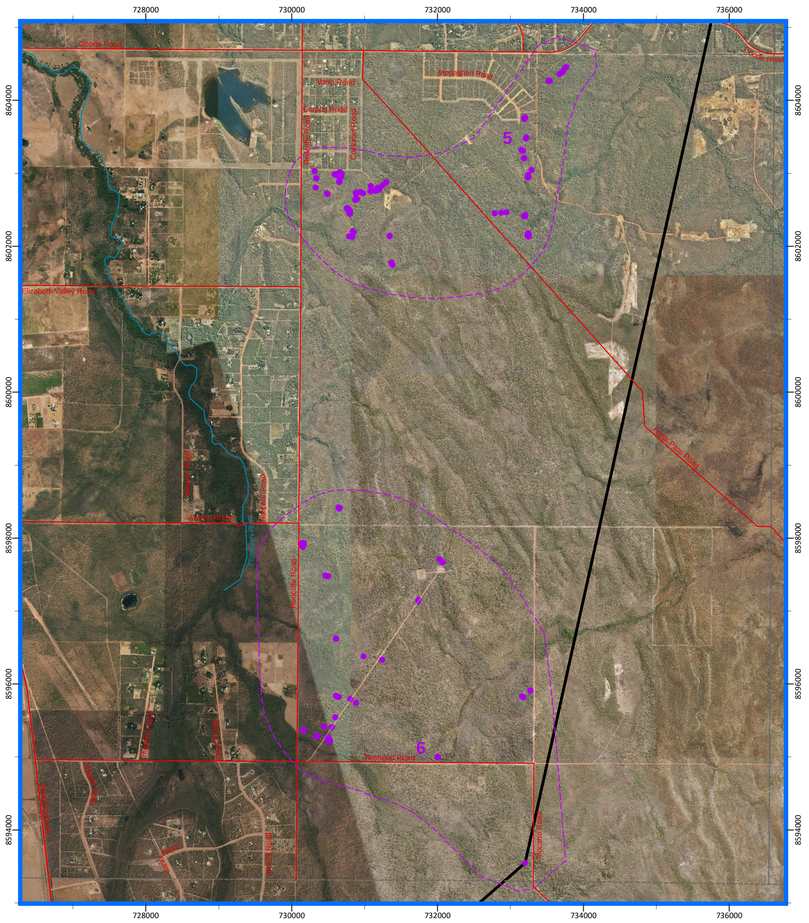
Inset - Intensive Survey Area: Holtze



Department of Environment and Natural Resources
Flora and Fauna Division
September 2019, Version 3.2

Threatened Species of the Greater Darwin Region - *Typhonium praetermissum*

Guidelines for Map Use

Version 3.2 of the *Typhonium praetermissum* threatened species map product supersedes the previous version of the product. This version is based on statistical modelling derived from primary data sources rather than interpreted or compiled data as was the case with previous versions. Data used to compile this map product are current at the date of publication. Users are encouraged to check the project Metadata record for more recent versions of this map product.

1. **Species Distribution Modelling** was used to develop a map of the potential habitat for *T. praetermissum* in the Greater Darwin region. The model is based on existing records of the species and uses expert knowledge of the species biology and ecology. This information was used to identify biophysical covariates that can be used to numerically model the species habitat.

   More detail: Current understanding of the landscape level ecology of *T. praetermissum* and the distribution of known records suggests a strong association with the margins of the upland lateritic plateaux and low hills typical of the Greater Darwin region. The species particularly inhabits areas of relatively lower overstorey vegetation cover in the ubiquitous *Eucalyptus tetrodonta* / *Eucalyptus miniata* dominated woodlands that occupy these land surfaces. The biophysical surrogates used to model the species distribution have been chosen based on this expert knowledge (Table 1).

Table 1: Biophysical surrogates used to model species distribution.

