Evidence on Listing Eligibility and Conservation Actions 2021

Tarennoidea wallichii (Hook.f.) Tirveng. & Sastre

Current EPBC Act status: Not listed
Current TPWC Act status: Endangered (D)

Proposed Action: Add to EPBC list
Nominated Status: Endangered B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); D

Taxonomy

Scientific name:	*Tarennoidea wallichii* (Hook.f.) Tirveng. & Sastre		
Common name:			
Family name:	RUBIACEAE	Fauna ☐	Flora ☒

Species Information

Description

Tarennoidea wallichii is a small tree to 8 m, with grey bark, smooth throughout. Its leaves are opposite with interpetiolar stipules, dark green and glossy (Figure 1). The domatia have fringing hairs. The flowers are white (Northern Territory Government 2013).

Distribution

In Australia, *Tarennoidea wallichii* occurs only in the Northern Territory (NT), where it is known from the Tiwi Islands within nine monsoon rainforest patches, five on the western end of Melville Island and four on Bathurst Island. These rainforest patches are geographically close to each other (less than 30 km between 8 of 9 patches) and demographic connectivity among all the patches is expected. One population is therefore identified on the basis of likely demographic exchange among all patches in which the species occurs.

The most serious plausible threat operating against the species across its distribution in Australia is habitat modification due to land development and the interactive impacts of hydrological and land system modification with grassy weed invasion and changed fire regimes. The Area of Occupancy (AOO) of the Australian regional population (based on the IUCN standard 2 km x 2 km grid cell size) is 32 km^2 and the Extent of Occurrence (EOO; minimum convex polygon) is 237 km^2 (Figure 2).

Outside of Australia, *Tarennoidea wallichii* is widespread in Malesia, extending from Timor Leste to India and southern China. Fruit dispersal is likely by birds, but the long-distance movement of propagules and subsequent recruitment between the Australian and extralimital populations is considered extremely rare. The Australian regional population does not likely experience any significant immigration of propagules likely to reproduce in the region. Consequently, the Australian population is considered to be isolated from conspecific populations outside the region and, thus, the IUCN Red List Categories and Criteria are applied to the Australian population without modification.

