the Pilbara.

Sherardia arvensis (field madder) – Recorded on Garden Island in the Swan Region, where it is prioritised as L (B, C, D). Distribution on Garden Island described as 'scattered in valleys and woodlands' (Keighery 1998). Invades disturbed woodlands but not a major weed.

Silene gallica (French catchfly) – Recorded on Baudin, Dirk Hartog, Three Bays and White islands in the Midwest Region and 12 islands in the Swan Region, 11 of which are in Peel Inlet (Fig. 8d). Some plants on Dirk Hartog Island have been identified as *S. gallica* var. *gallica*. Prioritised as L (B, C) in the Midwest Region and N (B) in the Swan Region. Mostly found in disturbed and agricultural areas.

Silene nocturna (Mediterranean catchfly) – Recorded on nine islands in the Midwest Region and Carnac,

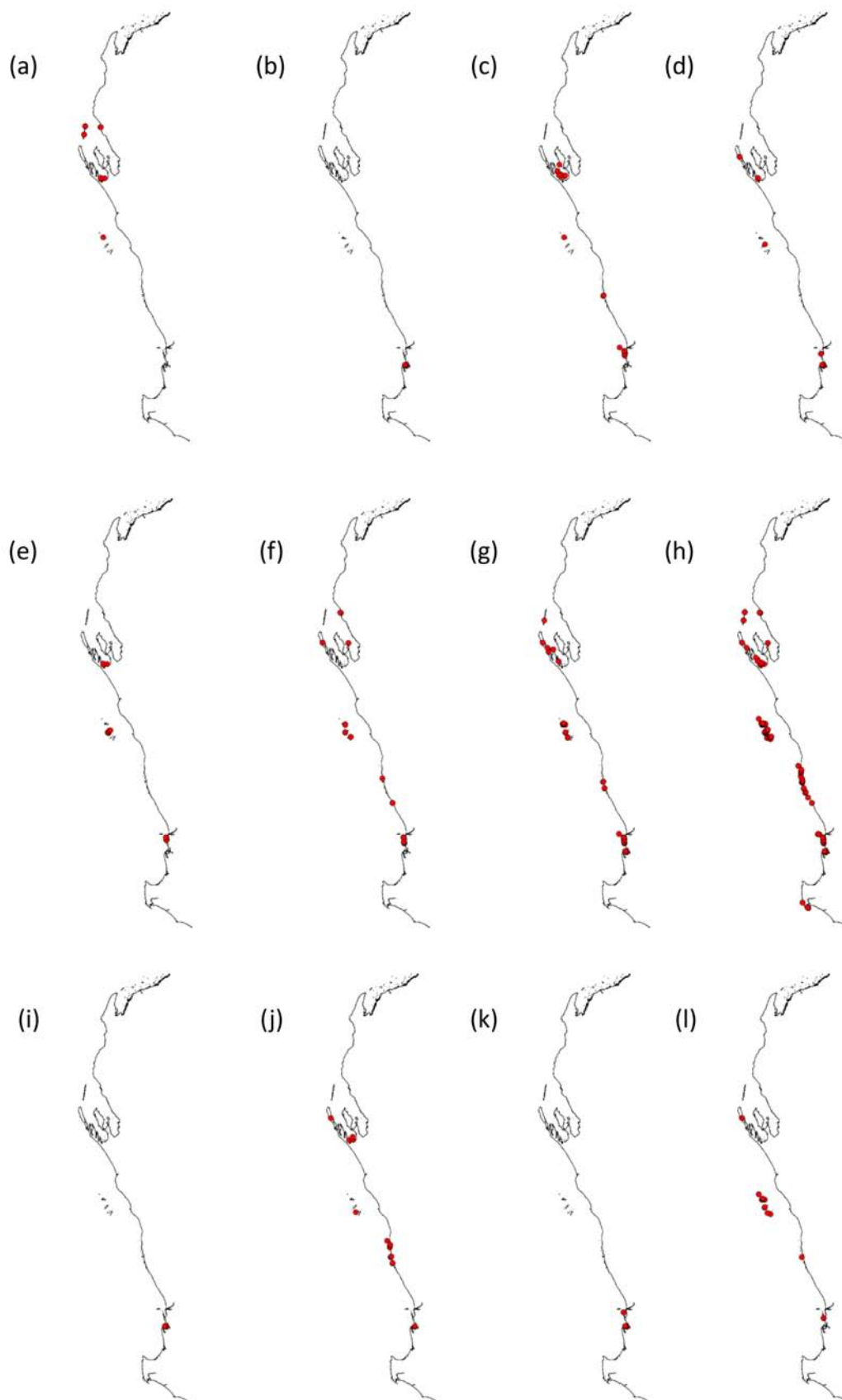


Figure 8. Distribution of (a) *Rostraria pumila*, (b) *Rumex crispus*, (c) *Sagina apetala*, (d) *Silene gallica*, (e) *Silene nocturna*, (f) *Sisymbrium orientale*, (g) *Solanum nigrum*, (h) *Sonchus oleraceus*, (i) *Spergula arvensis*, (j) *Spergularia diandra*, (k) *Spergularia marina* and (l) *Spergularia rubra* on islands of the west coast of Western Australia.

Garden and Rottnest islands in the Swan Region (Fig. 8e). Presumed extinct on Rottnest Island. Prioritised as L (B, C) in the Midwest Region and N (B) in the Swan Region. Mainly found in disturbed areas.

