Abridged Threatened Species Nomination Form

For nominations/assessments under the Common Assessment Method (CAM) where supporting information is available, but not in a format suitable for demonstrating compliance with the CAM, and assessment against the IUCN Red List threat status.

Cover Page *(Office use only for Assessment)*

Species name (scientific and common name)**:**	***Marianthus mollis***
Nomination for (addition, deletion, change)**:**	**Deletion**
Nominated conservation category and criteria:	**n/a**

Scientific committee assessment of eligibility against the criteria:			
This assessment is consistent with the standards set out in Schedule 1, item 2.7 (h) and 2.8 of the Common Assessment Method Memorandum of Understanding.			Yes ☐ No ☐
A.	Population size reduction	•	
B.	Geographic range	•	
C.	Small population size and decline	•	
D.	Very small or restricted population	•	
E.	Quantitative analysis	•	

Outcome*:*			
Scientific committee Meeting date:			
Scientific committee comments:			
Recommendation:			
Ministerial approval:		*Date of Gazettal/ Legislative effect:*	

Nomination/Proposal summary *(to be completed by nominator)*

Current conservation status				
Scientific name:	*Marianthus mollis*			
Common name:	Hairy-fruited Billardiera			
Family name:	Pittosporaceae		Fauna ☐	Flora ☒
Nomination for:	Listing ☐	Change of status/criteria ☐		Delisting ☒
1. *Is the species currently on any conservation list, either in a State or Territory, Australia or Internationally?* 2. *Is it present in an Australian jurisdiction, but not listed?*			*Provide details of the occurrence and listing status for each jurisdiction in the following table*	

Jurisdiction	**State / Territory in which the species occurs**	**Date listed or assessed (or N/A)**	**Listing category i.e. critically endangered or 'none'**	**Listing criteria i.e. B1ab(iii)+2ab(iii)**
International (IUCN Red List)				
National (EPBC Act)		2000 (transferred from former ESP Act)	Endangered	
State / Territory	1. WA	1988	Vulnerable	D1+2
	2. WA	2010	None	n/a
	3.			

Consistent with Schedule 1, item 2.7 (h) and 2.8 of the Common Assessment Method Memorandum of Understanding, it is confirmed that:	
• this assessment meets the standard of evidence required by the Common Assessment Method to document the eligibility of the species under the IUCN criteria;	Yes ☒ No ☐
Comments:	
• surveys of the species were adequate to inform the assessment;	Yes ☒ No ☐
Comments:	Extensive surveys were undertaken between 2007 and 2010. These surveys located four new populations, with the number of plants increasing from <1,000 plants in 1982 to 44,998. The range of the species was also extended by approximately 15 km.
• the conclusion of the assessment remains current and that any further information that may have become available since the assessment was completed supports or is consistent with the conclusion of the assessment.	Yes ☒ No ☐
Comments:	Assessment is consistent; the species no longer meets VU: D1+2 due to an increase in new populations, number of plants and its range.

Nominated national conservation status: category and criteria		
Presumed extinct (EX) ☐	Critically endangered (CR) ☐	Endangered (EN) ☐ Vulnerable (VU) ☐
None (least concern) ☒	Data Deficient ☐	Conservation Dependent ☐
What are the IUCN Red List criteria that support the recommended conservation status category?		
Eligibility against the IUCN Red List criteria (A, B, C, D and E)		
*Provide justification for the nominated conservation status; is the species eligible or ineligible for listing against the five criteria. For **delisting**, provide details for why the species no longer meets the requirements of the current conservation status.*		
A.	Population size reduction (evidence of decline)	• There has not been a known reduction in the number of locations or significant loss of plants to date, however, much of the known habitat is under mining tenements, but it is considered unlikely that a significant proportion of the habitat would be impacted by future mining activities.
B.	Geographic range (EOO and AOO, number of locations and evidence of decline)	• Extensive survey from 2007 to 2010 within the Ravensthorpe Range extended the species range by approximately 10 km. The number of known subpopulations increased from three to seven (3 locations) and the number of mature individuals increased from <1,000 to over 44,000. The EEO is approximately 232 km^2 and using the 2x2 km^2 grid system the area of occupancy is 48 km^2. The combined mapped area of the subpopulations is 23.25 km^2 which was measured from polygons over the seven subpopulations (+100m buffer). • There has not been a known reduction in the number of locations to date. Mining has resulted in the loss of 95 mature individuals to date at one subpopulation and it is likely that further future minor losses will occur, but this would not be significant to the conservation of the species. While much of the species' habitat is under mining tenement, it is considered unlikely that all subpopulations, or a significant area of habitat, would be impacted by future mining activities. The impact of mining may result in minor loss of plants at one location, but is not considered a significant factor to cause ongoing decline in the species. • The species regenerates strongly after fire, and hence fire is not a major threat, unless it occurs too frequently, which is unlikely in that environment. Fire is not considered a factor that would contribute to ongoing decline. • Firebreak maintenance and track maintenance has the potential to impact mature individuals, however, this type of activity has been shown to cause regeneration of the species, and thus will not contribute to ongoing decline. • **Does not meet criteria.** The species meets threshold levels for EOO, AOO and number of locations for Endangered under criterion B, however there is no current or projected continuing decline in any of the measures to meet the second subcriterion necessary. The species is not deemed to be at serious risk from any threatening process.

