Australian Government
Department of Agriculture, Water and the Environment

Conservation Advice for *Acacia pinguifolia* (Fat-leaved Wattle)

In effect under the *Environment Protection and Biodiversity Conservation Act 1999* from 29 September 2021.

This document provides a foundation for conservation action and further planning.

Acacia pinguifolia (Fat-leaved Wattle). Photography by D.N. Kraehenbuehl. Image used with the permission of the Botanic Gardens and State Herbarium, Department of Environment and Water, South Australia. Permission granted 11 February 2021.

Conservation status

Acacia pinguifolia (Fat-leaved Wattle) is listed in the Endangered category of the threatened species list under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act) effective from 16 July 2000. AThe species is eligible for listing because prior to the EPBC Act, it was listed as Endangered under the *Endangered Species Protection Act 1992* (Cwlth).

The main factors that make the species eligible for listing in the Endangered category are restricted geographic distribution and small population size.

Species can also be listed as threatened under state and territory legislation. For information on the current listing status of this species under relevant state or territory legislation, see the Species Profile and Threats Database.

Species information

Taxonomy

Conventionally accepted as *Acacia pinguifolia* JM Black (1947).

Description

The Fat-leaved Wattle (also known as Fat-leaf Wattle) is a dense, smooth, light-green shrub. It grows up to 1–2 m in height and often spreads 2–3 m across. Multiple ascending, arching branches extend from just above ground level or from ground level. The branchlets are smooth and reddish-brown, with thin bark that is pale grey at the base of the stems. The phyllodes (modified leaf stems) are 1–3.5 cm long, 2–3 mm in diameter and can be straight or hooked and cylindrical or somewhat compressed. They are rigid, thick, fleshy and light green in colour. The surface of the phyllodes becomes wrinkled and grooved when dry, and the apex ends abruptly with a hard, thick point. The flower-heads are simple and usually solitary or twin, though sometimes have up to four heads. They are smooth and deep yellow, with 20–30 individual flowers. This description was gathered from Jessop & Toelken (1986).

Distribution

The Fat-leaved Wattle is endemic to South Australia and has a disjunct distribution. Subpopulations are located on the Eyre Peninsula and Fleurieu Peninsula (Map 1).

The majority of subpopulations occur on Eyre Peninsula, where the most northerly subpopulation is located within the Kulliparu Conservation Park (CP). There is a group of subpopulations located in the east, between Cummins and Ungarra. The other subpopulations are found in restricted areas in the south, with the most southerly scattered between Cummins and Wanilla, including the Koppio Hills (Pound et al. 2011). Prior to a fire in 2005, there were approximately 2770 mature Fat-leaved Wattle individuals within these subpopulations (Pobke 2007). Though many mature plants were destroyed by the fire, thousands of seedlings have emerged in the years since (Pound et al. 2011). However, this natural recruitment has meant that the distribution of this subpopulation is still largely within narrow roadside and rail corridors.

On Fleurieu Peninsula the species has a restricted distribution. It occurs only near Finniss, a small town near the Finniss River (Davies 1992; Pickett & Mallen 2001), located 55 km south-south-east of Adelaide (Leigh & Briggs 1992; Jusaitis & Sorensen 1994) and immediately west of Lake Alexandrina (Davies 1992). In 1994, only 116 naturally occurring individuals were present in this area, all restricted to roadside or rail reserves (Pound et al. 2011). In 2009, only 86 plants remained (Environmental and Biodiversity services 2009). The abundance of mature plants in the subpopulation has declined by 44 percent over 20 years, and as of 2009 no recruitment has been observed (Environmental and Biodiversity Services 2009). Sites near Finniss that were recorded prior to 1980 are unlikely to still exist, as they have not been recorded in more recent surveys of the area (Pound et al. 2011). The 2011 recovery plan aimed to increase the total population from around 2900 mature individuals (pre-2005 estimate) to 4000 mature individuals (Pound et al. 2011); it is unclear whether this has been achieved.