Sisymbrium erysimoides (smooth mustard) – Recorded on Dirk Hartog, Salutation and Three Bays islands in the Midwest Region, where it is prioritised as L (B, C, D). Notes with a WA Herbarium specimen collected in 1989 state that the population on Three Bays Island consisted of 30–40 plants on the edge of a sea cliff on the south side of the island.

Sisymbrium irio (London rocket) – Recorded on Dirk Hartog, Lancelin, Lipfert and Suomi islands in the Midwest Region and Carnac Island in the Swan Region. Prioritised as L (B, C, D) in both the Midwest and Swan regions. Notes with a WA Herbarium specimen collected on Carnac Island in 2000 state that it was collected in an area where all vegetation had previously been killed by cormorant nesting.

Sisymbrium orientale (Indian hedge mustard) – Recorded on 11 islands in the Midwest Region and seven islands in the Swan Region (Fig. 8f). Recorded as present on Rottnest Island by Marchant and Abbott (1981) but now presumed to be extirpated (Rippey et al. 2003). Similarly, on Garden Island it appears in historical literature but was not found in more recent surveys (Keighery 1998). This pattern suggests possible reduction in abundance due to grazing pressure from quokkas and tammars. Records from Carnac Island and Shag Rock both refer to this plant as colonising areas where existing vegetation was destroyed by cormorant nesting. This type of disturbance may facilitate spread of this weed.

Solanum laciniatum (kangaroo apple) – Recorded on East Wallabi Island (Houtman Abrolhos) in the Midwest Region, where it is prioritised as L (B, C, D). Garden escape native to eastern Australia (Western Australia Herbarium 1998–). The East Wallabi Island population may have originated in gardens around fishermen's shacks on adjacent islands.

Solanum nigrum (black berry nightshade) – Recorded on 21 islands in the Midwest Region and 16 islands in the Swan Region (Fig. 8g). Prioritised as L (D) in the Midwest Region and L (B, C) in the Swan Region. Common and widespread weed throughout WA. Its bird-dispersed berries can be toxic to humans (Western Australia Herbarium 1998–).

Solanum nodiflorum (glossy nightshade) – Recorded on Dirk Hartog Island in the Midwest Region. Until 2015, this species was listed as an excluded name in WA that was mistakenly applied to *S. americanum*. However, a recent genetic study suggests that Australian material currently attributed to *S. americanum* is actually *S. nodiflorum* (Manoko et al. 2007). Examination of all WA material identified as *S. americanum* found that all specimens matched the description of *S. nodiflorum* in Manoko et al. (2007). To further complicate interpretation of the records, both species are frequently confused with the similar species *S. nigrum*, which

has collections from Dirk Hartog Island in the WA Herbarium. *S. americanum* is currently prioritised as M (D, E, F) in the Midwest Region. Berries can be toxic. If this record is correct and *S. nodiflorum* truly does exist on Dirk Hartog Island, the population is outside of its main naturalised range in WA and should be controlled.

Soliva sessilis (bindyi) – Recorded on Cooleenup Island in the Swan Region under the synonym *S. pterosperma*. Prioritised as N (A) in the Swan Region. Described as 'widespread in lawns and along paths near houses' on Cooleenup Island in 1990 (Hussey et al. 1992). Needle-like projections on its seeds make *S. sessilis* a serious amenity weed if present in lawns.

Sonchus asper (rough sowthistle) – Recorded on Cooleenup, Garden and Worallgarook islands in the Swan Region, where it is prioritised as N (B). Keighery (1998) reported that it was grazed by tammars and was restricted to old clearings near Beacon Head on Garden Island. However, records with a WA Herbarium specimen collected in 2002 noted 21–50 plants at Camp Markham. Biological control organisms under investigation for use on *S. oleraceus* have the potential to control *S. asper* as well.

Sonchus oleraceus (common sowthistle) – Recorded on 100 islands in the Midwest Region, Hamelin, Saint Alouarn and Seal islands near Cape Leeuwin in the South West Region, and 24 islands in the Swan Region (Fig. 8h). Common and widespread throughout WA. Prioritised as L (D) in the South West Region, L (B, C) in the Midwest Region, and N (B) in the Swan Region. Prevalence throughout the mainland and ability for wind-borne seeds to disperse over long distances have allowed it to colonise many west coast islands. Keighery (1998) records its distribution on Garden Island as 'scattered' and suggests that it may be controlled by tammars. Its status as a serious agricultural weed had prompted investigations into biological control options but no organisms have been released to date (Scott & McCarren 2012).

Sorghum bicolor (grain sorghum) – Recorded on Rottnest Island in the Swan Region, where it is prioritised as L (B, C, D). A grain crop with a few naturalised records in the Perth area. Collected on Rottnest Island in 1946–1947 but currently presumed to be extirpated on the island (Rippey et al. 2003). Perhaps a remnant from historical cultivation on the island.

Spergula arvensis (corn spurry) – Recorded on five islands in the Swan Region, all of them in Peel Inlet (Fig. 8i). Prioritised as L (B, C) in the region. Notes with a WA Herbarium specimen collected in 2000 describe its distribution as scattered on Jeegarnyeejip Island, and Hussey et al. (1992) described it as occasional on Cooleenup Island in 1990.

Spergularia diandra (lesser sand spurry) – Recorded on 16 islands in the Midwest Region and on Ballee, Jeegarnyeejip, Jennala and Meeyip islands in the Swan Region (Fig. 8j). Prioritised as FAR in the Midwest

Region and L (B, C) in the Swan Region. Minor weed of disturbed areas.

Spergularia marina (lesser sea spurry) – Recorded on eight islands in the Swan Region (Fig. 8k). Sometimes recorded under the synonym *S. salina*. Some sources still list this species as a weed but it is now considered to be native to WA.