Covariate	*Description*	*Surrogate Ecological*	*Source*	*Notes*
Foliage Projective Cover	Modelled measure of the actively photosynthesising component of vegetation cover within a pixel.	Records of *T. praetermissum* appear to be associated with open woodland or lower canopy-density woodland structural formations.	DENR/Qld. Government Sentinel 2.	Derived from Sentinel 2 data at 10 m ground resolution. These data were used as the 'base grid' to which other data sets were spatially aligned for analysis purposes.
Senescent Vegetation Cover	Modelled measure of the senescent or dead (i.e. non-photosynthetic) component of vegetation cover within a pixel.	Relatable to the seasonality of the secondary vegetation layers in savanna systems. Pixels with higher values in this component of vegetation cover during the dry season represent areas where the secondary vegetation layers are dominated by	DENR/Qld. Government Sentinel 2.	Derived from Sentinel 2 data at 10 m round resolution.

Covariate	*Description*	*Surrogate Ecological*	*Source*	*Notes*
		annual, annually-senescent (e.g. perennial grasses) or deciduous plant taxa as opposed to areas where values for this component of vegetation remain relatively low, likely indicating the presence of evergreen taxa. Woody life forms such as shrubs and trees are more likely to be represented in this 'evergreen' life form class. It is hypothesised that the occurrence of *T*. *praetermissum* is negatively correlated with the density of both tall annual grasses and evergreen shrubs which effectively outcompete *Typhonium* for light in the ground layer.		These data were used as the 'base grid' to which other data sets were spatially aligned for analysis purposes.
Proximity to plateau edge (EUCLID)	Derived by calculating euclidian distance of all cells on the input grid from the break in slope between flat upland surfaces and sloping land as defined by the Multi Resolution Ridge Top Flatness Index (MRRTF) a terrain index derived from Shuttle Radar Topographic Mission (SRTM) data .	A measure of the proximity of an occurrence record to the edge of the lateritic plateau surface. Field evidence suggest that this is an important factor in determining occurrence of the species and may be part of a more complex interaction between soil landscape parameters (e.g. soil depth, proportion of gravel in upper profile), geomorphological or lithological parameters (e.g. depth to indurated layer, relative progression of erosion and peneplaination), and/or vegetation attributes (e.g. reducing overstorey vegetation cover as these biophysical parameters vary).	CSIRO SRTM.	30 m resampled to 10 m and aligned with Sentinel 2 grids.
Weathering Intensity Index (WEATHER)	Identifies areas likely to have been subject to deep weathering processes in the Tertiary period that have resulted in the development of deep lateritic soil profiles overlying parent rock across much of northern Australia.	*Typhonium praetermissum* appears to be strongly associated with the deeply weathered, lateritic soil landscapes of the region as opposed to soil landscapes developed over 'fresh' basement geologies (e.g. Burrell Creek Formation in the Blackmore River area) or unconsolidated regolith landscapes (e.g. floodplain Alluvium). This index has been developed to specifically identify where these processes have operated in the landscape over geological time through the use of ratios calculated from remotely sensed radiometric data and digital terrain analysis (Wilford, 2012).	Geoscience Australia/ CSIRO.	90 m resampled to 10 m and aligned with Sentinel 2 grids.

Species distribution models were developed in MaxEnt (Phillips *et al.* 2017) software using these input covariates and filtered known records. Records were filtered to remove expected extinctions at locations known to have been subject to significant contemporary land-use change since the record was collected (e.g. Palmerston escarpment location in the vicinity of Maluka Drive). The default parameters were used in running the model with the output format set to CLOGLOG to represent the probability of the species presence between 0 and 1.

2. **Potential habitat mapping** is limited by the resolution of the input data used to develop the model. The biophysical covariates were developed at between 10 m and 90 m ground resolution (0.01 - 0.8 hectare) with all input data resampled to 10 m for statistical analysis. The accuracy of the data at fine scales will be limited by the resolution of the original data used to develop the model.

   More detail: Despite the finer level of spatial discrimination provided in Version 2.0 of this product, as a result of improvements in the availability of some primary data sets on which species distribution models can be developed, the models will still be limited in their predictive power by the resolution of the coarsest input covariates in the model. In this case, the weathering intensity index was developed at approximately 90 m resolution and this is a useful indicator of the ground resolution at which the model should be assessed/applied. Enlarging the mapping beyond this scale does not provide further detail.

   It is recommended that the use of this map product is accompanied by a property scaled assessment at suitable intensity of habitat suitability and species occupancy for all areas. Such field verification should be undertaken by a suitable qualified and experienced professional with experience in the identification and survey of threatened plant species.