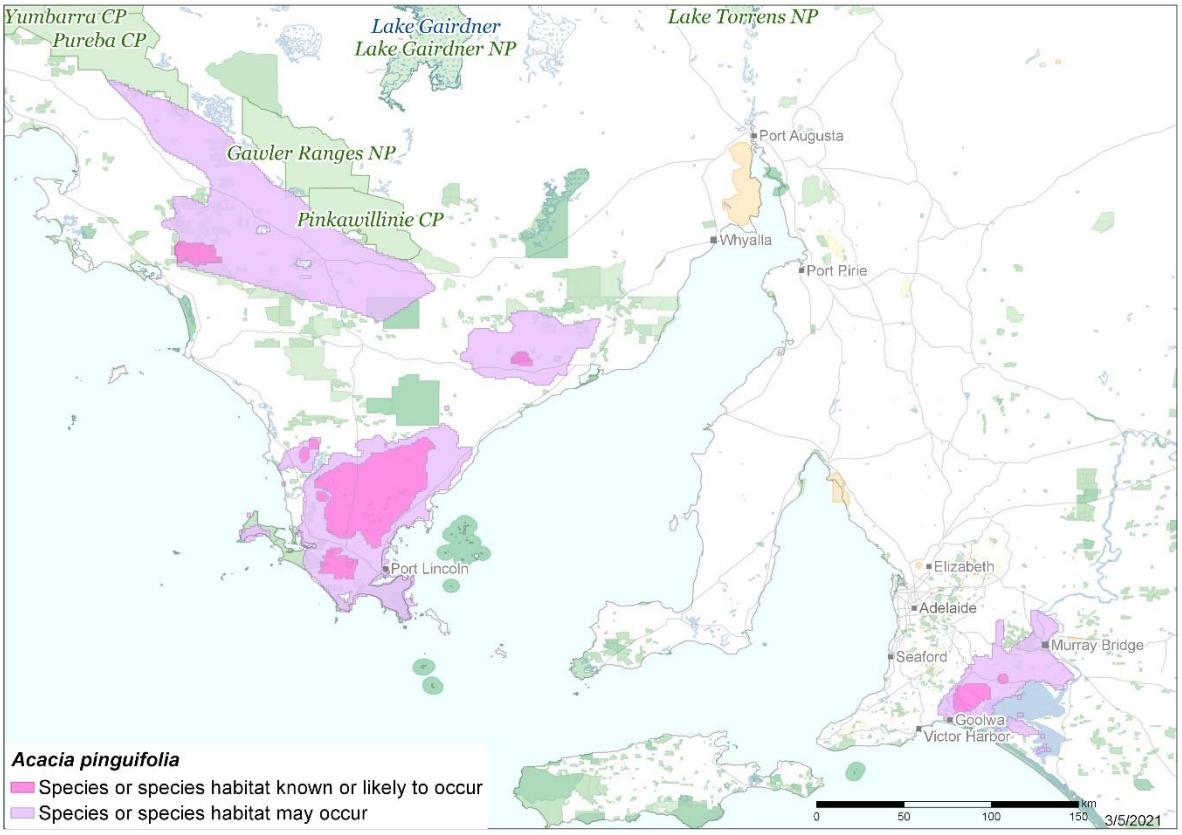
As a component of ongoing restoration work, seeds have been used to generate potted plants for potential revegetation in situ. Parent plants were sourced from a non-natural restoration plot

near Finniss, which were originally gathered from a combination of the Eyre Peninsula and Finniss subpopulations (Cross et al. 2016).

Impacts of 2019–20 bushfires

Gallagher (2020) estimated that approximately one percent of the modelled range of Fat-leaved Wattle was within the impacted area of the catastrophic 2019–20 bushfires.

Map 1 Modelled distribution of the Fat-leaved Wattle



Source: Species distribution data Species of National Environmental Significance database, Base map Geoscience Australia.
Caveat: The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything containing herein.
Species distribution mapping: The species distribution mapping categories are indicative only and aim to capture (a) the specific habitat type or geographic feature that represents to recent observed locations of the species (known to occur) or preferred habitat occurring in close proximity to these locations (likely to occur); and (b) the broad environmental envelope or geographic region that encompasses all areas that could provide habitat for the species (may occur). These presence categories are created using an extensive database of species observations records, national and regional-scale environmental data, environmental modelling techniques and documented scientific research.