Spergularia rubra (sand spurry) – Recorded on 19 islands in the Midwest and Penguin and Seal islands in the Swan Region (Fig. 8l). Prioritised as FAR in the Midwest Region and L (B, C) in the Swan Region. Populations from Dirk Hartog Island are the northernmost known records of this weed in WA.

Stachys arvensis (staggerweed) – Recorded on Cooleenup, Garden and Yunderup islands in the Swan Region, where it is prioritised as N (B). Common weed in disturbed areas of Cooleenup Island (Hussey et al 1992). Only recorded on Garden Island from a WA Herbarium specimen collected from the picnic area near Pig Trough Bay in 2002.

Stellaria media (chickweed) – Recorded on Lancelin and West Wallabi islands in the Midwest Region, Saint Alouarn and Seal islands in the South West Region, and 11 islands in the Swan Region (Fig. 9a). Prioritised as FAR in the Midwest and South West regions and N (B) in the Swan Region. Minor weed in disturbed areas.

Stellaria pallida (lesser chickweed) – Recorded on Carnac, Garden and Rottnest islands in the Swan Region, where it is prioritised as N (B). Most records of this plant are recent and from the Perth area. It may colonise other islands outside of the Perth area as its range expands.

Stenotaphrum secundatum (buffalo grass) – Recorded on nine islands in the Swan Region, where it is prioritised as L (C) (Fig. 9b). Commonly planted lawn grass. Smothers native herbs and shrubs in *Melaleuca lanceolata* woodlands on Rottnest Island (Keighery 1993). Consideration should be given to replacing this weed with less-invasive grasses in managed lawns on Garden, Penguin and Rottnest Islands.

Symphyotrichum squamatum (bushy starwort) – Recorded on Rat Island in the Midwest Region and 12 islands in the Swan Region (Fig. 9c). Some records refer to *S. subulatum* but in WA this name is listed as misapplied to *S. squamatum* (Western Australia Herbarium 1998–). *S. subulatum* was described as present on most of the Peel Inlet islands by Keighery and Muir (2010). There is currently confusion over which *Symphyotrichum* species are actually present in WA, but at least two distinct forms appear to be included in current WA Herbarium specimens. Records referred to in this entry probably encompass both putative taxa. *S. squamatum* is prioritised as M (D, E, F, G) in the Midwest Region and L (D) in the Swan Region. Management of this plant is recommended on Rat Island to prevent colonisation of adjacent Abrolhos Islands via wind-borne seeds.

Tamarix aphylla (athel pine) – Recorded on Babbage and Whitlock islands near Carnarvon in the Midwest Region

and Rottnest Island in the Swan Region. Recorded as cultivated on Rottnest Island (Rippey et al 2003); however, one WA Herbarium specimen collected on Rottnest Island in 1998 seems to indicate a naturalised individual in an old plantation near Serpentine Lake at the foot of Oliver Hill. Designated as a weed of national significance. A declared pest in WA with a control category of C3. Prioritised as M (D, E, F) in the Midwest Region and H (G, H, I) in the Swan Region. A serious environmental weed in arid parts of WA but has also naturalised in the Perth area. Kills native plants by increasing surface soil salinity and alters local hydrology by consuming large quantities of groundwater (Griffin et al. 1989). Both cultivated and naturalised individuals should be removed from all islands where they exist.

Tecoma stans (yellow trumpetbush) – Recorded as cultivated on Rottnest Island in the Swan Region. Naturalised in WA but only in the Pilbara and Kimberley regions. Not likely to naturalise on Rottnest Island.

Tetragonia decumbens (sea spinach) – Recorded on 15 islands in the Midwest Region, Saint Alouarn and Seal Islands in the South West Region, and 12 islands in the Swan Region (Fig. 9d). Possibly extirpated from Rottnest Island (Rippey et al. 2003). Prioritised as L (D) in the Midwest, South West and Swan Regions. Listed as an alert to control on islands in the Midwest Region. A serious weed on beaches and dunes in south-west WA.

Thinopyrum distichum (sea wheat) – Recorded on Wedge Island in the Midwest Region and Garden Island in the Swan Region. Keighery (1998) recorded only scattered individuals on beaches on Garden Island. Originally introduced for dune stabilization but is rapidly spreading along the coast from the Perth area (Hussey et al. 2007). Prioritised as L (B, C, D) in the Midwest Region and L (C) in the Swan Region.

Trachyantha divaricata (dune onion weed) – Recorded on Boullanger, Escape, Favorite and Lancelin islands in the Midwest Region and seven islands in the Swan Region (Fig. 9e). Prioritised as L (D, E) in the Midwest Region and L (D) in the Swan Region. Widespread weed of coastal dunes and bare sandy areas in south-west WA. Low abundance on Garden Island was at one point attributed to grazing by tammar wallabies (Keighery 1993) but more recently it is described as a common weed of disturbed woodlands, verges, dunes and firebreaks on the island (Keighery 1998).

Tribulus terrestris (caltrop) – Recorded on Babbage and Whitlock islands and an unnamed islet south-east of Whitmore Island near Carnarvon in the Midwest Region, where it is prioritised as M (D, E, F). Some forms of this plant may be native or introduced prior to European settlement, particularly in northern areas of the state (Hussey et al. 2007). Hard, spiny fruits make this species a serious amenity weed in lawns and recreation areas.