3. **Potential habitat extent displayed on the map** is limited by the currency of the data used to derive the extent of potential habitat. Extent of remaining potential habitat is current to 2016.

   More detail: The biophysical covariates used to define potential habitat vary in the dates at which they were captured. Some data (e.g. airborne radiometrics) may be up to 10 years old. Although the fundamental parameters that they measure are unlikely to have changed significantly over this time, changes in contemporary land-cover or land-use are likely to have a great influence on the current suitability of habitat for *T. praetermissum*. Areas of potential habitat were refined by intersecting the most up-to-date land-use information to exclude areas of intensive land-use and/or cleared areas now unlikely to support viable habitat for the species. However, the inherent spatial and attribute accuracy of this mapping will have an important influence on the spatial definition of intact potential habitat. Data on the extent of remaining potential habitat is current to 2016 (Staben and Edmeades 2017) and it is likely that in some instances the area of remaining intact and viable potential habitat differs from that indicated on the map. There are a small number of extant occurrence of *T. praetermissum* in areas incorrectly identified as intensive land-use or cleared native vegetation. These occurrences reinforce the notion that the species distribution modelling should be used as a guide to presence/absence.

4. **The map should be used as a guide to identifying the probability that the species maybe present** in any particular area and not a definitive assessment of distribution, occupancy or population status. The map can be used to make a preliminary assessment of the potential risk associated with a particular activity at a location. This may include the likelihood that the activity will result in impact upon a population or occurrence of a threatened species.

   More detail: As highlighted previously, the potential habitat mapping is limited by the spatial resolution of the input covariates as well as the adequacy of these covariates to accurately define the habitat envelope of the species. It is also limited by the ecological scale at which the species distribution is determined in the landscape. Consequently, the maps are unlikely to identify all areas where the species may be found and conversely *T. praetermissum* is highly unlikely to occur (occupy) in all the areas identified on the map as potential habitat or indeed highest likelihood potential habitat. The map should be used as a guide to identifying the probability that the species is present in any particular area and not a definitive assessment of distribution or occupancy.

   The map can be used to preliminarily assess the potential risk associated with a particular activity at a location and the likelihood that the activity may result in impact upon a population or occurrence of the species. In areas where there is considered to be a higher than low likelihood that the species may occur, appropriately timed on-ground survey by suitably qualified and experienced professionals of the species

presence or absence will be required to inform any formal impact assessment. This will ultimately determine the site specific risk associated with any development proposal.

5. **Highest likelihood of occurrence** potential habitat for *T. praetermissum* has been identified as those areas with a greater than or equal to 0.5 probability of the species being present.

6. **Moderate likelihood of occurrence** potential habitat for *T. praetermissum* has been identified as those areas with a greater than or equal to 0.4 and less than 0.5 probability of the species being present.

   More Detail: These areas have been separated into two categories for display purposes: 1) "Adjacent Moderate Likelihood of Occurrence" for those areas that are contiguous with high likelihood of occurrence potential habitat: and 2) "Isolated Moderate Likelihood of Occurrence" for those that do not adjoin high likelihood off occurrence habitat. This spatial context may be important in the analysis of relative risk or value associated with any particular patch of habitat or species occurrence during an assessment process.

7. **Undetected surveyed locations** represent detailed floristic or targeted survey sites sampled by suitably qualified observers at an appropriate time of year where *T. praetermissum* was not recorded. In simple terms the species may be treated as absent from these sites at the time of survey.

   More detail: Targeted search locations and full-floristic sites represent sampled locations within the Greater Darwin region over a number of years between November and March where *T. praetermissum* was not recorded. Surveyed sites were largely sampled using a standardised methodology (Brocklehurst et al. 2007) by experienced NTG botanical staff and represent the best available information on the known distribution of the taxon within the Darwin Region. Given the cryptic life history of the taxon and the seasonal conditions at the time of sampling there remains a very low probability that the species occurs at these sites. However, these data can be considered to represent the temporal 'window' of maximum-likelihood that the species would have been detected if it was present at the time of sampling.

