Declared plant surveillance plan:

**for agricultural weeds in the South West Land Division.**

Copies of this publication can be obtained from the [DAFWA website](https://agric.wa.gov.au).

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# Summary

This weed surveillance plan is intended as a reference to enable participants from the community, industry, biosecurity groups and grower groups to find and report declared plants in Western Australia, especially those weeds identified as surveillance targets. This will enable the early detection of significant new weed incursions and a rapid response to the incursions, thus preventing the intercepted weeds becoming damaging pests in the State.

This surveillance plan was developed for the project, Agricultural weed surveillance in the South West Land Division (SWLD) to protect industry profitability. This is a Boosting Biosecurity Defences project, supported by the State Government’s Royalties for Regions funds.

The surveillance plan describes which declared plants are surveillance targets for this project, where to find declared plants and how to report their occurrence. The plan also has links to further information on each surveillance target. The further information is being updated to including the time of year to look for the weed and where to find it.

# Introduction

Western Australia (WA) remains relatively weed free compared to the rest of Australia. About 2740 weed species have been recorded in Australia (Randall, 2007) in comparison to only about 1,250 weed species in WA (Florabase, 2015). In WA, 65 weed species are declared as pests (declared plants) under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) and several other species are declared as prohibited organisms (declared plants).

The current set of declared plants includes some that are widespread in the State, others that have a limited distribution in WA, several that are undergoing eradication and others that are not yet present in the State.

The early detection and management of declared plants in Western Australia delivers the greatest economic benefit to the State.

This weed surveillance plan aims to provide a structured approach to weed surveillance the community and other participants, based on identifying:

* the weeds that are surveillance targets,
* where to find weeds
* the most weed-prone sites and
* the most likely weed-carrying pathways

Successful surveillance, based on this approach, will allow the early detection of significant new weed incursions and a rapid response to the incursions, thus preventing the detected weeds becoming damaging pests in this State.

## What is surveillance?

Surveillance is keeping a look out for something. In a biosecurity context it is an official process which collects and records data on pest occurrence or absence by survey, monitoring or other procedures (ISPM 5, 2007)**.**

# Weed surveillance targets

To be eligible as a biosecurity surveillance target for this project the weed must be:

* a declared pest under the BAM Act: a prohibited organism is a declared pest for the whole of WA.
* an agricultural weed, that has an adverse effect on agricultural production or systems.
* likely to be found in the South West Land Division of WA. This encompasses the wheat belt and includes Perth, Albany, Bunbury, Geraldton and Mandurah
* able to be easily identified by project participants.

Details on the “Declared plant selection process” used to choose surveillance targets can be found through the link: <https://agric.wa.gov.au/n/3835>.

## Declared plants not selected will be in reporting applications

Declared plants neither selected for nor eligible for selection as surveillance targets will have the reporting “app’ developed as part of this project extended to them. However, these weeds will not have extra extension or training material developed for them. It is anticipated that the reporting app will be available in 2016.

## High priority surveillance targets

From the perspective of the State’s biosecurity the greatest economic benefit is in finding declared plants before they have a chance to spread throughout the State.

High priority declared plant surveillance targets are those that are on the left side of the invasion curve with prevention and eradication as management options (Figure 1). They are weeds that are thought to be absent from WA or have a small number of localised populations.

The Department of Agriculture and Food, WA (DAFWA) has selected 15 high priority declared plants across these groups to be surveillance targets for the State ([Declared plant selection process](https://agric.wa.gov.au/n/3835)). These declared plants are:

1. Bathust burr (*Xanthium spinosum* L.).
2. bedstraw (*Galium tricornutum* Dandy).
3. branched broomrape(*Orobanche ramosa* L.).
4. creeping knapweed(*Rhaponticum repens* (L.) Hidalgo).
5. gorse (*Ulex europaeus* L.).
6. hoary cress(*Lepidium draba* L.).
7. horsetail (*Equisetum hyemale* L.).
8. karoo thorn acacia(*Vachellia karroo* (Hayne) Banfi & Galasso).
9. kochia (*Bassia scoparia* (L.) A.J.Scott).
10. nodding thistle(*Carduus nutans* L.).
11. perennial thistle(*Cirsium arvense* (L.) Scop.).
12. purple flower devil's claw(*Proboscidea louisianica* (Mill.) Thell.).
13. ragwort (*Senecio jacobaea* L.).
14. skeleton weed(*Chondrilla juncea* L.).
15. wheel cactus(*Opuntia robusta* H.L.Wendl. ex Pfeiff).