Trifolium angustifolium (narrowleaf clover) – Recorded on Garden Island in the Swan Region, where it is

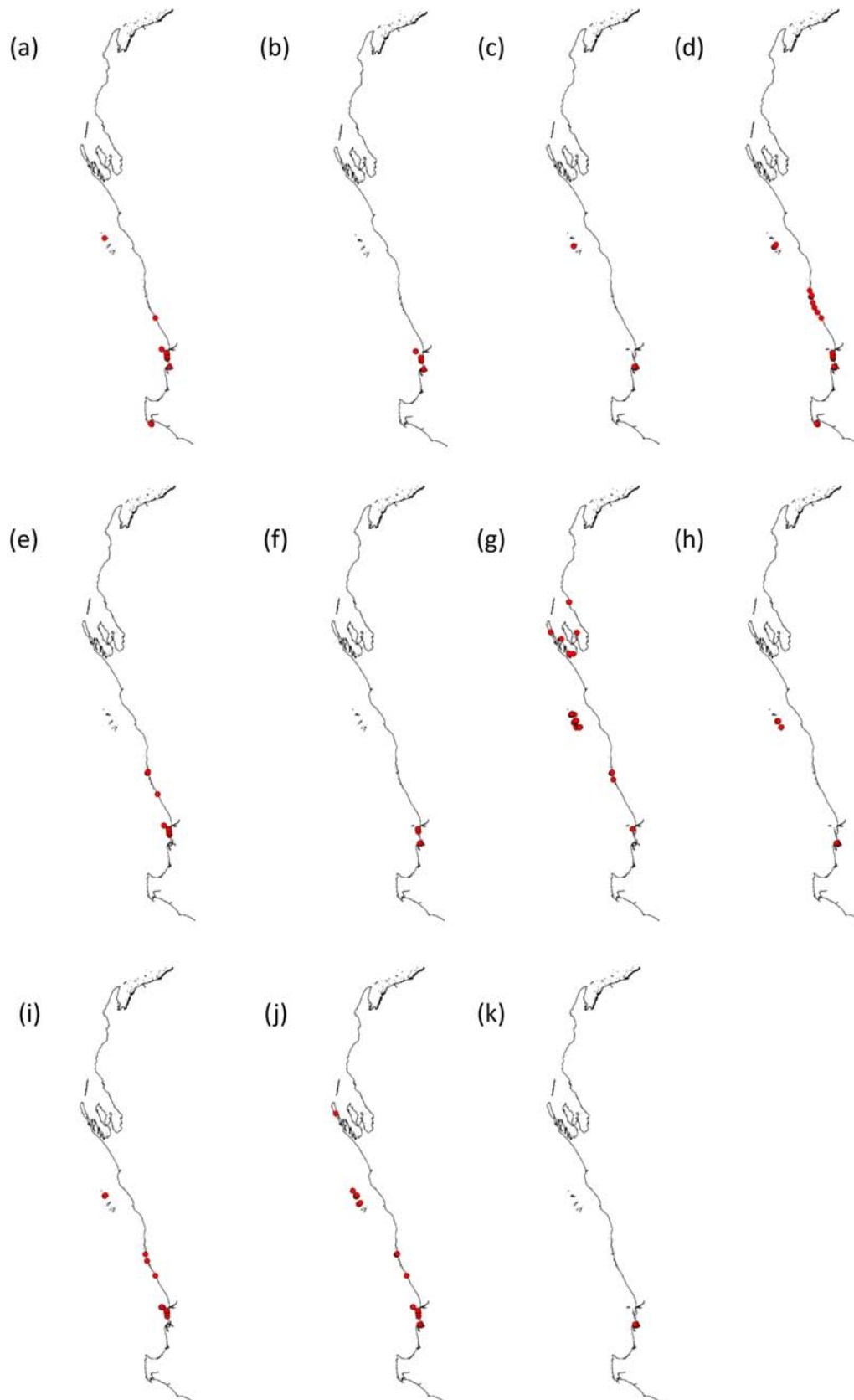


Figure 9. Distribution of (a) *Stellaria media*, (b) *Stenotaphrum secundatum*, (c) *Symphyotrichum squamatum*, (d) *Tetragonia decumbens*, (e) *Trachyandra divaricata*, (f) *Trifolium campestre*, (g) *Urospermum picroides*, (h) *Ursinia anthemoides*, (i) *Urtica urens*, (j) *Vulpia myuros* and (k) *Watsonia meriana* on islands of the west coast of Western Australia.

prioritised as FAR. Known from a single WA Herbarium specimen collected along the edge of tarmac near a wharf in 1996.

Trifolium campestre (hop clover) – Recorded on six islands in the Swan Region, where it is prioritised as FAR (Fig. 9f). A WA Herbarium specimen from Creery Island was identified as *T. campestre* var. *campestre*. Recorded only once on Garden Island in 2003 from a WA Herbarium specimen collected on the road verge beside a carwash. Recorded as early as 1958 on nearby Carnac Island. Abundant on Creery (Western Australia Herbarium 1998–) and Cooleenup (Hussey et al. 1992) islands in the Peel Inlet.

Trifolium dubium (suckling clover) – Recorded on Channel, Cooleenup and Garden islands in the Swan Region, where it is prioritised as FAR. Common in disturbed areas of Cooleenup Island (Hussey et al. 1992). Recorded once on Garden Island from a WA Herbarium specimen collected from disturbed soil at a picnic site in 2002.

Trifolium scabrum (rough clover) – Recorded on Carnac and Garden islands in the Swan Region, where it is prioritised as FAR. Abbott et al. (2000) questioned the identification of this species in previous records on Carnac Island. Garden Island records are all from the southern portion of the island, near the causeway. Only found on the Swan Coastal Plain in WA (Western Australian Herbarium 1998–).