Cultural and community significance

Records obtained after 1980 indicate that the entire distribution of the Fat-leaved Wattle is found in Ngarrindjeri Nation (DEH 2007).

Relevant biology and ecology

Habitat

The Fat-leaved Wattle generally grows on sandy or hard alkaline yellow duplex soils (Whibley 1980). In the Finniss area, the species has been found on an undulating plain of sands, sandy clay loams and clay loams with a pH of 7.5 to 9.5. Specimens from the southern Eyre Peninsula have been collected from undulating terrain on a variety of soils, including cream loam with clay subsoil, red loam, brown clay-loam on schist, brown clay loam on broken limestone, and pale grey sand over ironstone gravel (National Herbarium of Victoria, Melbourne, cited in Davies 1992; Pound et al. 2011). The species is found in areas with an average annual rainfall of 400 mm to 500 mm (Whibley 1980), though rainfall in these areas is likely to decrease due to climate change (CSIRO & Bureau of Meteorology 2015).

The species is more abundant in open and disturbed vegetation (Leigh et al. 1984; Davies 1992). It occurs in the understorey of *Eucalyptus* spp. (Mallee) open woodland, open scrub, shrubland and heath communities (Leigh et al. 1984; Davies 1992; Whibley & Symon 1992). Associated species in the Finniss region include *Eucalyptus incrassata* (Lerp Mallee), *Eucalyptus dumosa* (White Mallee), *Eucalyptus leptophylla* (March Mallee), *Eucalyptus calycogona* (Gooseberry Mallee), *Eucalyptus phenax* (Green-leaf Mallee) and *Eucalyptus foecunda* (Narrow-leaved Mallee) (Davies 1992; Pound et al. 2011). On Eyre Peninsula, the species has also been found with *Eucalyptus pileata* (Capped Mallee), *Eucalyptus socialis* (Red Mallee), *Eucalyptus peninsularis* (Cummins Mallee), *Eucalyptus diversifolia* (Soap Mallee), *Eucalyptus cladocalyx* (Sugar Gum), *Eucalyptus behriana* (Bull Mallee), *Melaleuca uncinata* (Broombush) and *Allocasuarina verticillata* (Drooping She-oak) (Pound et al. 2011).

Reproductive ecology

The Fat-leaved Wattle flowers from July to October (Jessop & Toelken 1986), though specimens have been collected flowering as early as June and as late as January (Adelaide Herbarium, National Herbarium of Victoria, cited in Davies 1992). Specimens with fruit have been collected from October to February (Davies 1992), and pods ripen and burst open between November and January (Jusaitis & Sorensen 1994). Growth is faster during spring and early summer, with growth rates slowing considerably during autumn and winter (Jusaitis & Sorensen 1994).

The Eyre Peninsula subpopulations are thought to produce large amounts of viable seed, and recruitment is common (Pobke 2007). However, recruitment in the Finniss subpopulation was extremely low in previous studies of the species. An experiment on seed production in the Finniss area found that no tagged flowers developed into pods in the first year, and only 1.6 percent of flowers developed into legumes in the second year (Jusaitis & Sorensen 1994; Obst 2005).

Acacia species are often early colonisers of a site following a fire, and there is some anecdotal evidence that the Fat-leaved Wattle responds well to fire. In 2000, an field experiment that burnt a small area near a dead plant observed some seedlings subsequently emerging, though they failed to survive the following summer (Pound et al. 2011). The Fat-leaved Wattle appears to undergo mass germination of seeds stored in a seed bank after fire, as noted in Pobke (2007), who observed mass recruitment of Fat-leaved Wattle at some sites on Eyre Peninsula after the 2005 Wangary fire. It is unknown if there is any recruitment between fire events, though the lack of recruitment in the Finniss subpopulation suggests that the species is dependent on

disturbance for germination (Pound et al. 2011). The effect of other disturbances on seedling recruitment is not known, although observations indicate that soil disturbance is likely to initiate seed germination and seedling establishment (Pound et al. 2011).