8. **Occurrence locations (point/patch data)** of *T. praetermissum* represent vouchered individual specimens or discrete locations at which the species has been recorded in the field and stored in DENR corporate databases. This does not necessarily represent all the locations from which the species is known. Patches represent the boundary of a defined area in which the species has been recorded and some measure of abundance of density calculated. These two types of data (point vs. patch data) are not mutually exclusive and where they overlap they are likely to represent targeted survey efforts conducted in different years and with different methodologies in the same area.

9. **Mapping reliability (confidence rating)** has been assigned to areas in which varying intensities of field assessment have been undertaken or are considered to represent suitable habitat for the species. These generically range from 'High' being high-intensity, targeted, species specific surveys or areas in which confirmed sub-populations are known to occur. At the other end of the scale, 'Low' infers where reconnaissance level or incidental surveys have been undertaken.

   More detail: In the broader regional context (represented on the location map) areas within the Greater Darwin region where the species has not been encountered during appropriately timed general surveys by suitably qualified personnel are considered a moderately reliable indication of species presence/absence (based on the intensity of field data collection).

References

Name	*More Information*
Mapped Distribution for Threatened Species of the Greater Darwin Region Project description, metadata record	Metadata
Westaway, J. and Cowie, I. (2012) *Threatened Species of the Northern Territory Typhonium praetermissum* Department of Land Resource Management, Palmerston. (sourced from Flora NT website)	Web Information sheet
Brocklehurst, P., Lewis, D., Napier, D. and Lynch, D. (2007). *Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping.* Technical Report No. 02/2007D, Department of Natural Resources, Environment and the Arts, Palmerston Northern Territory.	Report (NT Library)
*Land Unit Mapping of the Greater Darwin Region (*survey scale 1:25,000) This is a compilation of 16 land resource surveys (from 1979 to 1986) Report links are noted in the Metadata record.	Metadata
Hill, J.V., Fett, D., and Perrett, F. (2002). Survey scale 1:25,000 *Land Resources of the Lower Finniss* Technical Report 19/2002, Natural Systems Division, Department of Infrastructure Planning and Environment, NT.	Metadata Report (NT Library)
Staben, G. and Edmeades, B. (2017). *Northern Territory Land Use Mapping for Biosecurity 2016* Technical Report 18/2017D, Department of Environment and Natural Resources, Northern Territory Government, Darwin, NT	Metadata Report (NT Library)
Phillips, S.J., Dudík, M. and Schapire R.E. [Internet] *Maxent software for modelling species niches and distributions (Version 3.4.0).*	Maxent software
Wilford, J. 2012. A Weathering Intensity Index For The Australian Continent Using Airborne Gamma-Ray Spectrometry And Digital Terrain Analysis. *Geoderma* 138-184: 124-142.	
IUCN. 2001 IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, U.K.	
IUCN. 2012b IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK	Guidelines

Status of *Typhonium praetermissum* subpopulations (September 2019)

Subpopulation Definition:

The International Union for the Conservation of Nature (IUCN) defines subpopulations of threatened species as *"geographically or otherwise distinct groups in the population between which there is little demographic or genetic exchange (typically one successful migrant individual or gamete per year or less) (IUCN 2001, 2012b)".* The primary pollination vector for many *Typhonium* species in the Greater Darwin region is thought to be beetles from the Family Staphylinidae (Rove Beetles). Whilst the mobility of these insects is undocumented, it is unlikely that individuals would travel more than 2 kilometres. The propagules of *T. praetermissum* are thought to be poorly dispersed given the pattern of seed dispersal in close proximity to parent plants observed in the field: there appears to be little evidence of long-distance dispersal by animal vectors and the observed distribution of fruit/seed suggests gravity and water movement are the primary dispersal mechanisms. On this basis, subpopulations have been initially defined based on a minimum 2.5 km separation distance between records in continuous, intact potential habitat. This has been refined for individual occurrences based on the following additional criteria:

1. the continuity of potential habitat between records;
2. adequacy of survey in intervening potential habitat; or
3. presence of barriers to pollination or dispersal.