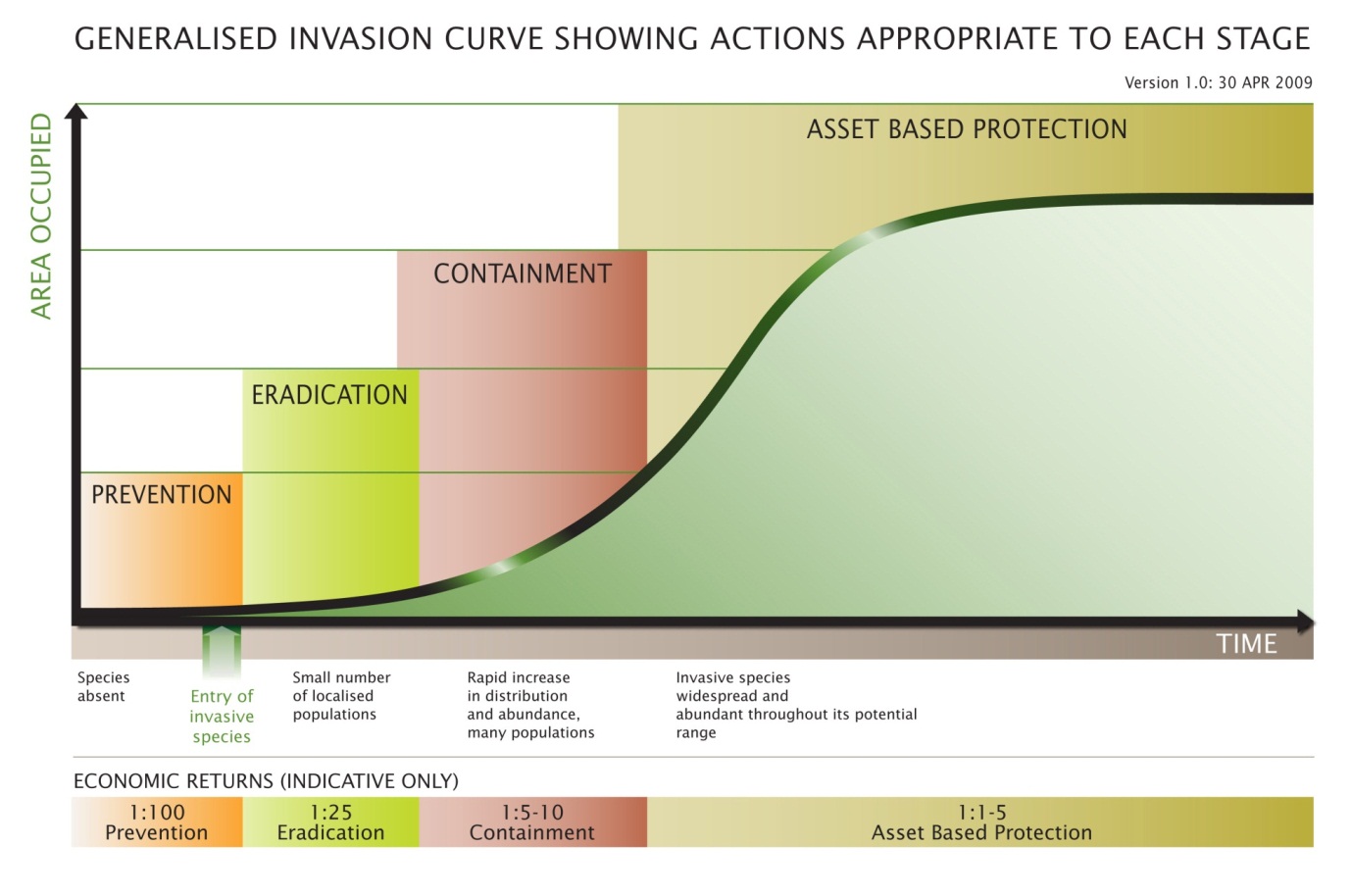


Figure 1 Generalised invasion curve showing management actions (prevention, eradication, containment and asset based protection) appropriate to each invasion stage (absent, small number, rapid increase and widespread) (Department of Environment and Primary Industries, Victoria, 2015).

## Other surveillance targets

Most of the weeds on the right side of the invasion curve (Figure 1) are widespread, well-established species that often impact agricultural production and profitability, and might require costly control measures as part of regular agricultural production.

They are important agriculturally, especially to producers seeking profitable production; however, because of their widespread and established nature, they provide relatively low economic return when public funds are invested by government to regulate these species. Consequently, they are of lower priority to publicly funded State/government biosecurity activities than other invasive species that are at the start of the invasion process.

For widespread declared plants at the right side of the invasion curve there is often a high level of industry and community support to manage and control them, sometimes involving a recognized biosecurity group or industry funding scheme to support their management. Industry and community may have a high interest in surveying some of these more widespread declared weeds for their own management programs.

Community, industry, biosecurity groups and grower groups have selected five other declared plant surveillance targets ([Declared plant selection process](https://agric.wa.gov.au/n/3835)). These declared plants are:

1. cotton bush(*Gomphocarpus fruticosus* (L.) W.T.Aiton).
2. arum lily(*Zantedeschia aethiopica* (L.) Spreng.).
3. Paterson’s curse (*Echium plantagineum* L.).
4. *Solanum* species: silverleaf nightshade and apple of Sodom(*Solanum elaeagnifolium* Cav. and *Solanum linnaeanum* Hepper & P.-M.L.Jaeger ).