Research into propagation techniques for the Fat-leaved Wattle found that a seed germination rate of greater than 60 percent could be obtained by rupturing the seed coat. This was achieved by boiling seeds in water for 30 seconds, or by soaking seed in concentrated sulphuric acid for 30 minutes (Jusaitis & Sorensen 1994). However, seedlings produced in these ways had poor vigour and were unsuitable for in situ introductions (Pickett & Mallen 2003). In 2007, leaf samples were collected to study the genetic vigour between and within the Finniss and southern Eyre Peninsula subpopulations (Ottewell et al. 2009). The study found significantly less genetic variation within the Finniss subpopulations compared to within the southern Eyre Peninsula subpopulations, and a significant degree of genetic differentiation between the two regions (Ottewell et al. 2009; Ottewell et al. 2011). A subsequent study also identified that both sites formed two genetic clusters and found a genetic distribution almost identical to Ottewell et al. (2011) (Cross et al. 2016). Revegetated plants with parents from both natural sites had genetic affinity with both subpopulations, though most were more closely associated with Eyre Peninsula individuals. Some parent plants also had affinity with both sites, suggesting that successful inter-provenance crossing may have occurred from previous restoration efforts at the Finniss site (Cross et al. 2016).

Habitat critical to the survival

Due to the species eligibility for listing (highly restricted range and/or severe fragmentation and /or /small population size), all habitat is considered critical to the survival of the species.

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

Important populations

In this section, the word population is used to refer to subpopulation, in keeping with the terminology used in the EPBC Act and state/territory environmental legislation.

There is sufficient evidence through the species eligibility for listing, to declare all populations/the national population of this species under particular pressure of survival and which therefore require protection to support the recovery of the species.

Threats

The largest threats to the Fat-leaved Wattle are invasion by a variety of prostrate weeds and grasses, and herbivory by introduced species. The Fat-leaved Wattle is also threatened by habitat loss, disturbance and modification through inappropriate fire regimes, land clearing and road and rail maintenance. Subpopulations near Finniss are also likely to be threatened by inbreeding depression. Dieback due to *Phytophthora cinnamomi* may also eventually spread throughout the distribution of the species.

Table 1 Threats impacting the Fat-leaved Wattle.

Threat	Status and severity [a]	Evidence
Invasive species		
Weed invasion	• Timing: current • Confidence: known • Consequence: major • Trend: increasing • Extent: across the entire range	A major threat to Fat-leaved Wattle is competition from weed species, especially Bridal Creeper (*Asparagus asparagoides*), which is listed as a Weed of National Significance (DPIRD 2020). Other creeping weeds and exotic grassy weeds also pose a threat to the species, though each subpopulation is impacted by different species. Bridal Creeper, Perennial Veldt Grass (*Ehrharta calycina*), Rye Grass (*Lolium rigidum*), Wild Oats (*Avena fatua*), Boneseed (*Chrysanthemoides monilifera* ssp. *monilifera*) and Aleppo Pine (*Pinus halepensis*) threaten seedling recruitment by the Fat-leaved Wattle at the Eyre Peninsula, particularly following the 2005 fires (Pound et al. 2011). The Finnis subpopulation is threatened by Bridal Creeper, Bridal Veil (*Asparagus declinatum*), Scabious (*Scabiosa atropurpurea*), Soursob (*Oxalis pes-caprae*) and Perennial Veldt Grass (Jusaitis & Sorensen 1994; Pickett & Mallen 2000). Competition from weed species can potentially reduce the ability of Fat-leaved Wattle to germinate and capture essential nutrients, light and water (Pound et al. 2011). The previous Recovery Plan aimed to reduce the extent of weeds in the species' habitat by 30%, though it is unclear if this has been achieved. Weed control is undertaken on a variety of weeds on the Eyre Peninsula and the Fleurieu Peninsula, though it is unclear if weed control still occurs within the habitat of the Fat-leaved Wattle (Landscape South Australia 2020a, 2020b). Herbicide drift from weed control maintenance also poses a threat to the species (Pickett & Mallen 2003). Chemical spray drift can be created by landholders on properties adjacent to Fat-leaved Wattle habitat, or by off-target damage when undertaking weed control on roadsides and rail lines (Pound et al. 2011).