Subpopulation Reference no	*Status*	*Size*	*Trend*	*Pressures*	*Uncertainties*	*Current Knowledge State*
1 Howard Springs Hunting Reserve	Extant	Unknown. 1 occupied Area of Occupancy (AoO) cell (4 km^2)	Unknown.	Invasion by exotic grasses.	Unknown, however, grassy weed invasion known to occur within 1 km to the north-east.	Initial record 30/11/1994. NT Herbarium Accession D0121440. No more recent data available. No population data available. Nearest contemporary (2015) survey information indicates infestation of Gamba and Mission grasses within 500 m of recorded location.

Subpopulation Reference no	*Status*	*Size*	*Trend*	*Pressures*	*Uncertainties*	*Current Knowledge State*
2 Palmerston and Holtze	Extant	>250 individuals. 4 occupied AoO cells (16 km^2)	Variously declining across subpopulation.	Habitat loss. Fragmentation. Inappropriate management. Weed incursion. Decline leading to loss of viability.	Medium to long term security of sub-population. Extent of subpopulation. Documented decline since 2005 – further clarification of trends required. Management regime uncertain: Evidence of invasive species (Gamba and Mission Grasses) incursion across subpopulation and dumping of garden waste over the top of known records. Mechanisms for conservation on-site given ongoing development activities unknown at this point in time. Ongoing security of plants removed from the subpopulation as part of translocation efforts.	One of the largest known sub-populations. Field survey work since 2016 has increased the spatial extent of the subpopulation and identified additional individuals throughout the area. Proportion of the subpopulation removed from site as part of translocation program in 2016 and 2017. Further work at the site would likely increase the extent and size of the subpopulation at the Hospital/Holtze site. Well documented but little ownership or recognition of significance in the Maluka Crescent and Palmerston Escarpment sections of subpopulation. Documented decline from >50 to < 20 individuals between 2005 and 2015 primarily due to habitat destruction. Suitable habitat area has been further reduced as a result of ongoing development including at the park site in 2017. November 2017 wet season field survey only identified 3 plants on the site. Weed management issues contributing to declines with ground-layer density increasing through the incursion of Mission and Gamba Grass onto the site. Clarification of future tenure and management arrangements associated with the development of the site remain unclear.
3 Karama	Extant	< 50 individuals. 1 occupied AoO cell (4 km^2)	Unknown.	Management. Weed incursion.	Ongoing management of site for both illegal dumping activities and weed incursion. Future intensification of land use (direct or indirect) at the site.	Relocated in 2014/15 wet season. Resurveyed in 2018/19 wet season with an increased number of individuals detected. Further survey in the vicinity has not located further individuals outside this patch. Occasional Gamba grass on the site and at high density in close proximity to recorded plants.

Subpopulation Reference no	*Status*	*Size*	*Trend*	*Pressures*	*Uncertainties*	*Current Knowledge State*
4 Virginia	Extant	< 10 individuals. 2 occupied AoO cell (8 km^2)	Unknown.	Unknown.	Extent and status of the sub-population unknown. Freehold tenure on land zoned for rural living gives rise to uncertainty regarding future management of the subpopulation. Currently threat from exotic grass invasion low due to active management but this situation has the potential to rapidly change if ownership changes.	Single record from the 2017/18 wet season (G. Wightman pers com) on freehold land. Further work required at location to better identify extent of sub-population.
5 Noonamah North	Extant	>100 recorded individuals; patches vary. 5 occupied AoO cells (20km^2)	Unknown.	Pending development. Invasion by exotic grasses.	Implementation of identified management actions associated with conservation zoning of the site. Population size likely to be larger than recorded individuals. Uncertain what if any connection exists with Noonamah South subpopulation.	2015 survey. Well documented, extent and abundance information from the site. Patches where the species detected largely incorporated into Conservation (CN) zoned land as part of development proposals for the area.
6 Noonamah South	Extant	<100 recorded individuals; patches vary in size. 5 occupied AoO cells (20 km^2)	Unknown.	Pending development. Invasion by exotic grasses.	Implementation of identified management actions associated with conservation zoning of the site. Population size likely to be larger than recorded individuals. Uncertain what if any connection exists with Noonamah North subpopulation.	2015 survey. Well documented, extent increased to the south during 2017/18 surveys. Patches where the species detected largely incorporated into Conservation (CN) zoned land as part of development proposals for the area.
7 Mira Road	Extant?	< 10 recorded individuals. 1 occupied AoO cell (4 km^2)	Unknown.	Proposed subdivision – application status unknown.	Current status of sub-population. Current status of development proposal. Longer-term security and viability of sub-population if development proceeds.	2015 survey. Only one individual confirmed during survey associated with proposed subdivision. Current status of sub-population unknown.