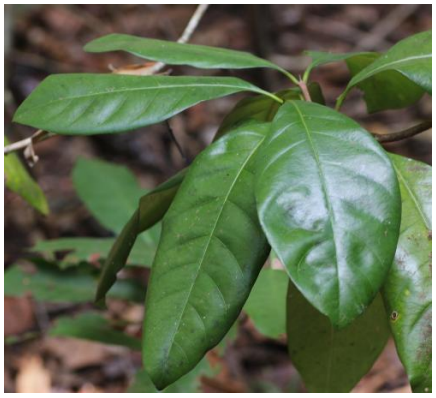

Figure 1. Leaves and habit of *Tarennoidea wallichii.* Image I.D. Cowie

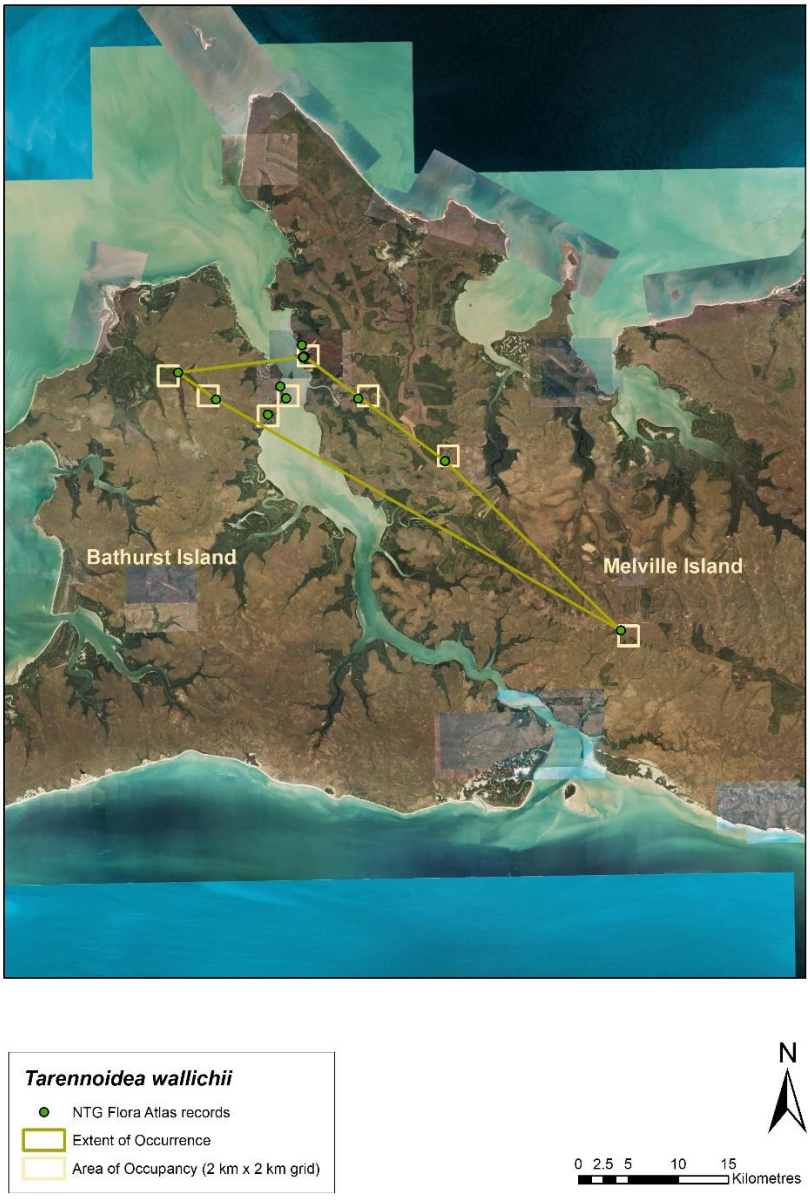

Figure 2. Distribution of the regional population of *Tarennoidea wallichii* within rainforest patches on Melville Island and Bathurst Island, Northern Territory.

Adequacy of Survey

Survey for *Tarennoidea wallichii* in the NT is deemed adequate. Across the NT, its preferred habitat has been well sampled (Russell-Smith 1991) and the Tiwi Islands have additionally been subject to intensive botanical survey effort. The one degree grid cell covering the species' EOO has 286 plant records per km^2, the fourth-highest collection density per grid cell for the NT. Monsoonal rainforests across the NT, including those of the Tiwi Islands, have been comparatively well sampled as part of an intensive survey of the NT's rainforest estate (Russell-Smith 1991; Liddle *et al*. 1994). Several major botanical survey programs have occurred on the Tiwi Islands since 1999: a large assessment of the biodiversity and conservation values of the Tiwi islands between 1999 and 2002, including by the NT Herbarium (Woinarski *et al.* 2003); extensive collection of specimens for pharmaceutical evaluation, in 1999-2002, by the NT Herbarium; a survey of Tiwi Threatened Plants in 2007-2008; and a survey of threatened plants on northern parts of Bathurst Island in 2014 (Liddle & Elliott 2008; Cowie *et al.* 2014).

Relevant Biology/Ecology

Flowering - October; Fruiting - July and October.

Tarennoidea wallichii occurs in drier parts of complex evergreen monsoon rainforests. The total area occupied by the species is estimated at 0.33 km^2. The known occurrences for the species are concentrated on the western end of Melville Island and adjacent Bathurst Island. The Tiwi Islands support some 1300 rainforest patches (in the broad sense, including evergreen, semi-evergreen, monsoon and deciduous forest) with a total area of around 160 km^2 or 7–15% of the total rainforest area of the Northern Territory (Woinarski et al. 2003). Of these, the evergreen rainforest patches on the Tiwi Islands where *Tarennoidea wallichii* occurs are particularly rich in Tiwi endemic, near endemic and highly disjunct species (e.g. *Dendromyza reinwardtiana* (Blume ex Kunth) Danser, *Elaeocarpus miegei* Weibel, *Embelia tiwiensis* Jackes, *Endiandra limnophila* B.Hyland, *Hypserpa polyandra* Becc., *Litsea breviumbellata* A.K.Allen, *Mitrella tiwiensis* Jessup & Bygrave, *Syzygium claviflorum* (Roxb.) Wall. ex Steud., *S. hemilamprum* (F.Muell. ex F.M.Bailey) Craven & Biffin, and *Xylopia monosperma* Jessup) (Woinarski et al. 2003, FloraNT 2015). The concentration of these species at these spring-fed evergreen rainforests fringing the highest ridges on the two islands suggests that these forests may have persisted as refugial areas during periods of presumed drier climate, such as past ice ages. This area also has the highest rainfall in the NT. While apparently similar forests are currently more extensive, including on the mainland, many of these restricted species do not occur in forests away from these islands or at a very limited number of locations on the mainland. *Tarennoidea wallichii*, like many of these other species, has not been recorded on mainland Northern Territory, despite being a conspicous life form and the existence of many areas of apparently suitable habitat on mainland NT.