Threat	Status and severity [a]	Evidence
Grazing by introduced and native herbivores	• Timing: current • Confidence: known • Consequence: moderate • Trend: unknown • Extent: across parts of the range	Grazing by both native and introduced herbivores is a threat to the Fat-leaved Wattle. Pickett & Mallen (2000) suggest that Rabbits (*Oryctolagus cuniculus*) are causing a severe impact upon Fat-leaved Wattle subpopulations in the Finniss region. Rabbits are listed as a Key Threatening Process (KTP) under the EPBC Act (DoEE 2016). Grazing by Rabbits can damage habitat by preventing plant regeneration, reversing the normal processes of plant succession, altering ecological communities and promoting weed invasion (DoEE 2016). Prider (2006) recorded grazing of mature and juvenile Fat-leaved Wattle individuals by Sheep (*Ovis aries*). Aside from damaging adult plants and preventing regeneration, grazing by Sheep may also result in compaction of soil and an increase in nutrients from manure (Cropper 1993). Soil compaction can reduce the ability of seedlings to penetrate the soil and germinate, and an increase in nutrients may facilitate the spread of weed seeds or be detrimental to some types of vegetation (Cropper 1993; DPIRD 2018). Grazing by *Macropus* spp. (Kangaroo) is also having a minor effect on Fat-leaved Wattle populations. Preferential grazing of seedlings by macropods can alter plant composition by greatly reducing the recruitment of adult plants of certain species (Hussey 2002).

Threat	Status and severity [a]	Evidence
Habitat loss, disturbance and modification		
Inappropriate fire regimes	• Timing: current • Confidence: suspected • Consequence: major • Trend: decreasing • Extent: across the entire range	A reduction in the frequency of fire disturbance is likely to be an important factor limiting the population size and growth of the Fat-leaved Wattle (Pound et al. 2011). Specifically, the lack of natural recruitment observed in the Finniss subpopulation is likely due to a lack of fire, as the recruitment of seedlings is dependent on fire. As of 2011, Finniss had not burnt in more than 50 years (Ottewell et al. 2011). In October 2019, the SA Country Fire Service issued a bushfire warning for a fire near Finniss, though it is unclear if the Finniss subpopulation was impacted and if any subsequent recruitment occurred (Victor Harbor Times 2019). Pobke (2007) observed a significant increase in recruitment of the species on Eyre Peninsula following the 2005 Wangary fires, which resulted in the germination of several hundred seedlings. Climate change is likely to increase the frequency, extent and severity of bushfires in southern Australia (CSIRO & Bureau of Meteorology 2015). This may increase the frequency of bushfires in the range of the Fat-leaved Wattle, potentially promoting recruitment in the Finniss subpopulation. However, fires occurring at short intervals may also be a threat to the species. If adult plants are killed by fire and the seedlings are killed by a consecutive fire before a seed bank can be built, this will likely lead to population decline. The minimum fire-free interval required for the species to persist is currently unknown, though will likely be at least 10 years based on other species in the genus. In 2019–20 catastrophic bushfire conditions resulted in bushfires over an unusually large area of Australia. Gallagher (2020) estimated that 1% of modelled range of Fat-leaved Wattle were within the fire impacted area.