Subpopulation Reference no	*Status*	*Size*	*Trend*	*Pressures*	*Uncertainties*	*Current Knowledge State*
8 Herbert	Extant?	< 10 individuals. 1 occupied AoO cell (4 km^2)	Unknown.	Unknown.	Extent and status of the sub-population unknown. Freehold tenure on land zoned for rural living gives rise to uncertainty regarding future management of the subpopulation. Currently threat from exotic grass invasion low due to active management but this situation has the potential to rapidly change if ownership changes.	Record from the 2015/16 wet season of 2 plants only on freehold land. Further work required at location to better identify extent of subpopulation.
9 Gunn Point	Extant	< 100 individuals. 2 occupied AoO cells (8 km^2)	Unknown presumed stable.	Potential future development at medium to large scale on Gunn and Glyde Points. Invasion by exotic grasses.	Current trend of sub-population. Potential impacts related to increased development, public access and altered environmental regimes (weed spread and fire) associated with construction of the Gunn Pt. Road and associated development.	Located and surveyed in 2016 wet season. Identity verified. Further work has increased the knowledge of the extent and size of the sub-population in subsequent wet seasons.
10 Raft Point	Extant	< 10 recorded individuals. 2 occupied AoO cell (8 km^2)	Unknown.	Unknown -likely none immediate.	Current trend of sub-population. Potential for future development uncertain. Given proximity of subpopulation to road infrastructure, invasion by exotic grasses along road corridor a future threat.	Located and surveyed in 2016 wet season. Further work required at the locality to identify the extent of the sub-population. Ecological relations with currently unnamed species of *Typhonium* on Cox Peninsula requires further investigation.
11 King Creek/Shoal Bay	Extant?	< 10 recorded individuals. 1 occupied AoO cell (4 km^2)	Unknown.	Local disturbance and reduction of habitat with development and maintenance of infrastructure.	Population status and security in relation to tenure unknown Management regime unknown Further work required at location to better identify extent of sub-population. Potential threat from exotic grasses largely unknown.	Single record only from 2015/16 wet season.

Subpopulation Reference no	*Status*	*Size*	*Trend*	*Pressures*	*Uncertainties*	*Current Knowledge State*
12 Koolpinyah – central Gunn Point	Extant	Potentially > 500 individuals recorded. **Minimum 10 occupied AoO cells.** **(>40 km^2)** [<10 individuals recorded. 21 occupied AoO cells (84 km^2)]	Unknown – recorded declines as a result of habitat loss associated with infrastructure and extractive developments.	Infrastructure and pastoral land development may directly impact on occupancy and quality of habitat. Parts of the subpopulation may be directly affected by extractive industry and pastoral land development. Invasion by exotic grasses.	Potential direct or indirect impacts to subpopulation as a result of ongoing development of infrastructure largely unquantified. Effectiveness of conservation and management actions proposed for retained occurrences within development areas. Possible direct or indirect impacts to subpopulation as a result of ongoing development and/or maintenance of infrastructure (extractive tenements and Gunn Point Road.). Effectiveness of conservation and management actions proposed for retained occurrences within development areas.	Identified during 2017/2018 field surveys on Koolpinyah Station and along the Gunn Pt Road alignment in the 2017/18 wet season. Extent of subpopulation likely to be well understood. Conservation measures proposed for occurrences associated with the Gunn Point Road alignment implemented in 2018.
13 The Narrows (Koolpinyah)	Extant	<10 plants 1 occupied AoO cell (4 km^2)	Unknown presumed stable and habitat in good condition.	Potential future development.	Potential direct or indirect impacts associated with pastoral land development.	Identified during 2017 (Koolpinyah Station) field survey. Extent and size of sub-population requires further confirmation.
14 Acacia Hills	Extant	< 10 recorded individuals 1 occupied AoO cell (4 km^2)	Unknown.	Unknown – potential extractive tenements on or adjacent to the site. Invasion by exotic grasses.	Current extent, size and trend of sub-population. Longer-term security and viability of sub-population; located on Vacant Crown Land possibly subject to mineral extraction activities. Current management and maintenance arrangements associated with adjacent road infrastructure.	Scattered occurrences of few individuals at locality identified in 2017/18 wet season.