C.	Small population size and decline (population size, distribution and evidence of decline)	• Further surveys conducted in 2007-2010 increased the total known number of mature individuals to 44,998, located at 3 locations, consisting of seven subpopulations. • **Does not meet criteria**
D.	Very small or restricted population (population size)	• 44,998 mature individuals. • **No longer meets VU D1+2**
E.	Quantitative analysis (statistical probability of extinction)	• No data

Summary of assessment information

EOO	232 km^2	AOO	48 km^2	Generation length	-
No. locations	3	Severely fragmented	Yes ☐ No ☒ Unknown ☐		
No. subpopulations	7	No. mature individuals	44,998		
Percentage global population within Australia		100			
Percentage population decline over 10 years or 3 generations		unknown			

Threats *(detail how the species is being impacted)*

Threat *(describe the threat and how it impacts on the species. Specify if the threat is past, current or potential)*	Extent *(give details of impact on whole species or specific subpopulations)*	Impact *(what is the level of threat to the conservation of the species)*
Refer to table at end.		

Management and Recovery

Is there a Recovery Plan (RP) or Conservation Management Plan operational for the species?	Yes ☒ No ☐

List all relevant recovery or management plans (including draft, in-preparation, out-of-date, national and State/Territory recovery plans, recovery plans for other species or ecological communities, or other management plans that may benefit or be relevant to the nominated species).

- Hartley, R. and Barrett, S. (2005) Hairy-fruited Marianthus (*Marianthus villosus*) Interim Recovery Plan 2005–2010. Interim Recovery Plan No. 204. Department of Conservation and Land Management, Western Australia.

Note, this species has had a revised taxonomy to *M. mollis.*

List current management or research actions, if any, that are being undertaken that benefit the conservation of the species.

- Liaise with mining companies to ensure subpopulations are not significantly impacted from mining;

- Protect the sites from too-frequent fire, and implement early intervention in any wildfires which may threaten the site in such situations (noting that the species regenerates strongly after fire where sufficient seed set has occurred);
- Survey for additional populations;
- Collection and storage of seed;
- Monitor the populations for changes in plant or site health.

List further recommended management or research actions, if any, that would benefit the conservation of the species. Please ensure that this section addresses all identified threats.

Management

- If the opportunity arises, protect the sites containing populations of the species, as well as other critical habitat, by inclusion of unallocated Crown land (UCL) and other remnant areas in the reserve system;
- Ensure future mining activities do not impact on subpopulations, habitat and hydrology of the area through the environmental impact assessment process;
- Implementation of standard hygiene measures during development or maintenance activities, which will assist in protecting susceptible habitat from disease introduction.

Nomination prepared by:	
Contact details:	
Date submitted:	8/7/2016

If the nomination has been refereed or reviewed by experts, please provide their names and contact details:

Summary of subpopulation information *(detailed information to be provided in the relevant sections of the form)*						
Location *(include coordinates)*	Land tenure	Survey information: Date of survey and No. mature individuals	AOO	Site / habitat Condition	Threats *(note if past, present or future)*	Specific management actions
Rabbit Proof Fence, NE of Ravensthorpe (includes new subpopulations)	Unallocated Crown Land (UCL)	1982: 744 2007/10: 37,500	3.099 km^2	Healthy, site burnt in 2003, regenerating well.	Past • Firebreaks Current • Firebreaks (minor) • Inappropriate fire regimes (minor) Future • Inappropriate fire regimes (minor) • Climate change (unknown)	As above
Kundip to Mt Demond, Elverdton Road, SE of Ravensthorpe (includes 3 new populations)	UCL, unmanaged reserve	1982-2007: ~6,746 (some populations have not been re-found since originally surveyed in 1982)	2.857 km^2	Healthy, some areas burnt. Observed occurring along tracks, firebreaks.	Past • Firebreaks • Mining Current • Mining (minor) • Inappropriate fire regimes (minor) Future • Inappropriate fire regimes (minor) • Mining (minor) • Climate change (unknown)	As above
Mt Benson, NNE of Ravensthorpe (new population)	UCL	2010: 752	0.481 km^2	Part of site burnt in 2000, with *M. mollis* occurring in unburnt and burnt areas.	Past • None Current • None Future • Inappropriate fire regimes (minor) • Climate change (unknown)	As above

Department of
Environment and Conservation

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Form to nominate a Western Australian species for listing as threatened, change of category or delisting 2010 (updated 2016).

NOTICE: Incomplete forms may result in delays in assessment, or rejection of the nomination. To fill out this form you must refer to the Guidelines and contact the relevant Officer in the DEC Species and Communities Branch. DEC staff can advise you on how to fill out the form and may be able to supply additional, unpublished information.

Answer all relevant sections, filling in the white boxes and indicating when there is no information available. **Note**, this application form applies to both flora and fauna species, and hence some questions or options may not be applicable to the nominated species – for these questions, type "N/A".

To mark boxes with a **cross**, double click the box and select not checked or checked.

SECTION 1. NOMINATION					
1.1. Nomination for:					
Flora ☒	**Fauna** ☐	**Threatened / DRF** ☐	**Change of category** ☒	**Delisting** ☐	
1.2. Scientific Name **This name will be used to identify the species on all official documentation. Use the approved name used by the Western Australian Museum or Herbarium. If this is not possible, use unpublished names or numbers of voucher specimens.**					
Marianthus mollis (E.M.Benn.) L.Cayzer & Crisp, *comb. nov*					
1.3. Common Name **If the species has a generally accepted common name, please show it here. This name will be used on all official documentation.**					
Hairy-fruited Billardiera					
1.4. Current Conservation Status. If none, type 'None'.					