Threat	Status and severity [a]	Evidence
Land clearing for agriculture	• Timing: historical/possibly current • Confidence: known • Consequence: major • Trend: decreasing • Extent: across parts of the range	Extensive land clearing, predominantly for agriculture, has been a major factor in the historical decline of the Fat-leaved Wattle's distribution. Clearance of land has drastically reduced the current habitat of the Fat-leaved Wattle and has reduced the amount of land suitable for future habitat (Pound et al. 2011). This historical land clearing has caused habitat fragmentation in the species' distribution, which has likely led to ongoing decline due to edge effects. Further land clearing is likely to be a threat to the survival of the species (Jusaitis & Sorensen 1994). Current levels of land clearing on the Eyre Peninsula and Fleurieu Peninsula are unknown, though most clearing is historical, and clearing has likely slowed since the introduction of the *Native Vegetation Act 1991* (PIR 2017).
Road, rail and fence maintenance	• Timing: current • Confidence: known • Consequence: moderate • Trend: decreasing • Extent: across parts of the range	Minor removal or accidental damage to Fat-leaved Wattle plants may occur during road or rail maintenance or while repairing and constructing fences, as many individuals are found along transport lines. Roadside markers have been installed at all roadside populations to assist in identification of these sites (Pound et al. 2011). On Eyre Peninsula, after the 2005 Wangary bushfire, burnt Roadside Vegetation Markers were reinstated on roadsides under the care and control of the District Council of Lower Eyre Peninsula.
Rubbish dumping	• Timing: current • Confidence: suspected • Consequence: not significant • Trend: decreasing • Extent: across parts of the range	Dumping of rubbish is occurring in the Finniss area, within the distribution of the Fat-leaved Wattle (Pound et al. 2011). The impact of this on the species is unknown but unlikely to be significant at the population level.

Threat	Status and severity [a]	Evidence
Low genetic diversity		
Inbreeding depression	• Timing: current • Confidence: suspected • Consequence: major • Trend: increasing • Extent: across parts of the range	The subpopulations of the Fat-leaved Wattle are small and geographically and genetically isolated across two regions. With limited gene flow, the lack of genetic variability within small populations can manifest in inbreeding depression, as appears to be the case at the Finniss sites (Ottewell et al. 2009; Ottewell et al. 2011). Inbreeding depression may express as a decline in seed set, seed viability and seedling growth (Charlesworth & Charlesworth 1987; Hardener et al. 1998). These factors may negatively influence the Finniss subpopulation over time, though it is not clear to what extent inbreeding is currently impacting fecundity and recruitment. Ottewell et al. (2011) investigated the use of prescribed burning to increase the genetic diversity of the Finniss subpopulation. Species with a seed bank (like the Fat-leaved Wattle) may be buffered against loss of genetic diversity, as seed banks represent the reproductive output of many seasons and individuals. Burning may be a way to stimulate germination and recovery of the genetic diversity stored in the seed bank. The project stimulated germination using fire, but seedling numbers 18 months post-fire were low and barely above the number of mature individuals killed in the fire. Self-fertilisation was high, suggesting that restricted gene flow and inbreeding may be acting to limit genetic diversity in the seed bank (Ottewell et al. 2011).

Threat	Status and severity [a]	Evidence
Disease		
Dieback caused by *Phytophthora cinnamomi*	• Timing: future • Confidence: suspected • Consequence: minor • Trend: unknown • Extent: across the entire range	*P. cinnamomi* is an introduced soil-borne pathogen which infects a large range of plant species and may contribute to plant death. Mortality is especially likely when other stressors are present, such as waterlogging, drought and bushfire (DoEE 2018). *P. cinnamomi* can disperse in water flowing from roots of infected plants and in soil clinging to vehicles, animals, and people (DoEE 2018). Infection results in plant death in susceptible species through the destruction of root systems. Dieback caused by *P. cinnamomi* is listed as a Key Threatening Process under the EPBC Act (DoEE 2018). *P. cinnamomi* can cause significant damage to *Acacia* species, though a 2012 study suggested that the Fat-leaved Wattle was not very susceptible to the pathogen (Kueh et al. 2012). Of five infected individuals, all survived inoculation with the pathogen. However, the species may act as a symptomless host. If plants with cryptic infections are planted in the wild, they may provide a long-term source of *P. cinnamomi* to other species in the vicinity (Kueh et al. 2012). Evidence of the potential presence of *P. cinnamomi* has been observed at Finniss, but this has not been verified through soil testing. The subpopulation located at Finniss, and subpopulations located to the south and west of Cummins on Eyre Peninsula, have been identified as occurring within moderate risk areas for *Phytophthora* establishment (TSA 2000). Both Eyre Peninsula and Fleurieu Peninsula are identified as vulnerable areas for the spread of the pathogen (DEH 2006).