5. doublegee(*Emex australis* Steinh. and *Emex spinosa* (L.) Campd.).

If time permits the next two most popular species will be partially included in the project:

1. cape tulip(*Moraea flaccida* (Sweet) Steud. and *Moraea miniata* Andrews).
2. early blackberry(*Rubus laudatus* A.Berger).

# Where to find weeds?

Weeds can be found almost everywhere in WA (Figure 2). The greatest number will generally be found where there is a high level of disturbance created by human activity, or along weed carrying pathways.

Most spread of agricultural weeds results from deliberate or accidental spread by humans, but natural or natural spread (for example, by wind or water) can also occur.

## Weed prone sites

Agricultural weeds are generally found at sites disturbed by human activity.

These sites typically receive extra water (for example, the run-off from roads, cropped paddocks and bare soil), light (due to removal of other plants) and nutrients (from fertilizers and nutrient-laden run-off), and are more likely to have weed seeds introduced though agricultural activities.

## Weed carrying pathways

Pathways and end-points of weed spread by human activity are obvious areas to target for surveillance; for example, stock-yards, parking places for agricultural vehicles, and sites associated with the dispersal of agricultural waste, waste disposal is associated with rubbish bins, rubbish tips and landfill sites (Figure 2).

Natural spread pathways include searching downwind from a known infestation site (for wind-blown seeds) or downstream (for weed seeds spread by water). Dispersal by birds and other animals is less predictable.

## Where to look for weeds in agricultural, urban and natural landscapes

The following lists highlight the main places where weeds are likely to occur in agricultural, urban and natural landscapes, as described in detail in Figure 2.

Weeds should be searched for in and around these sites during general weed surveillance.

These lists are not exhaustive – weeds are adaptable and could occur almost anywhere.