Threats

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)*	Potential Impact *(what is the level of threat to the conservation of the species)*
Current and potential threat. Habitat modification through land development for Forestry and Agriculture. Increasing development for forestry and agriculture is inferred to modify the species' habitat and adjacent habitats, increase abstraction of surface water and groundwater drawdown, and increase vulnerability to grassy weed infestation. No current Water Allocation Plan exists for Bathurst Is. or Melville Is. Increased drawdown may reduce aquifer recharge and alter natural flow regimes, including reduced flow from springs in the dry season. The modification of natural flow regimes may impact habitat availability and the survival, establishment and resilience of *T. wallichii* that is restricted to the drier areas of spring-fed monsoonal rainforest patches on the Tiwi Islands. Decline in habitat quality is inferred arising from the spread of introduced perennial grass species (past, current and future), including Gamba Grass (*Andropogon gayanus*) and perennial Mission Grass (*Cenchrus polystachios*). These species are listed as a Key Threatening Process under the EPBC Act (DEWHA, 2009) because they modify landscape fire regimes to the detriment of biodiversity. These invasive species out-compete many native species in terms of light, water and nutrient acquisition, giving rise to changes in nutrient flows, soil conditions and fuel loads (Douglas et al 2004). Although the impact of these invasive species on *T. wallichii* has not been studied directly, these high biomass species are present in *T. wallichii* habitat. Perennial Mission Grass has been implicated in the decline of rainforests	The whole regional population of the species is under current and potential threat from habitat modification due to land development and the interactive impacts of natural hydrological system modification and grassy weed infestation. More than 200 native plants are known to be used traditionally by Tiwi indigenous people for foods and consruction material. Most of these plants are associated with rainforest and eucalypt open forests although there are many utilised plants in all habitats (Puruntatameri et al. 2001). *Tarennoidea wallichii* is not recorded or known as being used as a high-value plant by the Tiwi people (Liddle et al 2008). On-ground survey and monitoring programs for Tiwi threatened plant species should consult with and involve Tiwi people, and provide on-going training in ongoing management of threatened plants and their habitats as per the recommended actions in the draft Recovery Plan for Tiwi threatened plants (Liddle et al. 2008). The whole regional population of *T. wallichii* in Australia is under current and potential threat from encroachment by invasive grassy weed species. Gamba Grass (Bathurst Is.) and perennial Mission Grass are present in open forests on the Tiwi Islands and have the potential to spread rapidly over much of the islands. The interaction of land development for forestry and agriculture with increased water abstraction and weedy grass infestation is inferred to reduce habitat quality and drive habitat loss. One site (Garden Point, Melville Is.) is highly vulnerable to edge effects due to its	High