	IUCN Red List Category e.g. Vulnerable	**IUCN Red List Criteria e.g. B1ab(iv);D(1)**
International IUCN Red List	None	None
National EPBC Act 1999	Endangered	
State of Western Australia	Vulnerable	D1+2

State of WA Priority	1☐	2☐	3☐	4☐	5☐

Is the species listed as 'Threatened' in any other Australian State or Territory? If Yes, list these States and/or Territories and the status for each.

No ☒ **Yes** ☐

Does the species have specific protection (e.g. listed on an annex or appendix) under any other legislation, inter-governmental or international arrangements e.g. CITES? If Yes, please provide details.

No ☒ **Yes** ☐

1.5. Nominated Conservation Status.

	IUCN Red List Category e.g. Vulnerable	**IUCN Red List Criteria e.g. B1ab(iv);D(1)**
State of Western Australia	Nil	N/A

State of WA Priority	1☐	2☐	3☐	4☒	5☐

1.6. Reasons for the Nomination.
Briefly summarise the reasons for the nomination in dot points. Please include details relevant to the IUCN Categories and Criteria where appropriate.

Currently listed as Vulnerable under IUCN Red List criteria D1 and 2:

D. Population very small or restricted in the form of either of the following:

1. Population size is estimated to be fewer than 1000 mature individuals

2. Population with a very restricted area of occupancy (typically less than 20 km^2) or the number of locations (typically 5 or fewer) such that it is prone to the effects of human activities or stochastic events within a very short period in an uncertain future, and thus is capable of becoming Critically Endangered or even Extinct in a very short time period

Marianthus mollis no longer satisfies criteria D1 or D2 because:

- There are an estimated 44,998 individual plants.
- The population comprises 7 populations (12 sub-populations - separated by more than 500 m).
- Extent of Occurrence: 232 km^2.
- Area of occupancy is estimated to 23.25 km^2 measured from polygons over the seven populations (+100 m buffer).
- **Nominated conservation status: Priority Four – Rare (Near Threatened).**

Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.

- The taxon is known from approximately 41 records (WA Herbarium, DEFL database, 2010 survey data) in the vicinity of the Ravensthorpe Range.
- Population census information has been recorded for most populations, which indicate population size is highly variable but can be up to 35,000. Records indicate there is often some soil disturbance or recent fire at the population sites.
- Given the substantial number of sub-populations with high numbers of plants, this taxon is not considered to be immediately threatened. It is suggested to be listed as Priority 4 under the State of WA Priority Flora list.

SECTION 2. SPECIES

2.1. Taxonomy.

Describe the taxonomic history, using references, and describe the key distinguishing features that can be used to separate this taxon from closely related taxa. Include details of the type specimen, changes in taxonomy, scientific names and common names used for the species.

This taxon was first described under the name *Billardiera mollis* (Bennett 1983). The type specimen was collected from the Ravensthorpe Range in September 1979 (E.M. Bennett 16979). It was renamed *Marianthus mollis* following a reinstatement and revision of the genus *Marianthus* (Cayzer & Crisp 2004). *Marianthus mollis* is known by the common name 'Hairy-fruited Billardiera'.

A specimen collected from the Bremer Range was previously included by Cayzer & Crisp (2004) under their concept of *Marianthus mollis*. Following a detailed morphometric analysis the Bremer Range populations were deemed to represent a distinct species and subsequently named *Marianthus aquilonaris* (Wege & Gibson 2009).

Marianthus mollis is most similar to *Marianthus aquilonaris* which also has a shrubby habit, bluish flowers and an indumentum of long, silky hairs and shorter glandular hairs on the stems, flower stalks, calyces and fruit. *Marianthus aquilonaris* is endemic to the Bremer Range and differs most obviously in having a taller, more erect growth form, leaves which are glabrous on both surfaces, and paler flowers (ice blue to almost white). This species also tends to have leaves with a higher L:W ratio (2.1–4.1), tapered rather than rounded bases, longer petioles (1–2.5 mm long), and fewer silky hairs on the stems, peduncles and fruit.

Is this species conventionally accepted? If no, explain why. For example, is there any controversy about the taxonomy? For undescribed species, detail the location of voucher specimens (these should be numbered and held in a recognised institution and be available for reference purposes).

No ☐ **Yes** ☒

This species is conventionally accepted.

Describe any known hybridisation with other species in the wild, indicating where this occurs and how frequently.

Two other species of *Marianthus* are known from the Ravensthorpe Range: *Marianthus microphyllus* and *Marianthus bicolor*. *Marianthus mollis* is distinct and cannot be confused with either of these species. No hybridization is known (or likely) between these morphologically distinct species. In fact hybridisation has not been recorded between any species of the genus *Marianthus*.

2.2. Description

Describe the physical appearance, habit, behaviour/dispersion and life history. Include anatomy or habit (e.g. size and/or weight, sex and age variation, social structure) and dispersion (e.g. solitary, clumped or flocks etc), and life history (e.g. short lived, long lived, geophytic, etc).

Description

This description was compiled by Carol Wilkins of the WA Herbarium.