Trifolium subterraneum (subterranean clover) – Recorded on Cooleenup and Yunderup islands in the Swan Region, where it is prioritised as FAR. Occasional around houses on Cooleenup Island (Hussey et al. 1992). Commonly grown as a pasture plant in WA (Western Australia Herbarium 1998–).

Trifolium suffocatum (suffocated clover) – Recorded on Garden and Rottnest islands in the Swan Region. Presumed extinct on Rottnest Island (Ripley et al. 2003). Recorded on Garden Island from a single WA Herbarium specimen collected in 2002 in recently disturbed soil on a roadside.

Trifolium tomentosum (woolly clover) – Recorded on Carnac, Garden and Rottnest islands in the Swan Region, where it is prioritised as FAR. WA Herbarium specimens from Garden and Rottnest islands have been identified as *T. tomentosum* var. *tomentosum*. On Garden Island it is known only from a single specimen collected in 2002.

Triticum aestivum (wheat) – Recorded on North Island in the Midwest Region. The first record on North Island is a WA Herbarium specimen collected in 1959. Common grain crop that probably arrived with resident fishermen. Typically does not persist for more than a few seasons outside of cultivation.

Tritonia gladiolaris (lined tritonia) – Recorded on Cooleenup Island in the Swan Region under the synonym *T. lineata*. A small population was recorded near a house in 1990 (Hussey et al. 1992). Prioritised as L (B, C, D) in the Swan Region.

Typha orientalis (bulrush) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as L (D, E). Substantial evidence suggests that this species is native to WA but has weedy tendencies under certain circumstances (Keighery & McCabe 2015). On Garden Island, this species was thought to be restricted to an area around a bore and was believed to have died out prior to a survey in 1993 (Keighery 1998). However, in 2002 a WA Herbarium specimen was collected from Garden Island. This specimen was from a population of 21–50 plants growing inside an old water tank near the north-west corner of the island. Primarily a problem in freshwater wetlands and is unlikely to spread to other sites on islands where it is present.

Urospermum picroides (false hawkbit) – Recorded on 38 islands in the Midwest Region and Carnac Island in the Swan Region (Fig. 9g). Prioritised as L (D, E) in the Midwest Region and L (D) in the Swan Region. Common on islands in the Abrolhos Archipelago.

Ursinia anthemoides (ursinia) – Recorded on six islands in the Midwest Region and 11 islands in the Swan Region (Fig. 9h). All 11 islands in the Swan Region are located in Peel Inlet. A WA Herbarium specimen from Creery Island was identified as *U. anthemoides* subsp. *anthemoides*. Prioritised as L (D, E) in the Midwest Region and N (B) in the Swan Region.

Urtica urens (small nettle) – Recorded on five islands in the Midwest Region and six islands in the Swan Region (Fig. 9i). Records from the Abolhos Islands represent the northernmost distribution of this species in WA. Often found in high-nutrient soils like those found in seabird colonies (Hussey et al. 2007). Population on Tern Island described as a 'massive infestation' (Keighery 1993). Widespread on Rottnest Island. Prioritised as L (B, C, D) in the Midwest Region and L (D) in the Swan Region. Painful stinging hairs make this a serious amenity weed in areas of human use. Removal from frequently visited areas on Garden Island, Penguin Island and Rottnest Island is recommended.

Vachellia farnesiana (mimosa bush) – Recorded on Babbage and Whitlock islands near Carnarvon in the Midwest Region, where it is prioritised as M (D, E, F). Apparently introduced to Australia from the tropical Americas prior to European settlement (Hussey et al. 2007). Problematic weed around watercourses and should be removed from Babbage and Whitlock islands.

Vellereophyton dealbatum (white cudweed) – Recorded on Snag Island in the Midwest Region and Ballee, Jennala and Yunderup islands in the Swan Region. Prioritised as L (B, C) in the Midwest Region and N (B) in the Swan Region. Common minor weed in disturbed areas across south-west WA.

Verbascum virgatum (twiggy mullein) – Recorded on Garden Island in the Swan Region, where it is prioritised as L (B, C). Keighery (1998) noted that it was known from previous literature but its status on Garden Island was not known.

Verbesina encelioides (golden crownbeard) – Recorded on East Wallabi, North, Pigeon and Rat islands in the Midwest Region, where it is prioritised as VH (H, I). Common and spreading on the mainland adjacent to these islands. *V. encelioides* is allelopathic, competes aggressively with native vegetation, is toxic to livestock, and reduces ability of seabirds to nest successfully in invaded areas (Western Australia Herbarium 1998–). Introduced to East Wallabi Island in 1999 in gravel that was brought in to repair the airstrip (Keighery & Sercombe 2001). In November 2001 over 3000 plants were observed on East Wallabi Island but none were seen on Rat Island or North Island (Keighery & Sercombe 2001). Eradication of all populations in the Abrolhos Islands was recommended (Keighery & Sercombe 2001). Subsequently, populations were discovered on Rat, Pigeon and North islands. As of 2012, *V. encelioides* had not been detected on Rat Island for six years, and detections on East Wallabi, North and Pigeon islands had decreased to less than 10 plants per island (Keighery 2012). Continued surveys should be conducted on these islands to ensure that complete eradication is achieved.

Vicia sativa (common vetch) – Recorded on Channel, Cooleenup and Meeyip islands in the Swan Region, where it is prioritised as N (B). Occasional in sandy soil on Cooleenup Island in 1990 (Hussey et al. 1992). Grows rapidly and can smother native vegetation (Western Australia Herbarium 1998–).