around Darwin due to altered fire regimes (Panton, 1993). Gamba and Mission Grasses increase fuel loads (e.g. Setterfield et al. 2010) resulting in the establishment of a positive grass-fire-feedback and reduced habitat quality for *T. wallichii*.	occurrence on the margin of rainforest adjacent to cleared, disturbed land on the edge of a settlement. Weed invasion, fire, clearing and anthropogenic disturbance including rubbish dumping impose a high risk to this site.	
Natural System Modifications – Increase in fire intensity Past, current and potential threat. IUCN Threats Classification Scheme ver. 3.2: 7.1.1 The rainforest patches that *T. wallichii* inhabits are small in size, are dependent upon continuous availability of water, and are embedded within a highly flammable open forest landscape. Changed fire management from traditional early dry season, low intensity fires to late dry, high intensity fires may severely impact wet rainforests (Russell-Smith and Bowman 1992).	The whole regional population of *T. wallichii* faces potential threat from disturbance by changed fire regimes.	Medium
Invasive species – feral animals Current and potential threat. IUCN Threats Classification Scheme ver. 3.2: 8.1.2 Habitat disturbance. Both feral pigs (*Sus scrofa*) and water buffalo (*Bubalus bubalis*) are present on the Tiwi Islands and have the potential to affect recruitment of rainforest species including *Tarennoidea wallichii* through grazing, trampling of vegetation and compacting the soil, or rooting of juvenile plants (Russell-Smith and Bowman, 1992; Woinarski et al., 2007). No current program of control is in place. Occurrences of control are incidental only.	Bathurst Island, including the rainforest habitat where *T. wallichii* occurs, is under current threat from habitat disturbance by feral pigs. Melville Island, particularly to the south and east, is under current threat from habitat disturbance by water buffalo. The entire regional population of *T. wallichii* on the Tiwi Islands (Bathurst and Melville Islands) is at potential future risk from disturbance by feral pigs and water buffalo.	Medium
Severe Weather – Cyclones Past, current and potential threat. IUCN Threats Classification Scheme ver. 3.2: 11.4 The Australian population of *Tarennoidea wallichii* on the Tiwi Islands is inherently susceptible to stochastic events by virtue of its small AOO, small population size,	The entire regional population of *T. wallichii* may be impacted by a single stochastic event. The severity of impact of a cyclone event on the survival and recruitment of *T. wallichii* is unknown, although It is considered that a single cyclone event is unlikely to impact all occurrences of the species such that	Medium

restricted localised occurrences and high habitat specificity. The intensity of tropical cyclones is projected to increase under future climates (http://www.bom.gov.au/cyclone/climatology/trends.shtml).	irrecoverable decline in AOO and population size results	

Determination of IUCN parameters

The Australian regional population of *Tarennoidea wallichii* has an Extent of Occurrence of 237 km^2 based on the minimum convex polygon method and an Area of Occupancy of 32 km^2 based on the IUCN standard 2 km x 2 km grid cell size and calculated following the minimisation methods of Lee et al. (2019). The area within which the Australian regional population exists reflects the small size of the rainforest patches on the Tiwi Islands and is restricted to 0.33 km^2.

The most serious plausible threat to *T. wallichii* is habitat modification due to development for forestry and agriculture. The interaction of increased water drawdown and invasibility by grassy weed species as a result of land development is inferred to threaten the whole regional population of *T. wallichii*. Water allocation plans and water drawdown modelling, however, are not available for Bathurst Island or Melville Island such that the number of locations is applied in this assessment based on the plausible threat of water regime modification.

The species occurs on Melville Island and Bathurst Island, an area that is connected hydrogeomorphically by two regional aquifers that occur on both islands, a shallow aquifer system covering most of the two islands (the Van Diemen Sandstone and overlying laterite and alluvium) and a deep, confined sandstone aquifer within the Moonkinu Member of the Bathurst Island Formation (NT Government 2003).

Tarennoidea wallichii is a groundwater-associated species. Reduced groundwater discharge to the wet rainforests in which *T. wallichii* occurs may result in a) the direct mortality of established individuals through a reduction in the hydroperiod required to support the species; b) reproductive failure of individuals and lack of recruitment to the population due to ecological stress or unsuitable conditions for seed germination and establishment; and c) increased susceptibility of the preferred habitat to potential impacts from other plausible threatening processes (fire regime and invasive grasses) as a result of a progressively drying habitat.

There is no available evidence to assess genetic exchange among individuals of *T. wallichii* on the Tiwi Islands. The dispersal and pollination vectors of *T. wallichii* on the Tiwi Islands are unknown. Frugivory and seed dispersal by verterbrates including birds and rats is plausible and common in tropical forest communities (Corlett 2017). One subpopulation is therefore defined based upon the close geographic proximity of the nine sites in which *T. wallichii* is recorded (EOO of 288 km^2; Figure 2) and the potential connectivity among rainforest patches supporting demographic exchange across sites.