A low, multi-stemmed, spreading shrub 0.2–0.6(–1) m high and 0.2–0.8 m wide. The *stems* have a dense covering of ± glandular hairs to 0.3 mm long and silky (pilose) hairs 0.5–2 mm long, but become glabrous with age. The *leaves* are alternate, ovate to oblong, 6–25 mm long and 3–11 mm wide, with a L:W ratio of 0.9–2.8. The apex is acuminate (rarely acute), the margins entire, the base rounded, and the petioles 0.5–1.5 mm long. There are long silky hairs and shorter glandular hairs on both leaf surfaces and the margin, although these rub off with age leaving small papillose protuberances. The ± nodding *flowers* are solitary in the leaf axils. The flower stalks are 8–30 mm long with a dense covering of short, ± glandular hairs and longer, evenly scattered silky hairs. The *sepals* are 3–8 mm long, taper to a narrow point, and have both glandular and silky hairs. The 5 spathulate *petals* cohere as a tube in the throat then recurve, and are sparsely hairy on the inside. They are dark purple-blue with fine purple striations and the throat is white. The 5 stamens are 5.5–9.8 mm long, the filaments are flared towards the base, and the anthers are white. The *ovary* is 5.7–7.8 mm long including the ± curved style and basal nectary, and has 2 locules and a dense covering of silky hairs obscuring shorter, ± glandular hairs. The fruit is a dehiscent capsule which is ellipsoid to oblong (occasionally obovate), 6.5–10 mm long, and 5–7 mm wide, with dense pilose and glandular hairs. The *seeds* are elliptic to reniform, dark red-brown, shiny, wrinkled and have an aril.

Life History

The life expectancy of *Marianthus mollis* is unknown. It has been recorded in relatively high abundance along tracks and firebreaks, demonstrating that it responds well following disturbance events. Plants have been observed flowering at an age of three years. Large, healthy populations have also been recorded from long undisturbed vegetation (>50 years). Plants at such locations are very large (sprawling shrub to 1 m tall & 1.5 m wide) with no evidence of recruitment, indicating a high life expectancy for the species.

Marianthus mollis is a geosporous species with seeds released relatively quickly following fruiting and stored in the soil seedbank.

2.3. Distribution

Describe the distribution of the species in Australia and, if possible, provide a map.

There are 41 records of *Marianthus mollis* from the Ravensthorpe region. It occurs from Mt Benson to Kundip in the Ravensthorpe Range, and also to the NE around the Rabbit Proof Fence near Nindibillup Road. The extent of occurrence is 232 km^2. The furthest records are separated by 22.4km.

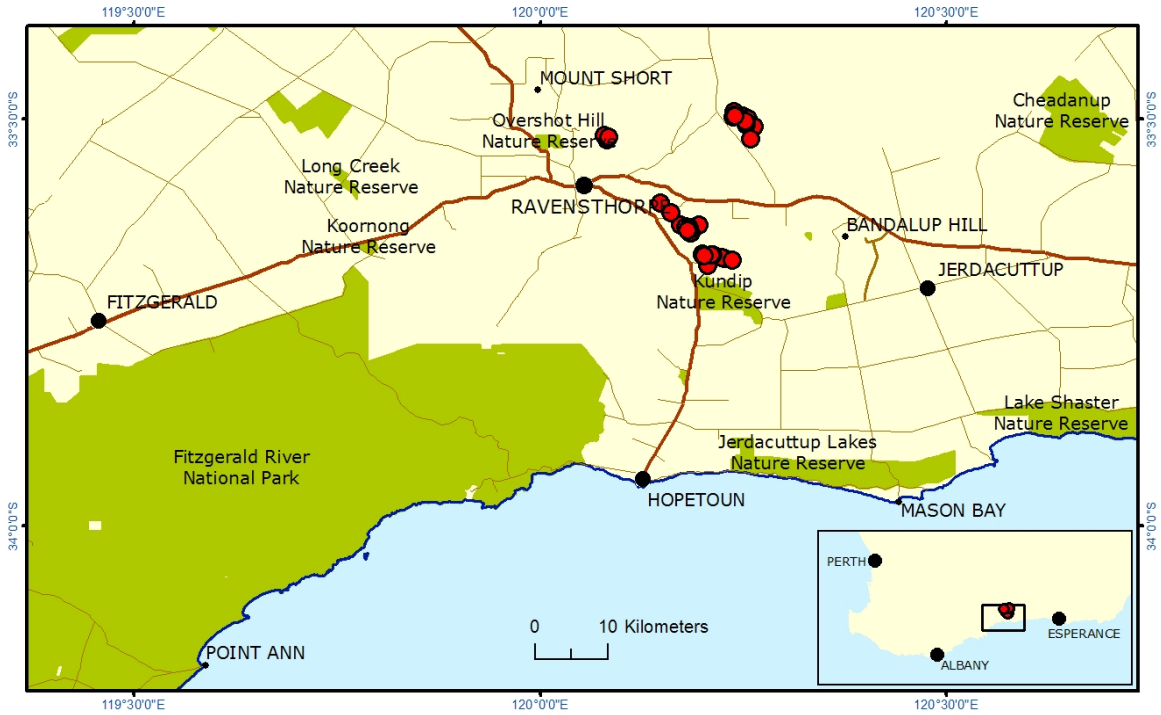

Figure 1. Distribution of *Marianthus mollis.*

2.4. Habitat

Describe the non-biological habitat (e.g. aspect, topography, substrate, climate) and biological habitat (e.g. forest type, associated species, sympatric species). If the species occurs in various habitats (e.g. for different activities such as breeding, feeding, roosting, dispersing, basking etc) then describe each habitat.