Subpopulation Reference no	*Status*	*Size*	*Trend*	*Pressures*	*Uncertainties*	*Current Knowledge State*
15 Weddell	Extant	<10 individuals scattered at apparent low density. 2 occupied AoO cells (8 km^2)	Unknown.	Proximity to road corridors as a potential vector for introduction of exotic grasses to site.	Extent and status of the sub-population unknown. Possible site of future large-scale intensive development.	Subpopulation identified in two patches in the 2017/18 wet season. Likely to be more individuals present in suitable habitat.
16 Murrumujuk	Extant	> 300 individuals. 3 occupied AoO cell (12 km^2)	Unknown presumed stable.	Infrastructure development may directly impact on occupancy and quality of habitat. Exotic grass establishment and spread. Potential future development at medium to large scale on Gunn and Glyde Points.	Current trend of sub-population. Potential direct or indirect impacts to subpopulation as a result of ongoing development of infrastructure largely unquantified. Effectiveness of any proposed management actions for retained occurrences adjacent to infrastructure footprint. Long term security of subpopulation in future development scenarios.	Located and surveyed in 2017/18 wet season as part of targeted surveys for development purposes. Conservation measures proposed for occurrences associated with the Gunn Point Road alignment implemented in 2018.
17 Gunn Point Road North	Extant	< 20 individuals. 3 occupied AoO cells (12 km^2)	Unknown presumed stable.	Infrastructure development may directly impact on occupancy and quality of habitat. Exotic grass establishment and spread. Potential future development at medium to large scale on Gunn and Glyde Points.	Current trend of sub-population. Potential direct or indirect impacts to subpopulation as a result of ongoing development of infrastructure largely unquantified. Effectiveness of any proposed management actions for retained occurrences adjacent to infrastructure footprint. Long term security of subpopulation in future development scenarios.	Located and surveyed in 2018 as part of targeted surveys for development purposes. Conservation measures proposed for occurrences associated with the Gunn Point Road alignment implemented in 2018.

Subpopulation Reference no	*Status*	*Size*	*Trend*	*Pressures*	*Uncertainties*	*Current Knowledge State*
18 Gunn Point Road South	Extant	< 20 individuals. 1 occupied AoO cell (4 km^2)	Unknown presumed stable.	Infrastructure development may directly impact on occupancy and quality of habitat. Exotic grass establishment and spread. Potential future development at medium to large scale on Gunn and Glyde Points.	Current trend of sub-population. Potential direct or indirect impacts to subpopulation as a result of ongoing development of infrastructure largely unquantified. Effectiveness of any proposed management actions for retained occurrences adjacent to infrastructure footprint. Long term security of subpopulation in future development scenarios.	Located and surveyed in 2018 as part of targeted surveys for development purposes. Conservation measures proposed for occurrences associated with the Gunn Point Road alignment implemented in 2018.
19 Middle Arm	Extant	800 – 1000 mature individuals 1 occupied AoO cell (4 km^2)	Presumed stable.	Pending development of the site for industrial purposes. Ongoing spread of exotic grasses present on site.	Ongoing conservation and maintenance of subpopulation under changed land use scenario. Current and ongoing control and management of weed establishment and spread on the site.	Located and surveyed February 2019. Largest known subpopulation. Extent and size likely to be well understood. Part of the subpopulation occupies land cleared of native vegetation in the early 2000s and now regrowing as relatively intact native eucalypt woodland.

Extent of Occurrence [1] (excluding ocean)

2 400 km^2 Total EoO.

546 km^2 Potential habitat within currently known extent.