The considerable survey effort of rainforest patches on Melville Island and Bathurst Island during 1987 – 2008 and the considerably high detectability of this species when a mature tree support inferred estimates of population size as less than 250 mature individuals. *Tarennoidea wallichii* was not detected at any new sites and minimal mature individuals were observed at previously known sites during threatened species surveys of the Tiwi Islands in 2008. The species was observed at only one of eight previously recorded rainforest patches in 2008 (Liddle and Elliott 2008). Individual patches of plants recorded during survey work were consistently very small, mostly consisting of a few (less than 10) juveniles (Liddle & Elliott 2008; Cowie et al. 2014; NT Vegetation Site Database). Applying a precautionary but realistic approach to uncertainty in the current population estimates, the number of mature individuals is considered

to be less than 250 individuals and thus the regional population meets the threshold for listing as Endangered under criterion D.

Summary of IUCN attributes

EOO	237 km^2	AOO	32 km^2	Generation length	Unknown. > 1 year

No. locations	N/A	Severely fragmented?	Yes ☐ No ☒ Unknown ☐
No. subpopulations	1	No. mature individuals	< 250
Percentage global population within Australia		Unknown	
Percentage population decline over 10 years or 3 generations		Unknown	

Assessment of available information in relation to the listing Criteria

Criterion A. Population size reduction (reduction in total numbers)
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
A1	**≥ 90%**	**≥ 70%**	**≥ 50%**
A2, A3, A4	**≥ 80%**	**≥ 50%**	**≥ 30%**

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(*a) cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the followin

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:
Considerable survey effort for threatened plant species on Bathurst Island and Melville Island during 1987 – 2008 and the relatively high detectability of the species support the assessment of the number of mature individuals of *Tarennoidea wallichii* as less than 250. Individual patches of plants recorded during survey work were consistently very small, mostly consisting of a few juveniles (Liddle & Elliott 2008; Cowie et al. 2014). If hydrological system modification and weed encroachment increase due to development for forestry and agriculture, substantial reduction to at least 30% of the regional population is suspected to be met in the future on the basis of a decline in the quality of habitat. There are insufficient quantitative data on the plausible suspected pace of population reduction, however, to assess population size reduction and the species under this criterion.

Criterion B.	Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy			
		Critically Endangered Very restricted	**Endangered Restricted**	**Vulnerable Limited**
B1.	Extent of occurrence (EOO)	**< 100 km²**	**< 5,000 km²**	**< 20,000 km²**
B2.	Area of occupancy (AOO)	**< 10 km²**	**< 500 km²**	**< 2,000 km²**
AND at least 2 of the following 3 conditions indicating distribution is precarious for survival:				
(a)	Severely fragmented OR Number of locations	**= 1**	**≤ 5**	**≤ 10**
(b)	Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c)	Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations;(iv) number of mature individuals			

Evidence:
The Australian regional population of *Tarennoidea wallichii* is restricted to drier areas within rainforest patches on the Tiwi Islands. The total area of the Tiwi Islands is 7481 km^2, and the extent of rainforest patches totals 176 km^2. The EOO of the regional population based on the minimum convex polygon method is 237 km^2 which includes areas of unsuitable habitat (woodland, ocean). The species has an AOO of 32 km^2 based on a 2 km x 2 km grid cell size and calculated following the minimisation methods of Lee et al. (2019).

The species is known from one population across nine rainforest patches on the Tiwi Islands that are considered demographically connected through potential bird dispersal of propagules. During threatened plant surveys in 2008, the species was observed at only one of eight previously recorded rainforest patches (Liddle and Elliott 2008). Individual patches of plants recorded during survey were consistently very small, mostly consisting of a few juveniles (Liddle & Elliott 2008; Cowie et al. 2014). The entire regional population is estimated to contain less than 250 mature individuals.

The entire regional population is under current and potential threat from habitat modification due to land development and the interactive impacts of natural hydrological system modification, grassy weed infestation and disturbance by feral animals. Water allocation plans and water drawdown modelling, however, are not available for Bathurst Island or Melville Island such that the geographically separate areas that may be threatened by a single event can be identified to assess the number of locations on the basis of the threat of hydrological modification. The minimum environmental water requirements for the Tiwi rainforest habitat require determination. Accounting for water useage by the monsoon forest should apply an evapotranspiration rate of 650 mm/annum (Development of Land Resource Management 2015).

Continuing decline in the quality of rainforest habitat is inferred due to multiple threatening processes (Table 1). The invasive introduced weed species Gamba Grass, *Andropogon gayanus* (on Bathurst Island), and Perennial Mission Grass, *Pennisetum polystachion*, are present in open forests on the Tiwi Islands and have the potential to extend over much of the islands. These species pose a serious threat by increasing fuel loads, leading to increased fire intensity (Rossiter et al., 2003), extensive changes in the community structure and critical changes in soil chemistry and potential degradation of rainforest habitat (Panton, 1993).