Non-biological habitat

Marianthus mollis has been recorded from a range of sites representing a diversity of habitat types. Records reveal no preference for a particular aspect and this species is known to occur on a range of landform element types including hill crests, upper slopes, mid slopes and gullies. *Marianthus mollis* has been recorded from both long unburnt and recently burnt vegetation, with several records indicating that it occurs in increased abundance along disturbed areas such as tracks. It typically occurs on a substrate of sandy loam (or similar), but has also been recorded on clay. It is associated with a range of geological types, most commonly laterite but also quartz, gossen, metamorphosed sedimentary, granite, shale, schist and silcrete.

Due to the restricted geographical range of *Marianthus mollis*, all sub-populations are subjected to the similar climatic conditions. The climate of the Ravensthorpe region has been described as 'warm mediterranean' with a concentration of rainfall in the winter months. The average annual rainfall is 426 mm, two thirds of which falls in the months May to October.

Biological habitat

Most frequently recorded from vegetation that has a dominant mallee stratum (commonly *Eucalyptus pleurocarpa, E. incrassata, E. phaenophylla, E. tetraptera, E. falcata, E. preissiana*) with a shrub dominated understorey (various species including *Banksia lemanniana*). *Marianthus mollis* has occasionally been recorded from mallet-dominated communities (*Eucalyptus megacornuta, E. clivicola*) with an open understorey, and shrublands dominated by *Acacia pinguiculosa* subsp. *pinguiculosa* and *Kunzea affinis*.

Does the (fauna) species use refuge habitat e.g. in times of fire, drought or flood? Describe this habitat.

N/A

Is the species part of, or does it rely on, a listed threatened ecological community? Is it associated with any other listed threatened species?

There are no currently listed threatened ecological communities known from the distribution of *Marianthus mollis*.

Five listed priority ecological communities are known from the Ravensthorpe Range. *Marianthus mollis* is not believed to rely on a listed priority ecological community based on the vegetation community descriptions from known populations.

Priority-listed ecological communities known from the Ravensthorpe Range

	Community Name	**Catagory**
12	**Heath on Komatiite at Bandalup Hill**	Priority 1
13	***Melaleuca* sp. Kundip Heath**	Priority 1
16	***Eucalyptus purpurata* (woodlands (Bandalup Hill)**	Priority 1
18	***Banksia laevigata – Banksia lemanniana* proteaceous thicket**	Priority 1
19	***Eucalyptus megacornuta* mallet woodland**	Priority 1

Marianthus mollis is not known to be directly associated with any other listed threatened species. A Priority Four-listed species, *Eucalyptus proxima*, has been recorded as an associated species (Kern *et al.* 2008).

It is known to occur within a few hundred metres of the threatened species *Kunzea acicularis* and within a few kilometres of *Acacia rhamphophylla* (En) and *Daviesia megacalyx* (En).

2.5. Reproduction

Provide an overview of the breeding system.

For <u>fauna</u>: Provide an overview of the breeding system and breeding success, including: when does it breed; what conditions are needed for breeding; are there any breeding behaviours that may make it vulnerable to a threatening process?

For <u>flora</u>: When does the species flower and set fruit? Is the seed produced viable? What conditions are needed for this? What is the pollinating mechanism? If the species is capable of vegetative reproduction, a description of how this occurs, the conditions needed and when. Does the species require a disturbance regime (e.g. fire, ground disturbance) in order to reproduce?

Marianthus mollis predominantly flowers from September to December. However, flowering events have also been recorded in January and February, indicating this species may flower at any time of the year under favourable conditions.

Mature fruit has been collected in November, December and February (Wege & Gibson 2009).

Seed was collected from Population 4 in December 1995. Initial germination and retest germination of the seed yielded 46% and 36% germination, respectively. The seed was germinated on agar containing 25mg/l Gibberellic acid. *Marianthus villosus* (and another *Marianthus* species tested) have not been tested on plain agar and it therefore unclear whether the Gibberellic acid is aiding in the germination (Hartley & Barrett 2004). Smoke treatment and seed coat nicking were also tested but do not appear to have had any beneficial effect on germination. However, results are inconclusive due to the small sample sizes (3A. Crawford, personal communication).

There is limited available information regarding the pollination biology of *Marianthus mollis* or indeed the genus *Marianthus*. Hartley & Barrett (2004) suggested that the small flower size of *Marianthus mollis* as evidence that it is likely to be insect or self pollinated rather than bird pollinated.

2.6. Population dynamics

Provide details on ages of sexual maturity, extent of breeding success, life expectancy and natural mortality. Describe population structure (presence of juveniles/seedlings, mature and senescing individuals).

Flowers have been observed on plants of young age (<3 years). *Marianthus mollis* is a geosporous species with seeds released relatively quickly following fruiting and stored in the soil seedbank. It recruits successfully following fire, and has been observed in abundance along tracks and firebreaks.

Large old plants (to 1 m tall & 1.5 m wide) have been observed in relatively high numbers in long undisturbed vegetation near Mt Benson (>50 years since last fire). Within this site there was no seedling recruitment observed, however in nearby burnt vegetation young plants were abundant (no evidence of plants resprouting from lignotubers).

Questions 2.7 and 2.8 apply to <u>fauna</u> nominations only

2.7. Feeding

Summarise food items or sources and timing/availability.

N/A

Briefly describe feeding behaviours, including those that may make the species vulnerable to threatening processes.

N/A

2.8. Movements

Describe any relevant daily or seasonal pattern of movement for the species, including relevant arrival/departure dates if migratory. Provide details of home range/territories.