Area of Occupancy [1] **232 km^2** (Number of 2 km x 2 km cells within which mapped records occur 58)

[1] International Union for Conservation of Nature (IUCN) Standards and Petitions Subcommittee. (2017). *Guidelines for using the IUCN Red List categories and criteria.* Version 13. Prepared by the Standards and Petitions Subcommittee. http://www.iucnredlist.org/documents/RedListGuidelines.pdf

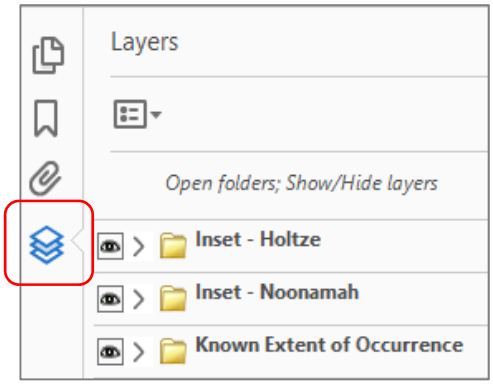
About viewing this interactive PDF map using Adobe Reader

Interactive layers are not visible via web view. Download the PDF to your computer.

Threatened Species of the Greater Darwin Region - *Typhonium praetermissum*

Click here to view
Main Map

Click here to view
Guidelines for Map Use



Page 1 of this PDF is an Interactive Map with layers.

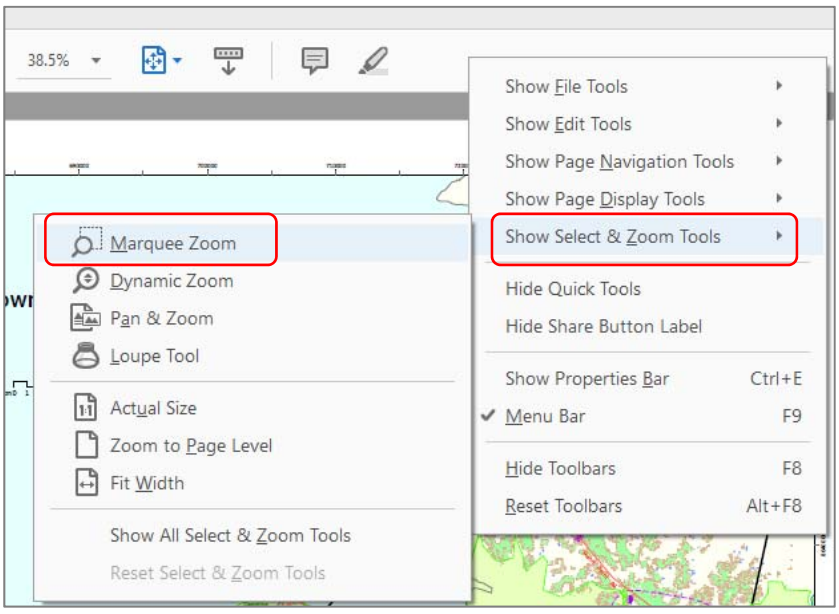
In Adobe Reader, open the left panel to reveal the map layers.

Open each folder to see the individual map layers.

Hide or show layers to find out more about this species distribution, particularly in the inset maps, where some layers may mask layers underneath.

Pages 2 – 13 contain the Guidelines for Map Use.

Maps of Threatened Species Distributions in the Greater Darwin Area should be interpreted with the attached Guidelines for Map Use - page size A4.



How to add new Adobe tools.

Right mouse click on the grey menu toolbar to see Adobe viewing tools.

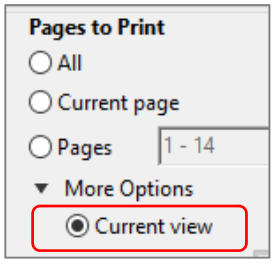
Tick a tool to display on the menu bar.

The **Marquee Zoom tool** is useful to view a small area on the map, eg. the inset map or the legend.

Show Select & Zoom Tools > Marquee Zoom

Draw a rectangle on the map to zoom to that area.

Printing



Page 1 (the map) is 84.1 x 59.4 cm. Print to a large format printer as size A1 (landscape) with no scaling. Only turn on one layer, so the titles do not merge.

Zoom to a smaller area on the map page and print using the Current View printing option.

Eg. Zoom to the Map Legend and print to an A4 size to assist with map interpretation while viewing on screen.