***Agricultural production sites***

* crops
* pastures
* orchards
* vineyards
* intensive horticulture sites
* forestry plantations
* abandoned or ‘resting’ production sites

***Agricultural facilities***

* storage areas such as sheds, yards and silos
* machinery yards
* along fence lines and firebreaks
* along tracks and around gateways
* farm dams and watering points
* livestock sale yards
* livestock loading and unloading facilities
* irrigation and drainage channels
* on-farm waste disposal sites

***Urban sites***

* gardens, parks, recreation reserves, walk trails
* picnic and barbeque sites
* camping sites
* around rubbish bins
* in and around rubbish dumps
* vehicle parking areas
* vehicle wash-down facilities
* old cemeteries
* abandoned homesteads, school sites, mine sites and former town-sites
* derelict or neglected urban land
* along utility easements (e.g. power lines and gas pipelines)

***Transport related***

* along roads, and railway tracks and easements
* road verges
* roadside ditches
* drainage culverts and run-off areas
* roadside parking bays
* car parks
* flood-ways and fords
* illegally dumped garden waste and other rubbish

***In natural landscapes***

* along road and tracks
* car parks
* picnic sites
* look-outs
* along walking trails
* recreational fishing spots
* recently burnt areas
* revegetated areas
* under roosting trees chosen by birds
* tree plantations
* along tracks and trails used by native, feral and domestic animals

***Water related***

* in and along river banks and creeks
* in and around wetlands and swamps
* recently flooded land
* farm dams and irrigation channels
* urban waterbodies and waterways where dumping or aquatic plants (and fish) likely to occur
* downstream of known weed infestations
* on either side of floodways and fords.

1 deliberate spread by humans
1.1 ornamental  medicinal or food plant trade
1.1.1 escape of garden and landscape plants (look in adjacent bushland sites, cemeteries and adjacent properties)
1.1.2 nurseries for plant propagation and production
1.1.3 nurseries or internet sales of declared plants
1.1.4 spread among plant enthusiasts
1.1.5 arboreta
1.2 aquarium plant trade
1.2.1 escape into waterways (see water under natural spread) 
1.2.2 nurseries or internet sales of declared plants
1.2.3 pet shops
1.2.4 urban wetlands
1.3 fodder trade
1.3.1 plants grown and promoted as livestock or animal food
1.3.2 look near feedlots, farm biosecurity paddocks, farm paddocks, silage pits, stockyards
1.4 re-vegetation or forestry
1.4.1 timber plantations
1.4.2 soil conservation plantings
1.4.3 any re-vegetation plantings
2 accidental spread by humans
2.1 human apparel or equipment
2.1.1 attachment of seeds to clothes, footwear, camping equipment, push bikes, saddle blankets
2.2 machinery or vehicles
2.2.1 attachment of seeds to passenger vehicles, slashers, farm equipment, boats, caravans, horse floats, trailers and earth moving equipment
2.2.2 look at: vehicle wash-down sites, parking bays along roads, roadsides, car parks (conservation areas), camping grounds (formal and unofficial), road, rail, freight loading and unloading terminals, show grounds 
2.3 construction or landscaping material
2.3.1 contamination of gravel, soil, sand, mulch, potting mix, manure and turf with weeds
2.3.2 look at bulk material storage sites, piles of timber, steel, bricks, tiles and guttering
2.4 agricultural produce
2.4.1 contamination of hay, straw, grain, feed grain and seed for sowing with weeds
2.4.2 look near seed cleaning sites, silos, grain receival points
2.5 research sites
2.5.1 escape from research/trial sites
2.5.2 look beyond the edges of a research site
2.6 livestock movement
2.6.1 through faeces or plant material/seeds attached to livestock (sheep cattle horses, goats and so on)
2.6.2 look at: holding pens, stock yards, markets, loading/unloading facilities, feed-lots, saleyards, transport vehicles
2.7 waste disposal
2.7.1 dumping of garden refuse and aquarium plants
2.7.2 look at: rubbish bins, rubbish tips, rubbish dumps, landfill sites, illegally dumped waste
3 disturbed sites that are managed (water)
3.1 open water
3.1.1 water bodies
3.1.2 rice fields
3.1.3 farm dams
3.2 close to water
3.2.1 irrigation channels
3.2.2 drains
3.3 close to water, occasionally flooded
3.3.1 riverbanks
3.3.2 creek banks
3.3.3 culverts
3.3.4 roadside drains
4 disturbed sites
4.1 maintained landscapes
4.1.1 gardens
4.1.2 parks
4.1.3 lawns
4.1.4 amenity areas
4.2 crops
4.2.1 irrigated crops
4.2.2 intensive horticulture
4.2.3 rain fed crops
4.2.4 orchards and vineyards
4.3 pastures
4.3.1 irrigated pastures
4.3.1.1 introduced grasses and legume weeds
4.3.2 improved pastures
4.3.2.1 introduced grasses and legume weeds
4.3.3 unimproved pastures
4.3.3.1 native grasses and legume weeds
4.4 abandoned sites
4.4.1 abandoned homesteads/habitation areas
4.4.2 abandoned/resting/unmanaged agricultural sites (farmland/orchards/tree farms)
4.4.3 look beyond the edges of an abandoned site
4.5 Rehabilitation sites or natural environments
4.5.1 National parks
4.5.2 pastoral stations under rehabilitation
4.5.3 conservation areas
4.6 building sites
4.6.1 road building, look along a road
4.6.2 construction sites (dams, holding yards, material storage areas, car areas)
4.7 soil disturbance
4.7.1 cultivation
4.7.2 scraping
4.7.3 soil removal
4.7.4 soil introduction
4.7.5 look along fence lines, telephone lines, utility rights of way, fire breaks, tracks and trails
5 natural spread
5.1 birds or bats
5.1.1 through consumption and excretion of seeds and fruit
5.1.2 look under roosting sites (trees, fence lines, telephone lines, utility rights of way)
5.2 other animals
5.2.1 through consumption and excretion of seeds and fruit
5.2.2 through external attachment to native and introduced animals
5.2.3 look along animal trails
5.3 wind
5.3.1 wind blown seeds
5.3.2 look 15-20m downwind from a known infestation
5.4 water
5.4.1 distribution downstream of seeds or plant parts via waterways
5.4.2 look downstream from a known infestation
5.4.3 Look along fences and low areas that have pooled water or been kept moist after a flood on a flood plane