The rainforest patches of the Tiwi Islands are small in size, dependent upon continuous availability of water and are embedded within a highly flammable open forest landscape. Changed fire management resulting in a shift from early dry season, low intensity fires to late dry season, high intensity fires may cause severe disturbance to and degrade *T. wallichii* habitat (Russell-Smith and Bowman 1992).

Both feral pigs and water buffalo are present on the islands and have the potential to directly affect recruitment of *T. wallichii* through grazing, trampling of habitat or rooting of juveniles (Russell-Smith and Bowman 1992; Woinarski et al., 2007).

The Australian population of *T. wallichii* on the Tiwi Islands is inherently susceptible to stochastic events by virtue of its small AOO, small population size and restricted localised occurrences and high habitat specificity. Resilience of the species to stochastic events including cyclones is likely to be increasingly lost due to the impact of serious threats including invasion by grassy weeds and water flow modification.

Based on the evidence presented above, *T. wallichii* has a restricted geographic distribution with an EOO of less than 5000 km^2 and an AOO of less than 500 km^2 and thus meets the subcriteria for listing as Endangered (B1, B2). Nevertheless, two locations (Bathurst Island, Melville Island) and one population are inferred acknowledging the assumed demographic connectivity and geographic closeness of the rainforest habitat patches, the connectivity of the regional aquifers and the scale of operation of the potential threat of large climate events (cyclones). There is no evidence that the population is severely fragmented.The species is subject to multiple serious plausible threats and inferred continuing decline in the quality of habitat (drier areas within monsoon rainforest patches). Water allocation plans and water drawdown modelling are not available to assess the number of locations on the basis of the geographical areas over which the most serious plausible threat of water regime modification operates. Other plausible threats to the species (weed invasion and feral species impacts) operate across the species distribution and are inferred to cause decline in habitat quality in the present (weeds - Gamba Grass, perennial Mission Grass; feral pigs – Bathurst Island; water buffalo – Melville Island) and future (Gamba Grass, Mission Grass, feral pigs and water buffalo across both islands). *Tarennoidea wallichii* is therefore considered eligible for listing as **Endangered B1ab(i,ii,iii,iv)+2ab(i,ii,iii,iv)** under this criterion. Considerable uncertainty is noted in the applicability for listing under B1ab+2ab due to uncertainties in quantifying and predicting the scale of operation of the threats. Due to this issue, NT propose to list on the basis of Criterion D.

Criterion C. Population size and decline				
		Critically Endangered Very low	**Endangered Low**	**Vulnerable Limited**
Estimated number of mature individuals		**< 250**	**< 2,500**	**< 10,000**
AND either (C1) or (C2) is true				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	**Very high rate 25% in 3 years or 1 generation (whichever is longer)**	**High rate 20% in 5 years or 2 generation (whichever is longer)**	**Substantial rate 10% in 10 years or 3 generations (whichever is longer)**
C2	An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	**≤ 50**	**≤ 250**	**≤ 1,000**
	(ii) % of mature individuals in one subpopulation =	**90 – 100%**	**95 – 100%**	**100%**
(b)	Extreme fluctuations in the number of mature individuals			

Evidence:
The regional population of *T. wallichii* in Australia has a restricted geographic distribution on the Tiwi Islands and is estimated to contain less than 250 mature individuals (Liddle and Elliott

2008; Cowie et al. 2014) in a single subpopulation. There is insufficient quantitative evidence available of continuing decline, however, to assess the species against this criterion.

Criterion D. Number of mature individuals			
	Critically Endangered Extremely low	**Endangered Very Low**	**Vulnerable Low**
D. Number of mature individuals	**< 50**	**< 250**	**< 1,000**
D2. *Only applies to the VU category* Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	**-**	**-**	**D2. Typically: AOO < 20 km^2 or number of locations ≤ 5**

Evidence:
The species is known from nine rainforest patches representing one demographically connected subpopulation on the Tiwi Islands (EOO of 237 km^2, AOO of 32 km^2; 2 km x 2 km grid cell size) and the whole Australian population is considered to occur at two geographically separate locations (Melville Island and Bathurst Island). The total extent of potential rainforest habitat on the Tiwi Islands is 176 km^2 within which *Tarennoidea wallichii* is restricted to drier areas within 0.33 km^2. Plausible threats impacting the whole population include habitat modification through land development and interactive impacts of invasive grassy weeds (Gamba Grass and Perennial Mission Grass), changed fire management practices leading to increased fire intensity, grazing, rooting and habitat disturbance by feral animals and stochastic cylone events.