Status—identify the temporal nature of the threat.

Confidence—identify the extent to which we have confidence about the impact of the threat on the species.

Consequence—identify the severity of the threat.

Trend—identify the extent to which it will continue to operate on the species.

Extent—identify its spatial content in terms of the range of the species.

Each threat has been described in Table 1 in terms of the extent that it is operating on the species. The risk matrix (Table 2) provides a visual depiction of the level of risk being imposed by a threat and supports the prioritisation of subsequent management and conservation actions. In preparing a risk matrix, several factors have been taken into consideration, they are the life stage they affect; the duration of the impact; and the efficacy of current management regimes, assuming that management will continue to be applied appropriately. The risk matrix and ranking of threats has been developed in consultation with experts and using available literature.

Table 2 Fat-leaved Wattle risk matrix

Likelihood	**Consequences**				
	Not significant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost certain	Low risk	Moderate risk	Very high risk **Grazing by introduced and native herbivores**	Very high risk **Weed invasion**	Very high risk
Likely	Low risk	Moderate risk	High risk **Road, rail and fence maintenance**	Very high risk **Inappropriate fire regimes** **Inbreeding depression**	Very high risk
Possible	Low risk **Rubbish dumping**	Moderate risk **Dieback caused by *Phytophthora cinnamomi***	High risk	Very high risk **Land clearing for agriculture**	Very high risk
Unlikely	Low risk	Low risk	Moderate risk	High risk	Very high risk
Unknown	Low risk	Low risk	Moderate risk	High risk	Very high risk

Priority actions have then been developed to manage the threat particularly where the risk was deemed to be 'very high' or 'high'. For those threats with an unknown or low risk outcome it may be more appropriate to identify further research or maintain a watching brief.

Conservation and recovery actions

Primary conservation objective

By 2030, the population of 3000–4000 will have increased in abundance and viable populations are sustained in habitats which are managed for ongoing threats.

Conservation and management priorities

Invasive species (including threats from grazing, trampling, predation)

- Implement weed control at all sites where weeds are extant. This includes the use of physical removal and/or herbicide application, depending on the level of infestation. Extreme care must be taken when using herbicides for weed control as Fat-leaved Wattle individuals are susceptible to herbicide sprays (Pickett & Mallen 2003; Jusaitis & Sorensen 1994).

- Implement suitable weed hygiene protocols when undertaking survey, monitoring and management activities. Refer to the *Arrive Clean, Leave Clean Guidelines to help prevent the spread of invasive plant diseases and weeds threatening our native plants, animals, and ecosystems* (DoE 2015).
- Develop and implement long-term strategies to control introduced herbivores, including Rabbits, as detailed in the relevant Threat Abatement Plan (DoEE 2016).
- Manage herbivory by feral animals and livestock by constructing exclusion cages and fencing. If necessary, conduct population control on these species.

Habitat loss, disturbance and modifications (including fire)

- Develop and implement a long-term fire management strategy that optimises the survival of the species and incorporates new knowledge about its fire regime requirements.
- Provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigation measures in bushfire risk management plans, risk registers and operation maps.
- Conduct prescribed burns to stimulate germination of the Fat-leaved Wattle seedbank.
- Avoid physical damage to the habitat of the species during and after prescribed burns and fire management operations.
- Undertake active weed control after bushfires and fire management operations along roads and railways.
- Protect and maintain habitat at known sites by restricting vehicular and pedestrian access and undertaking targeted bush regeneration works where required.
- Ensure land managers are aware of the species' occurrence and minimise clearing where it is found.
- Protect known habitat from the impacts of road and rail construction, including:
  - Install and maintain signage along roadsides and railways, to indicate where the species habitat or known populations occur.
  - Close unused or little-used roads and tracks and revegetate these areas.
- Remove rubbish in the habitat of the Fat-leaved Wattle and discourage future dumping.
- Refer to guidance in the *National Standards for the practice of ecological restoration in Australia* (SERA 2017).