Vinca major (blue periwinkle) – Recorded on Garden Island in the Swan Region, where it is prioritised as N (B). A garden escape which is known from two locations on Garden Island. Keighery (1998) noted naturalised plants at Beacon Head and stated that they were spreading slowly. A WA Herbarium specimen was collected later in 2003 at the north end of the causeway at the car pull-in area. Should be controlled to prevent spread to wetland edges where it can become a problematic invasive.

Vitis vinifera (grape vine) – Recorded on Garden Island in the Swan Region. Marchant and Abbott (1981) recorded it as present but apparently extirpated on the island now (Keighery 1998). Commonly cultivated in WA with some persisting from old plantings but rarely naturalised.

Vulpia fasciculata (dune fescue) – Recorded on Lancelin Island in the Midwest Region, Hamelin Island in the South West Region, and Garden and Rottnest islands in the Swan Region. Sometimes recorded by the synonym *V. membranacea*. On Rottnest Island, it was first collected at Parker Point beach in 1998 and was subsequently collected again at the east end of Longreach Bay in 1999 (Western Australia Herbarium 1998–). On Garden Island, it is recorded from a single WA Herbarium specimen taken from a population of 2–5 plants found in disturbed soil at the north end of the causeway. It has been documented on Hamelin Island since a WA Herbarium specimen was collected in 1959. Prioritised as L (B, C) in the Midwest Region, L (B, C)

in the South West Region and M (D, E, F) in the Swan Region. Current populations of this grass on Rottnest and Garden islands should be assessed and considered for management.

Vulpia muralis (wall fescue) – Recorded on Garden and Rottnest islands in the Swan Region, where it is prioritised as M (D, E, F). First collected on Rottnest island in 1999 (Rippey et al. 2003). Not documented on Garden Island until a WA Herbarium specimen was collected in 2003 from a population of over 50 individuals on a track off Denham Road. Current populations of this grass on Rottnest and Garden islands should be assessed and considered for management.

Vulpia myuros (rat's tail fescue) – Recorded on 16 islands in the Midwest Region and 12 islands in the Swan Region (Fig. 9j). *V. myuros* forma *megalura* and *V. myuros* forma *myuros* have both been documented on islands in the Swan and Midwest regions. Common and widespread throughout south-west WA. Prioritised as L (B, C) in the Midwest Region and M (D, E, F) in the Swan Region. Consideration should be given to managing this weed on islands in the Swan Region.

Wahlenbergia capensis (cape bluebell) – Recorded on Ballee, Creery, Cooleenup and Jeegarnyeejip islands in Peel Inlet in the Swan Region, where it is prioritised as L (B, C). Not found by Hussey et al. (1992) during 1990 surveys of Cooleenup Island despite existence of previous records from the island, but may have been overlooked because it does not flower at the time of year when surveys were conducted.

Washingtonia filifera (California fan palm) – Recorded as cultivated on Rottnest Island in the Swan Region, where it is prioritised as N (A, B). Known to have naturalised in other areas around Perth and capable of forming dense stands (WA Herbarium 2014). Seedlings should be controlled and adults should be replaced with other species by attrition.

Washingtonia robusta (Mexican fan palm) – Recorded as cultivated on Rottnest Island in the Swan Region. Similar to *W. filifera* and the two are known to hybridise (Western Australia Herbarium 1998–). Seedlings should be controlled and adults should be replaced with other species by attrition.

Watsonia meriana var. *bulbillifera* (bulbil watsonia) – Recorded on 11 islands in the Swan Region, all of which are in Peel Inlet (Fig. 9k). Notes with a WA Herbarium specimen from 2000 describe it as abundant on Jeegarnyeejip Island. Hussey et al. (1992) reported that it dominated the ground layer of vegetation around the edges of Culleenup Island in 1990. A serious environmental weed in wet areas of south-west WA (Hussey et al. 2007). Prioritised as H (H, I) in the Swan Region. Management on the Peel Inlet islands will need to address upstream populations to be effective, as bulbils are easily spread by water.

Zantedeschia aethiopica (arum lily) – Recorded on Carnac, Cooleenup, Garden and Rottnest islands in the Swan

Region, where it is prioritised as M (D, E, F, G). Arum lily is currently scheduled for eradication on Rottnest Island and is the target of a major control effort on Garden Island where a widespread infestation was once present (Keighery 1993). Described as locally frequent in a valley on Carnac Island in 1995. A declared pest in WA with a control category of C3 and moderately high PIERS ranking of 13. 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 has recently spread to *Acacia* shrublands and interdunal valleys on Garden Island. Plants are highly toxic and not controlled by tammar or quokkas. This species should be removed when possible to prevent formation of dense monospecific stands.

DISCUSSION

The five islands with the most species-rich weed flora all exhibited attributes we expected would facilitate weed invasion. All five islands were in close proximity to Perth. Additionally, all of these islands, except for Carnac Island, included permanent built structures. The two islands with the most species-rich weed flora—Garden Island and Rottnest Island—have, arguably, the longest history of regular human use and disturbance in Western Australia. Cooleenup Island in the Peel Harvey Estuary was the only estuarine island represented in the five most weedy islands. However, four other islands in the Peel Harvey Estuary (Meeyip, Channel, Ballee and Jeegarnyeejip) were ranked within the top ten islands with the most species-rich weed flora in this analysis.

The weeds that pose the greatest threat to the integrity of west coast island ecosystems were determined to be mother of millions (*Bryophyllum delagoense*), sea spurge (*Euphorbia paralias*), cleavers (*Galium aparine*), African boxthorn (*Lycium ferocissimum*), tree mallow (*Malva arborea*), ice plant (*Mesembryanthemum crystallinum*), common prickly pear (*Opuntia stricta*), sea spinach (*Tetragonia decumbens*) and golden crownbeard (*Verbesina encelioides*). These species are known to be either currently impacting some islands along the west coast to a substantial extent or, in the case of *G. aparine* and *O. stricta*, 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 west coast islands.