Figure 2: Where to find weeds in WA (modified from (Swarbrick, 1983) and (Sindel, van der Muelen, Coleman, & Reeve, 2008)).

# Reporting weed occurrence

All declared plants including those on the surveillance target list should be reported to DAFWA either by calling the Pest and Disease Information Service (PaDIS) on 1800 084 881 or by using the MyWeedWatcher app or web page.

## MyWeedWatcher

DAFWA has developed [MyWeedWatcher](https://www.agric.wa.gov.au/n/5412) which has been designed to be a user-friendly reporting mechanism for all declared plants. The MyWeedWatcher app can be downloaded free from [iTunes App Store](https://itunes.apple.com/us/app/my-weed-watcher/id1090235081?mt=8) or for Android devices from [Google Play](https://play.google.com/store/apps/details?id=au.gov.wa.mobile_weedsurveillance&hl=en). Training material on how to use the app is available on the [DAFWA website](https://www.agric.wa.gov.au/myweedwatcher-training-material-and-online-weed-identification-training).

MyWeedWatcher is an online database for reporting and mapping weed detections that was released in April 2016. It is available in the form of an interactive website ([MyWeedWatcher web](https://www.agric.wa.gov.au/myweedwatcher-web/search)) and a mobile device application ([MyWeedWatcher mobile](https://www.agric.wa.gov.au/5412)). The application is targeted at the South-West Land Division, but can be used anywhere in Western Australia.

The **MyWeedWatcher app** assists users to record the location of weeds of interest. It produces maps that can be used to make more informed decisions for better management of local weed problems.