Breeding, seed collection, propagation, and other ex situ recovery action

- To manage risk of losing genetic diversity, undertake seed collections and store at appropriate institutions. Seeds from as many wild plants as possible across the majority of wild subpopulations should be collected and stored.
- If required, conduct supplementary plantings from seed. This is particularly relevant for subpopulations near Finniss, which have a low number of individuals. Plantings, if considered appropriate, should primarily be located adjacent to or within known populations.

- Conduct inter-population crosses between the Eyre Peninsula and Finniss subpopulations to restore genetic diversity.
- When conducting plantings, care must be taken to ensure that appropriate numbers are planted to maintain the genetic integrity of each population (as in Ottewell et al. 2009).
- Any translocation should be conducted in accordance with the *Guidelines for the Translocation of Threatened Plants in Australia* (Commander et al. 2018).

Disease

- Conduct soil testing to determine where *Phytophthora cinnamomi* is present in the soil in Fat-leaved Wattle habitat.
- Implement a *P. cinnamomi* management plan to ensure the pathogen does not spread through the range of the Fat-leaved Wattle and to mitigate the spread from any nearby infected areas (DoEE 2018).
- Ensure that appropriate hygiene protocols are adhered to when entering and exiting areas where the Fat-leaved Wattle occurs, such as those identified in DEWHA (2009).

Stakeholder engagement/community engagement

- Liaise with relevant stakeholders and landholders to encourage weed control and reduction of pollution.
- Engage with and involve Traditional Owners in conservation actions, including the implementation of Indigenous fire management and other survey, monitoring and management actions.
- Develop and implement procedures to protect the species during road or rail maintenance, for use by council or transport authority staff, landowners, land managers and contractors.
- Where monitoring or research identifies potential habitat for the species in areas that are privately-owned, liaise with landholders to provide information on the species and its habitat requirements, and encourage reporting of any sightings.
- Increase the recognition and support for the species' recovery by disseminating information on the species and its conservation status to the public.

Survey and monitoring priorities

- Assess the efficacy of previous weed control procedures to provide information for adaptive management.
- Coordinate targeted surveys of potential habitat for the Fat-leaved Wattle to identify new populations.
- Conduct further surveys to collect population data, including on:
    - abundance
    - age structure
    - recruitment since last survey
    - population stability.

- Conduct post-management monitoring to determine the impact of management strategies on Rabbit populations. Seedling survival and recruitment should also be monitored to establish the impact of Rabbit grazing.

Information and research priorities

- Determine whether surveying was carried out to verify records of Fat-leaved Wattle from Kulliparu CP and Yeldulknie CP, which appear to be significantly outside the species' range (Pobke 2007).
- Conduct research to further understand the species' biology and ecology, including:
  - quantity and timing of seed germination
  - pollination biology and pollinators
  - growth rate
  - longevity.
- Conduct research to further understand the species' disturbance ecology, including:
  - response to non-fire disturbances, such as raking and ground-ripping
  - appropriate fire intervals
  - seedling recruitment and survival between fires.
- Investigate the impacts of climate change on the long-term survival prospects of the species.
- Investigate the efficacy of actions in the previous recovery plan, and whether it was successful in increasing the total population to 4000 individuals.
- Better ascertain the impacts of *Phytophthora cinnamomi* on the species.
- Investigate options for establishing additional populations; or if new populations are discovered, investigate options for enhancing or increasing connectivity with these populations.

Links to relevant implementation documents

Recovery Plan for *Acacia pinguifolia* (Fat-leaved Wattle) (2011)

Threat abatement plan for competition and land degradation by rabbits (2016)

Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* (2018)

Threat abatement plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs (*Sus scrofa*) (2017)

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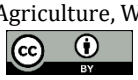
This publication (and any material sourced from it) should be attributed as: Department of Agriculture, Water and the Environment 2021, *Conservation advice for* Acacia pinguifolia (*Fat-leaved Wattle*), Canberra. 

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