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REFERENCES

- Abbott I, Marchant N, Cranfield R (2000) Long-term change in the floristic composition and vegetation structure of Carnac Island, Western Australia. *Journal of Biogeography*, **27** 333–346.
- Blood K (2006) What is an invasive plant? In *Proceedings of Weeds in the Media 2006*. CRC for Australian Weed Management, Adelaide.
- Conservation Commission of Western Australia (2003) *Carnac Island Nature Reserve: Management Plan*. Department of Conservation and Land Management, Perth.
- Conservation and Land Management (1990) *Shoalwater Islands: Draft Management Plan*. Department of Conservation and Land Management, Perth.
- Conservation and Land Management (2004) *Turquoise Coast Island Nature Reserves: Management Plan*. Department of Conservation and Land Management /Conservation Commission of Western Australia, Perth.
- Cunning DA, Glasson M, McCarthey M (1995) *Lighthouses of the Western Australian Coast and Off-Shore Islands*. Report 100, Western Australian Maritime Museum, Department of Maritime Archaeology, Fremantle.
- Day M (2012) *Lantana camara* L. – lantana. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 334–346. CSIRO Publishing, Collingwood, Victoria.
- The Department of Agriculture and Food (2015). Western Australian Organism List. Western Australian Department of Agriculture and Food, Perth. Available at <https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol>. [accessed 21 January 2015]
- Department of Defence (1980) 'Land Management Plan, Garden Island, Western Australia'. Department of Defence, Canberra.
- Department of the Environment (2015) National Weed Lists. Australian Government Department of the Environment, Canberra. Available at <http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/index.html>. [accessed 10 January 2015]

- Department of Parks and Wildlife (2015) How Does Parks and Wildlife Manage Weeds? Department of Parks and Wildlife, Western Australia. Available at <http://www.dpaw.wa.gov.au/plants-and-animals/plants/weeds/156-how-does-dpaw-manage-weeds>. [accessed 27 January 2015]
- Flint E, Rehkemper C (2002) Control and eradication of the introduced grass, *Cenchrus echinatus*, at Laysan Island, Central Pacific Ocean. In *Turning the Tide: The Eradication of Invasive Species: Proceedings of the International Conference on Eradication of Island Invasives* (eds CR Veitch, MN Clout), pp. 110–115. IUCN, Switzerland.
- Frewer PS, Humphries RB, Hesp PA, Whitehouse SJO (1985) *Rottneest Island Management Plan, Volume 1*. Government of Western Australia, Perth.
- Graham-Taylor S (2012) *Shark Bay: Pastoral Voices*. Shire of Shark Bay, Denham.
- Griffin GF, Smith DS, Morton SR, Allan GE, Masters KA, Preece N. (1989). Status and implications of the invasion of tamarisk (*Tamarix aphylla*) on the Finke River, Northern Territory, Australia. *Journal of Environmental Management* **29**, 297–315.
- Groves RH, Sheppard AW (2012) *Carduus pycnocephalus* L. – slender thistle *Carduus tenuiflorus* Curt. – slender thistle. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 131–138. CSIRO Publishing, Collingwood, Victoria.
- Harvey JM, Alford JJ, Longman VM, Keighery GJ (2001) A flora and vegetation survey of the islands of the Houtman Abrolhos, Western Australia. *CALMScience* **3**, 521–623.
- Hosking JR (2012) *Opuntia* spp. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 431–436. CSIRO Publishing, Collingwood, Victoria.
- Hussey BMJ, Anderson D, Loney S (1992) A checklist of plants found growing in a native or naturalised state on Cooleenup Island, Yunderup, Western Australia. *Western Australian Naturalist* **19**, 35–43.
- Hussey BMJ, Keighery GJ, Dodd J, Lloyd SG, Cousens RD (2007) *Western Weeds. A Guide to the Weeds of Western Australia*, 2nd ed. Weeds Society of WA Inc., Victoria Park, Western Australia.
- Lowe S, Browne M, Boudjelas S, De Pourter M (2000) 100 of the World's Worst Invasive Alien Species – A Selection from the Global Invasive Species Database. Invasive Species Specialist Group of the International Union for the Conservation of Nature, Auckland. Available at http://www.issg.org/worst100_species.html. [Accessed 20 December 2014]
- Jebb MA (1984) The Lock hospitals experiment: Europeans, Aborigines and venereal disease. *Studies in Western Australian History* **8**, 68–87.
- Keighery G J (1986) *Garden Escapes on Rottneest Island – An Annotated Checklist*. Landnote 3. Department of Conservation and Land Management, Western Australia.
- Keighery GJ (1993). Weeds of Western Australia's west coast offshore islands. In *Proceedings I: 10th Australian Weeds Conference and 14th Asian Pacific Weed Science Society Conference* pp. 167–171. Brisbane, 6–10 September 1993. Weed Society of Queensland, Brisbane.
- Keighery G (1998) The weeds of Garden Island: an annotated list. *Western Australian Naturalist* **22**, 61–76.
- Keighery G J (2005) New and noteworthy plant species recognised as naturalised in Western Australia. *Nuytsia* **15**, 523–527.
- Keighery G (2012). 'Abrolhos Verbesina Control Memorandum'. Unpublished report by Department of Environment and Conservation, Perth.
- Keighery G (2013) Weedy native plants in Western Australia: an annotated checklist. *Conservation Science Western Australia* **8**, 259–273.
- Keighery GJ, Dodd J (1997) Occurrence and spread of sea spurge (*Euphorbia paralias*) along the west coast of Western Australia. *Nuytsia* **11**, 285–286.
- Keighery G, Muir W (2010) Checklists of the vascular plants of the deltaic islands of the Peel Estuary. *Western Australian Naturalist* **27**, 107–125.
- Keighery G, Muir W (2008) Vegetation and vascular flora of Faure Island, Shark Bay, Western Australia. *Records of the Western Australian Museum* **75**, 11–19.
- Keighery GJ, Alford JJ, Trudgen ME, Muir WR (2006) Floristics of the Shark Bay World Heritage Site, Western Australia: Vegetation and Flora of 34 small islands. *Western Australian Naturalist* **25**, 111–134.
- Keighery G, McCabe S (2015). Status of *Typha orientalis* in Western Australia. *Western Australian Naturalist* **30**, 30–35.
- Longman VM, Harvey JM, Keighery GJ (2000) *Bryophyllum delagoense* (Crassulaceae): a new weed for Western Australia and a potentially serious problem for the Abrolhos Islands. *Nuytsia* **13**, 399–401.
- Manoko ML, van den Berg RG, Feron RM, van der Weerden GM, Mariani C (2007) AFLP markers support separation of *Solanum nodiflorum* from *Solanum americanum* sensu stricto (Solanaceae). *Plant Systematics and Evolution* **267**, 1–11.
- Marchant NG, Abbott I (1981) Historical and recent observations of the flora of Garden Island, Western Australia. *Western Australian Herbarium Research Notes* **5**, 49–62.
- Morton JF (1978) Brazilian pepper—its impact on people, animals and the environment. *Economic Botany* **32**, 353–359.
- Pacific Island Ecosystems at Risk (2013). Plant Threats to Pacific Ecosystems: Plant Species Present in