N/A

SECTION 3. INTERNATIONAL CONTEXT
For species that are distributed both in Australia and in other countries.
3.1. Distribution **Describe the global distribution.**
Marianthus mollis is known only from the Ravensthorpe region of Western Australia.
Provide an overview of the global population size, trends, threats and security of the species outside of Australia.
N/A
Explain the relationship between the Australian population and the global population. What percentage of the global population occurs in Australia? Is the Australian population distinct, geographically separate or does part, or all, of the population move in/out of Australia's jurisdiction? Do global threats affect the Australian population?
N/A
SECTION 4. CONSERVATION STATUS AND MANAGEMENT
4.1. Population **What is the total population size in terms of number of mature individuals? Has there been any known reduction in the size of the population, or is this likely in the future? – provide details. Are there other useful measures of population size and what are they? Or if these are unavailable, provide an estimate of abundance (e.g. scarce, locally abundant etc).**
The population comprises 12 sub-populations (separated by >500 m) with a total of 44,998 plants. The largest sub-population contains an estimated 35,000 plants. There has been no recorded reduction in population size.
Provide locations of: captive/propagated occurrences or *ex situ* collections; recent re-introductions to the wild; and sites for proposed re-introductions. Have these sites been identified in recovery plans?
There are no known propagated occurrences. Some 15,000 seed from populations 1,4 and 5 are in storage at DEC's TFSC.
How many locations do you consider the species occurs in and why? Where a species is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.

Marianthus mollis is known from 41 records (WA Herbarium, DEFL database, 2010 survey data), representing 12 distinct subpopulations (separated by at least 500 m).

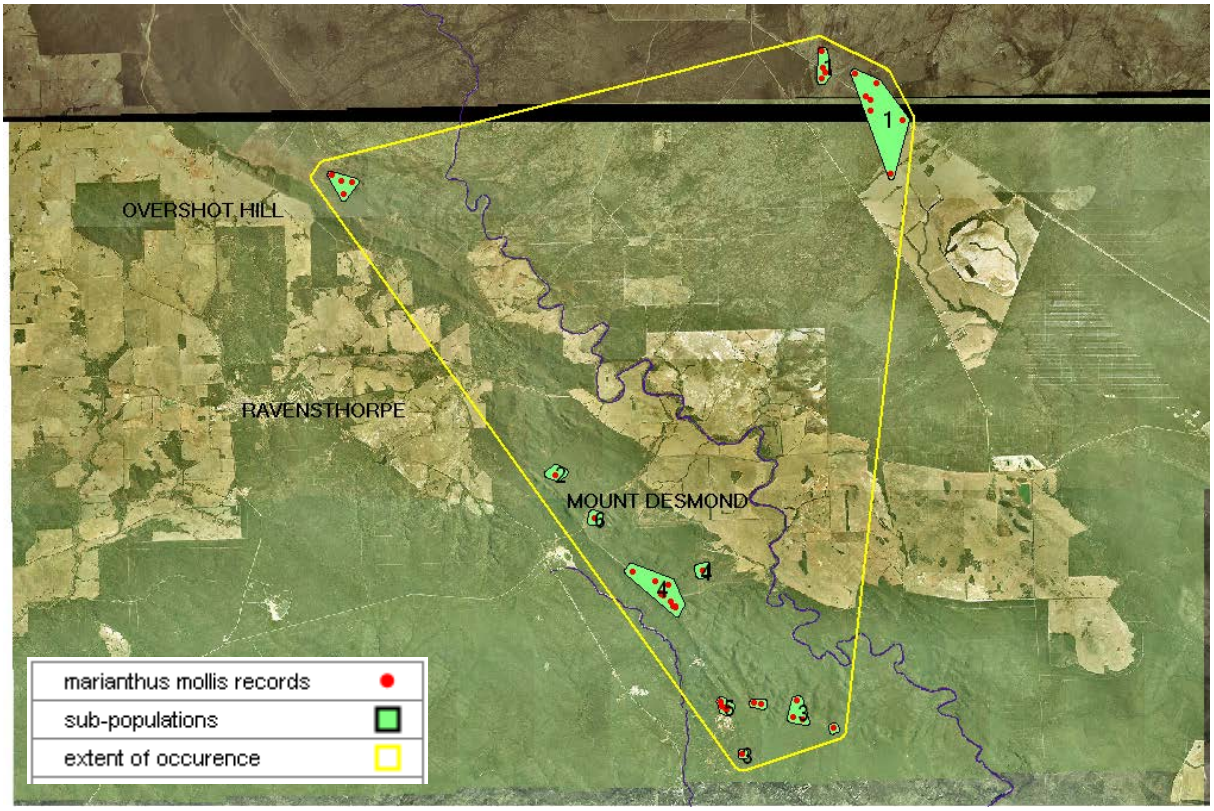

Figure 2. Sub-populations of Marianthus mollis (numbering indicates DEFL recognised populations)

For <u>flora</u>, and where applicable, for <u>fauna</u>, detail the location, land tenure, estimated number of individuals, area of occupancy, and condition of site for each known date, location or occurrence.

Date of survey	Location	Land status	Number of individuals at location	Area of occupancy at location	Condition of site
28/05/2010	Rabbit Proof Fence	UCL	2500	0.379	Entire site burnt in 2003, Marianthus mollis regenerating in abundance.
16/10/2007	Rabbit Proof Fence	UCL	35000	2.720	Entire site burnt in 2003, Marianthus mollis regenerating in abundance.
1/1/1982	Mt Desmond	Unmanaged Reserve	50	0.243	Unknown, attempts to relocate this population from location description in 2010 were unsuccessful.
07/10/2010	Kundip	UCL/Unmanaged Reserve	466	0.414	Healthy, long unburnt vegetation.
2/10/2004	Kundip	Unmanaged Reserve	700	0.081	Unknown.
9/9/1999	North of Kundip	Unmanaged Reserve	30	0.194	Healthy.