MyWeedWatcher contains images and descriptions of over 300 weeds, with more being added, and is supported by detailed information pages on high priority declared weeds.

MyWeedWatcher helps users to identify a weed, record an observation and view observations. The identification guide allows users to quickly search for a weed according to plant characteristics such as flower colour, leaf shape and plant type.

The reporting feature enables users to map weeds, add images and record survey data such as weed density, weed counts, confidence of identification and notes on control activities done. The location of a weed may be recorded using GPS functionality, by searching on a map or by entering GPS coordinates.

**MyWeedWatcher Web** is an interactive website that provides an online database that allows the public to view maps of reported weeds, download spreadsheets of mapped weeds and report weeds online.

MyWeedWatcher Web makes weed reporting available to people without a mobile device. The web version of MyWeedWatcher makes it easy for users to access and use weed data. Users can generate customised data reports and view or export these as tables or maps. An advantage of the web version over the app is that users can access all MyWeedWatcher records and are not limited to viewing their own observations.

MyWeedWatcher Web provides a versatile online database for community and land managers to make informed decisions on weed management.

Both the MyWeedWatcher app and website allow users to satisfy the reporting of declared pests as required under the *Biosecurity and Agriculture Management Act 2007*.

Note that the earlier mapping system known as WeedWatcher is no longer available.

## What to record/collect

If you are using MyWeedWatcher to report declare plants, the app or website will capture relevant information as well as prompting the user to record other relevant details.

If you are reporting weeds by other means, the following information is the bare minimum required to enable biosecurity groups, industry or DAFWA to plan actions against declared plants.

* Species name (common and/or scientific name).
* Date when observed.
* Location (for example, description or latitude and longitude, or closeness to named localities or geographical features).
* Contact details.
* Collector’s name.
* Collector’s phone number or email.

Optional information that will assist in correct identification of the declared plant includes:

* A photograph of the declared plant.
* A sample of the declared plant (contact DAFWA before sending a sample).

# Mapping weed occurrence

Reports made via MyWeedWatch or by other means allow preparation of maps that show the location of declared plants to industry and the community. Maps include data that DAFWA collects as well as data submitted by project participants.

High priority declared plant surveillance targets are treated in a different manner to other weeds because they can be a risk to WA trade and/or might require the landholder to employ new management methods. Because of their importance as weeds, the identity of high priority weeds that are reported via this project is verified by an expert in weed identification before the location is mapped; and the map itself will not show the exact location of the weed. Details of the property boundary, property manager or owner will not be given to the general public.

Other weed surveillance targets (that is, those that are not high priority weeds) will be directly put on a map to advise biosecurity groups, industry and DAFWA of their location and to help determine future management options.

Links to surveillance targets

The following links will take you to information pages on each surveillance target. The information pages will be updated to include data on where to find the weed and a calendar on the best time of year to look for each surveillance target.