- Australia (Indian Ocean Offshore Islands. Institute of Pacific Islands Forestry, United States of America Department of Agriculture, Forest Service. Available at http://www.hear.org/pier/locations/indian_ocean/australia_indian_ocean_islands/specieslist.html. [accessed 23 September 2104]
- Palmer B, Senarante W (2012) *Anredera cordifolia* (Ten.) Steenis– Madeira vine. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 60–64. CSIRO Publishing, Collingwood, Victoria.
- Palmer WA, Rafter MA (2012) *Bryophyllum delagoense* (Ecklon & Zehner) Schinz–mother-of-millions. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 99–107. CSIRO Publishing, Collingwood, Victoria.
- Rich R (1993) *Murray and Mandurah. A Sequel History of the Old Murray River District of Western Australia*. Shire of Murray and City of Mandurah.
- Richards R (1978) *The Murray District of Western Australia: A History*. Shire of Murray, Pinjarra.
- Rippey E, Hislop MC, Dodd J (2003) Reassessment of the vascular flora of Rottnest Island. *Journal of the Royal Society of Western Australia* **86**, 7–23.
- Rippey E, Rippey JJ, Dunlop N (2002) Management of indigenous and alien Malvaceae on islands near Perth, Western Australia. In *Turning the Tide: The Eradication of Invasive Species. Proceedings of the International Conference on Eradication of Island Invasives* (eds CR Veitch, MN Clout), pp. 254–259. IUCN, Switzerland.
- Rottnest Island Authority. About Rottnest Island. Available at: <http://www.rottnestisland.com/about>. [Accessed 4 August 2014]
- Sanders AC (1996) Noteworthy collections: California. *Madrono* **43**, 526.
- Scott JK, McCarren K (2012) *Sonchus oleraceus* L. – sowthistle. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 563–567. CSIRO Publishing, Collingwood, Victoria.
- Scott JK, Julien M, McFadyen R, Cullen J (2012) *Euphorbia paralias* L.– sea spurge. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 259–262. CSIRO Publishing, Collingwood, Victoria.
- Scott JK (2012) *Zantedeschia aethiopica* (L.) Spreng. – arum lily. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 609–613. CSIRO Publishing, Collingwood, Victoria.
- Sheppard W, Smyth M (2012) *Echium plantagineum* L. – Paterson’s curse. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 211–226. CSIRO Publishing, Collingwood, Victoria.
- van Klinken RD (2012) *Prosopis* spp. – mesquite. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 477–485. CSIRO Publishing, Collingwood, Victoria.
- Vilà M, Espinar JL, Hejda M, Hulme PE, Jarošík V, Maron JL, Pergl J, Schaffner U, Sun Y, Pyšek P (2011) Ecological impacts of invasive alien plants: a meta-analysis of their effects on species, communities and ecosystems. *Ecology Letters* **14**, 702–708.
- Vitousek PM, D’Antonio CM, Loope LL, Rejmanek M, Westbrooks R (1997) Introduced species: a significant component of human-caused global change. *New Zealand Journal of Ecology* **21**, 1–16.
- Western Australian Herbarium (1998–) FloraBase – the Western Australian Flora. Department of Parks and Wildlife. Available at <http://florabase.dpaw.wa.gov.au/>. [accessed 10 February 2015]
- Yeoh P, Julien M, Scott J, McFadyen R, Cullen J (2012) *Emex australis* Steinheil – doublegee *Emex spinosa* (L.) Campdera – lesser jack. In *Biological Control of Weeds in Australia*. (eds JK Scott, M Julien, R McFadyen, J Cullen), pp. 238–255. CSIRO Publishing, Collingwood, Victoria.