10/6/2007	North of Kundip	Unmanaged Reserve	2000	1.300	Healthy, long unburnt vegetation, Marianthus mollis observed to be particularly on and near tracks.
1/11/2007	Kundip	UCL/Unmanaged Reserve	1500	0.215	Healthy, long unburnt.
21/9/2005	Elverdton Road	Unmanaged Reserve	2000	0.177	Healthy, site partially burnt in 2000.
27/9/2007	Kundip	UCL	no estimate	0.089	Healthy, long unburnt.
25/9/2007	Kundip	UCL	no estimate	0.144	Healthy, long unburnt.
29/05/2010	Mt Benson	UCL	752	0.481	Part of site burnt in 2000, Marianthus mollis occurs in both burnt and unburnt areas.

Has the number of individuals been counted, or is this an estimate? Provide details of the method of determining the number of individuals.

The sub-population numbers given in the above table come from a variety of sources. In most cases the number of plants is an estimate, the exact methods are unknown. In cases where a sub-population is represented by a number of nearby records, the largest recorded estimate has been listed. As such, the number of individuals may be under estimated.

Has there been any known reduction in the number of locations, or is this likely in the future? – provide details.

There has not been a known reduction in the number of locations to date. Ninety five plants out of some 1,500 were impacted by a drilling program (Tectonics) in population 5. It is considered that only 30 plants were directly affected by the drill rig, total mortality unclear.

Future mining at Kundip (Tectonics) may result in further loss of plants within population 5, an earlier permit to take in 2006 specified 4 plants to be taken for waste dump (not taken) and 50 for the haul road (population 3), however plans for the haul road appear to have been shelved. The Draft Flora and Vegetation Communities Management Plan (Tectonic Resources NL 2007) aimed to minimise disturbance to *M. mollis*.

While much of *M. mollis* habitat is under mining lease, it is considered unlikely that all populations would be impacted by future mining activities. After minor disturbance, it is likely that *M. mollis* would regenerate well as it has been observed in abundance along tracks and firebreaks.

What is the extent of occurrence (in km^2) for the species; explain how it was calculated and datasets used. If an accurate estimate is unavailable, provide a range of values or a minimum or maximum area estimate. Include estimates of past, current and possible future extent of occurrence. If available, include data that indicates the percentage decline over 10 years or 3 generations (whichever is longer) that has occurred or is predicted to occur.

The extent of occurrence is 232 km^2. This has been calculated by measuring the area of a polygon that contains all the sub-populations of *Marianthus mollis* (WA Herbarium, DEFL and 2010 survey records).

Is the distribution of the species severely fragmented? Why?

No. The furthest distance between any two records of *Marianthus mollis* is 22.4 km.

Identify important occurrences necessary for the long-term survival and recovery of the species? This may include: key breeding populations, those near the edge of the range of the species or those needed to maintain genetic diversity.

All populations are important, as well as remnant vegetation that may link future populations.

4.2. Survey effort

Describe the methods to conduct surveys. For example, (e.g. season, time of day, weather conditions); length, intensity and pattern of search effort (including where species not encountered); any limitations and expert requirements.

The optimal survey time is in Spring to coincide with flowering. However this taxon is readily distinguished and can be identified by a field botanist at any time of the year. Surveys should be conducted in dry soil conditions to minimise the risk of spreading Phytophthora dieback.

Provide details on the distinctiveness and detectability of the species, or the distinctiveness of its habitat, that would assist survey success.

Marianthus mollis superficially resembles *Daviesia mollis* with which it co-occurs in the Ravensthorpe region. These two species could be confused in the field when not in flower.

Has the species been reasonably well surveyed? Provide an overview of surveys to date (include surveys of known occurrences and surveys for additional occurrences) and the likelihood of its current known distribution and/or population size being its actual distribution and/or population size. Include comments on potential habitat and surveys that were conducted, but where the species was not present/found.

Yes, this species has been well surveyed. It has been incorporated in a DEC rare flora survey program that has been running from 2007 to 2010. Through targeting this species (and many others) this program has surveyed extensive areas of native vegetation within the Ravensthorpe region. These surveys have specifically targeted similar habitats in the Ravensthorpe region and beyond including:

- locations with similar geological types encountered across the Ravensthorpe region.
- locations with similar vegetation associations, particularly those mapped by Craig *et al*. (2008)
- locations with similar soil landscapes

The region has also been the subject of several other detailed botanical surveys:

- A recent floristic survey of the Ravensthorpe Range (Kern *et al*. 2008) established 200 quadrats. An additional 66 quadrats were established as part of this study in 2008/9 (Markey, unpublished data).
- The vegetation of the Ravensthorpe Range between Mt Short and Kundip has recently been mapped at a scale of 1:10,000 (Craig *et al.* 2008). This involved extensively traversing the study area by an experienced team of botanists.

These surveys have increased the number of known sub-populations. It is considered likely that additional populations may exist in some of the more remote and inaccessible areas of the Ravensthorpe region.

4.3. Threats

Identify past, current and future threats indicating whether they are actual or potential. For each threat describe:

a). how and where they impact this species

b). what the effect of the threat(s) has been so far (indicate whether it is known or suspected

c). present supporting information/research

d). does it only affect certain populations?

e). what is its expected effect in the future (is there supporting research/information; is the threat only suspected; does it only affect certain populations?).