* [apple of Sodom](https://agric.wa.gov.au/n/676) ([*Solanum linnaeanum* Hepper & P.-M.L.Jaeger](https://agric.wa.gov.au/n/676))
* [arum lily](https://agric.wa.gov.au/n/682) (*[Zantedeschia aethiopica](https://agric.wa.gov.au/n/682)* [(L.) Spreng.](https://agric.wa.gov.au/n/682))
* [Bathust burr](https://agric.wa.gov.au/n/684) ([*Xanthium spinosum* L.](https://agric.wa.gov.au/n/684))
* [bedstraw](https://agric.wa.gov.au/n/915) (*[Galium tricornutum](https://agric.wa.gov.au/n/915)* [Dandy](https://agric.wa.gov.au/n/915))
* [branched broomrape](https://agric.wa.gov.au/n/692) (*[Orobanche ramosa](https://agric.wa.gov.au/n/692)* [L.](https://agric.wa.gov.au/n/692))
* [One leaf cape tulip](https://agric.wa.gov.au/n/699) [two leaf cape tulip](https://agric.wa.gov.au/n/716) (*[Moraea flaccida](https://agric.wa.gov.au/n/699)* [(Sweet) Steud](https://agric.wa.gov.au/n/699). and [*Moraea miniata* Andrews](https://agric.wa.gov.au/n/716))
* [cotton bush](https://agric.wa.gov.au/n/741) (*[Gomphocarpus fruticosus](https://agric.wa.gov.au/n/741)* [(L.) W.T.Aiton](https://agric.wa.gov.au/n/741))
* [creeping knapweed](https://agric.wa.gov.au/n/742) (*[Rhaponticum repens](https://agric.wa.gov.au/n/742)* [(L.) Hidalgo](https://agric.wa.gov.au/n/742))
* [doublegee](https://agric.wa.gov.au/n/773) (*[Emex australis](https://agric.wa.gov.au/n/773)* [Steinh. and](https://agric.wa.gov.au/n/773) *[Emex spinosa](https://agric.wa.gov.au/n/773)* [(L.) Campd.](https://agric.wa.gov.au/n/773))
* [early blackberry](https://agric.wa.gov.au/n/687) (*[Rubus laudatus](https://agric.wa.gov.au/n/687)* [A.Berger](https://agric.wa.gov.au/n/687))
* [gorse](https://agric.wa.gov.au/n/822) (*[Ulex europaeus](https://agric.wa.gov.au/n/822)* [L.](https://agric.wa.gov.au/n/822))
* [hoary cress](https://agric.wa.gov.au/n/825) (*[Lepidium draba](https://agric.wa.gov.au/n/825)* [L.](https://agric.wa.gov.au/n/825))
* [horsetail](https://agric.wa.gov.au/n/827) ([*Equisetum hyemale* L.](https://agric.wa.gov.au/n/827))
* [karoo thorn acacia](https://agric.wa.gov.au/n/644) (*[Vachellia karroo](https://agric.wa.gov.au/n/644)* [(Hayne) Banfi & Galasso](https://agric.wa.gov.au/n/644))
* [kochia](https://agric.wa.gov.au/n/832) (*[Bassia scoparia](https://agric.wa.gov.au/n/832)* [(L.) A.J.Scott](https://agric.wa.gov.au/n/832))
* [nodding thistle](https://agric.wa.gov.au/n/874) (*[Carduus nutans](https://agric.wa.gov.au/n/874)* [L.](https://agric.wa.gov.au/n/874))
* [Paterson’s curse](https://agric.wa.gov.au/n/880) (*[Echium plantagineum](https://agric.wa.gov.au/n/880)* [L.](https://agric.wa.gov.au/n/880))
* [perennial thistle](https://agric.wa.gov.au/n/881) (*[Cirsium arvense](https://agric.wa.gov.au/n/881)* [(L.) Scop.](https://agric.wa.gov.au/n/881))
* [purple flower devil's claw](https://agric.wa.gov.au/n/743) (*[Proboscidea louisianica](https://agric.wa.gov.au/n/743)* [(Mill.) Thell.](https://agric.wa.gov.au/n/743))
* [ragwort](https://agric.wa.gov.au/n/892) (*[Senecio jacobaea](https://agric.wa.gov.au/n/892)* [L.](https://agric.wa.gov.au/n/892))
* [silverleaf nightshade](https://agric.wa.gov.au/n/958) ([*Solanum elaeagnifolium* Cav.](https://agric.wa.gov.au/n/958))
* [skeleton weed](https://agric.wa.gov.au/n/908) (*[Chondrilla juncea](https://agric.wa.gov.au/n/908)* [L.](https://agric.wa.gov.au/n/908))
* [wheel cactus](https://agric.wa.gov.au/n/4926) (*[Opuntia robusta](https://agric.wa.gov.au/n/4926)* [H.L.Wendl. ex Pfeiff](https://agric.wa.gov.au/n/4926) )

Further information

For further information on declared plants or the Agricultural weed surveillance in the South West to protect industry profitability project please visit the DAFWA website at <https://www.agric.wa.gov.au/>.

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