Tarennoidea wallichii was not detected at any new sites and minimal numbers of mature individuals were observed at previously known sites during threatened species surveys of the Tiwi Islands in 2008. The species was observed at only one of eight previously recorded rainforest patches in 2008 (Liddle and Elliott 2008). Individual patches of plants recorded during survey were consistently very small, mostly consisting of a few juveniles (Liddle & Elliott 2008; Cowie et al. 2014). Considering the substantial survey effort applied to threatened plant species of the Tiwi Islands during 1987 - 2008, the restricted habitat on the Tiwi Islands and the non-cryptic nature of the species, it is estimated that the number of mature individuals is less than 250 (Liddle and Elliott 2008; Cowie et al. 2014).

The area of occupancy is restricted to drier areas within rainforest patches within the 176 km^2 extent of potential habitat on the Tiwi Islands and is not expected to increase substantially with further survey. Applying a precautionary and realistic approach to uncertainty in current population estimates, the whole population is considered to contain less than 250 mature individuals. *Tarennoidea wallichii* is therefore eligible for listing as **Endangered (D)** under this criterion.

Criterion E. Quantitative Analysis			
	Critically Endangered Immediate future	**Endangered Near future**	**Vulnerable Medium-term future**
Indicating the probability of extinction in the wild to be:	**≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)**	**≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)**	**≥ 10% in 100 years**

Evidence:

There are insufficient quantitative data available to assess the species against this criterion.

Summary

Tarennoidea wallichii meets the criteria for listing as **Endangered B1ab(i,ii,iii,iv)+2ab(i,ii,iii,iv); D.**

Tarennoidea wallichii is a tree species that occurs in the drier areas of wet rainforest. The Australian population of *T. wallichii* is restricted to one population in nine rainforest patches on Bathurst Island and Melville Island in the NT. Considering the substantial survey effort applied to threatened species on the Tiwi Islands, the restricted habitat and non-cryptic nature of the species, and applying a precautionary but realistic approach to uncertainty in current population size estimates, it is estimated that the number of mature individuals in the whole regional population is less than 250. The regional population is restricted to the total area of potential rainforest habitat on the Tiwi Islands (176 km^2) and further survey is unlikely to substantially increase the extent of occurrence, the area of occupancy or the number of mature individuals detected such that the eligibility for listing is changed.

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).

- Liddle DT, Gibbons A, Taylor R (2008). Recovery plan for the threatened plants of the Tiwi Islands in the Northern Territory of Australia 2008 - 2013. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.
- Kalippa C, Kerinaiua W, Wonaeamirri M, Hadden K (2003). Tiwi Islands Regional Natural Resource Management Strategy, Tiwi Land Council.

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

- There are no current management or research actions (e.g. weed control program, analysis of population diversity) that are being undertaken. See following section for recommended management or research actions.

List further recommended management or research actions, if any, that would benefit the conservation of the species.

- Research the impacts of threats on the species and factors limiting current population size. Understanding population demographic and genetic structure and and how genetic diversity is distributed across the spatial habitat is important to be able to inform the likely threat severity and rapidity of impact and level of resilience to or recovery through sexual recruitment from high-risk threats including hydrogeological change, climate change and agricultural land practices.
- Population genetic sampling and analysis to assess genetic diversity and population connectivity
- Establish a program to monitor the status of sub-populations in the field
- Collect propagation and fruit material from wild population
- Determine seed viability and establish ex-situ conservation population.

- Stakeholder involvement and engagement in species conservation management, including updating land owners and site managers of the population and stakeholder consultation about options for conservation management and protection of the species.