Mining

Several of the sub-populations (3, 5) from the Kundip area occur on active mining tenements, or may be in the future.

Inappropriate fire regime

Three of the sub-populations occur on or near firebreaks. In addition, four sub-populations have been subject to wildfires in the last decade. *Marianthus mollis* has been observed to successfully regenerate following fires. However, poorly timed, intense and too frequent fire may be detrimental if the seedbank has not been built up sufficiently. The minimum desirable fire interval has been estimated to be at least 6 years (Hartley and Barrett 2005).

Phytophthora dieback

The Ravensthorpe Range (including entire habitat of *Marianthus mollis*) is currently considered free of dieback caused by *Phytophthora cinnamomi*. However, it remains a potential threat that could be introduced along the vehicle tracks that dissect several of the sub-populations.

Testing of another Marianthus species (*M. paralias*) indicated resistance to *P. cinnamomi* (B. Shearer unpublished data)

If possible, provide information threats for each current occurrence/location:

Location	Past threats	Current threats	Potential threats	Management requirements (see section 4.4)
1. Rabbit Proof fence	Firebreaks	Firebreaks	Inappropriate fire regime.	
1. Rabbit Proof fence	Firebreaks	Firebreaks	Inappropriate fire regime.	
2. Mt Desmond	Unknown	Unknown	Unknown	
3A. Kundip	Nil	Nil	Mining, inappropriate fire regime.	
3B. Kundip	Nil	Nil	Mining, firebreaks, inappropriate fire regime.	
4. North of Kundip	Firebreaks	Nil	Inappropriate fire regime.	
4. North of Kundip				
5. Kundip	Mining	Mining	Inappropriate fire regime	
6. Elverdton Road	Nil	Nil	Inappropriate fire regime.	
Kundip	Nil	Nil	Mining, inappropriate fire regime.	
Kundip	Nil	Nil	Mining, inappropriate fire regime.	
Mt Benson	Nil	Nil	Inappropriate fire regime.	

Identify and explain why additional biological characteristics particular to the species are threatening to its survival (e.g. low genetic diversity). Identify and explain any models addressing the survival of the species.

None identified.

4.4. Management

Identify key management documentation for the species e.g. recovery plans, conservation plans, threat abatement plans etc.

Interim Recovery Plan No. 204 was completed in July 2005 (Hartley and Barrett 2005).

Does this species benefit from the management of another species or community? Explain.

No.

How well is the species represented in conservation reserves or covenanted land? Which of these are actively managed for this species? Provide details.

Marianthus mollis is not currently represented within the conservation estate.

Are there any management or research recommendations that will assist in the conservation of the species? Provide details.

Specific management requirements [added 2016] include:

- Protect the sites containing populations of the species, as well as other critical habitat from mining by acquire UCL and other remnant areas for inclusion in the reserve system;
- Liaison with mining companies to ensure populations are not impact from mining;
- Monitor the populations for changes in plant or site health;
- Protect the sites from fire unless required for ecological reasons, and implement early intervention in any wildfires which may threaten the sites;
- Survey any newly identified areas of suitable habitat;
- Implement dieback hygiene measures to protect susceptible habitat from disease introduction;
- Determine species pollination ecology, seed germination requirements and viability, and longevity;
- Determine the species response to fire.

4.5. Other

Is there any additional information that is relevant to consideration of the conservation status of this species?

No

SECTION 5. NOMINATOR

Nominator(s) name(s)	
Organisation(s)	
Address(s)	
Telephone number(s)	
Email(s)	
Date	30/11/2010

If the nomination has been refereed or reviewed by experts, provide their names and contact details.

This nomination has been reviewed by the following:

- Sarah Barrett – Flora Conservation Officer, DEC Albany.
- Gil Craig – Botanical Consultant, Ravensthorpe.
- Damien Rathbone – Conservation Officer (dieback), DEC Albany.

SECTION 6. REFERENCES

What references or sources did you use to prepare your nomination? Include written material, electronic sources and verbal information. Include full references, address of web pages and the names and contact details of authorities with whom you had verbal communications.

Bennett, E.M. (1983). A new species of *Billardiera* (Pittosporaceae) from south-west Western Australia. *Nuytsia* 4(3): 275–278.

Cayzer, L.W. & Crisp, M.D. (2004). Reinstatement and Revision of the Genus *Marianthus* (Pittosporaceae). *Australian Systematic Botany* 17: 127-144.

Craig, G.F., Sandiford E.M., Hickman, E.J., McQuoid, N., Rick, A.M. & Newell, J. (2008). *The vegetation of the Ravensthorpe Range, Western Australia: I. Mt Short to Kundip, 1:10,000 scale*. Department of Environment and Conservation and South Coast Natural Resource Management Inc, Albany, Western Australia.

Hartley, R., & Barrett, S. (2005). *Interim Recovery Plan No. 204: Hairy-fruited Marianthus (Marianthus villosus)*. Department of Conservation and Land Management, Albany, Western Australia.

Kern, S., Jasper, R. & True, D. (2008). *Floristic survey of the Ravensthorpe Range*. Unpublished report for the Department of Environment and Conservation, Woodvale, Western Australia.

Wege, J.A. & Gibson, N. (2009). A new, rare *Marianthus* (Pittosporaceae) from the Bremer Range in Western Australia. *Nuytsia* 19(2): 295-302.