Recommended recovery actions for Tiwi threatened plant species (Liddle et al. 2008) relevant to *Tarennoidea wallichii*:

- Involve the Tiwi people in the implementation and ongoing refinement of this recovery plan
  - Establish a recovery team to guide implementation of this recovery plan
  - Conduct further field surveys and expand long-term plant population monitoring
  - Eradicate/control the exotic Gamba Grass from the Tiwi Islands
  - Control the exotic Guinea Grass and Perennial Mission Grass on the Tiwi Islands
  - Manage fire adjacent to rainforest habitat, particularly in the first two years post cyclone
  - Act to ensure an adequate and ongoing spring-fed water supply to maintain rainforests
  - Eradicate feral pigs on Melville Island

Consistency with CAM MOU

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:	See section above under **Adequacy of survey**
• 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:	

Nomination prepared by:	Dr Caroline Chong
Contact details:	
Date submitted:	
If the nomination has been refereed or reviewed by experts, please provide their names and contact details:	
Nicholas Cuff, A/Director Information and Advice, Flora and Fauna Division, Department of Environment, Parks and Water Security, Northern Territory Government	

Professor Stephen Garnett, RIEL Charles Darwin University

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References cited in the advice

Corlett RT (2017) Frugivory and seed dispersal by vertebrates in tropical and subtropical Asia: An update. *Golbal Ecology and Conservation* 11, p. 1 – 22.

Cowie ID, Cuff N, Liddle DT, Russell-Smith J (2014). Appendix 7A. 44. Unpublished report to Dept Land Resource Management.

Department of Land Resource Management (2015) Tiwi Island Economic Development – Bio-Physical resources of north east Bathurst Island (Technical Report). Technical Report 12/2014/D, Northern Territory Government, Darwin.

Douglas MM, Setterfield SA, Rossiter N, Barratt J, Hutley LB (2004). Effects of mission grass (*Pennisetum polystachion* (L.) Schult.) invasion on fuel loads and nitrogen availability in a northern Australian tropical savanna. In Weed Management Balancing People, Planet, Profit (eds B.M. Sindel and S.B. Johnson), pp. 179-181. Weed Society of New South Wales, Wagga Wagga.

Fensham RJ, Woinarski JCZ (1992) Yawulama: the ecology and conservation of monsoon forest on the Tiwi Islands, Northern Territory. Report to DASET. Conservation Commission of the Northern Territory, Darwin.

Northern Territory Government 2013, FloraNT, http://eflora.nt.gov.au/home, accessed August 2021

IUCN Standards and Petitions Subcommittee (2019) Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the Standards and Petitions Subcommittee. Downloadable from http://www.iucnredlist.org/documents/RedListGuidelines.pdf.

Kalippa C, Kerinaiua W, Wonaeamirri M, Hadden K (2003). Tiwi Islands Regional Natural Resource Management Strategy, Tiwi Land Council.

Lee CKF, Keith DA, Nicholson E, Murray NJ (2019) Redlistr: tools for the IUCN Red Lists of ecosystems and threatened species in R, Ecography 42, pp. 1 – 6, https://doi.org/10.1111/ecog.04143

Liddle DT, Elliott LP 2008. Tiwi Island threatened plants 2006 to 2008: field survey, population monitoring including establishment of a program to investigate the impact of pigs, and weed control. Report to Natural Resource Management Board (NT), NHT Project 2005/142 Implementation of Recovery Plan for Tiwi Island threatened plants. Department of Natural Resources, Environment, The Arts and Sport, Palmerston.

Liddle DT, Gibbons A, Taylor R (2008). Recovery plan for the threatened plants of the Tiwi Islands in the Northern Territory of Australia 2008 - 2013. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

Liddle DT, Russell-Smith J, Brock J, Leach, GJ, Connors GT (1994) Atlas of the vascular rainforest plants of the Northern Territory. Flora of Australia Supplementary Series No. 3, (ABRS, Canberra.)

Northern Territory Government (2003) Volume 1. Water Resources of the Tiwi Islands: Main Report. Report Number 26-2003D, ISBN 0 7245 4848 3.

Russell-Smith J (1991). Classification, species richness, and environmental relations of monsoon rain forest in northern Australia. Journal of Vegetation Science 2, 259-278.

Woinarski J, Brennan K, Cowie I, Kerrigan R, Hempel C (2003). Biodiversity conservation on the Tiwi islands, Northern Territory. Part 1. Plants and environments. 144 pp. Department of Infrastructure Planning and Environment, Darwin.