

Assessing the Conservation Status and nomination for Formal Listing of fungi species in Western Australia

A discussion document provided for the FungiMap V workshop 2009 “Threat status listing of Australian fungi”

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To support recent nominations for conservation listing of two *Torrencia* species from the WA wheatbelt, discussion notes were provided upon nomination by Neale Bougher to DEC’s Species and Community Branch. The aim of this was to encourage clarity in formal DEC assessment of the conservation status of fungi species in WA. The notes also raised some issues about fungi relevant to the criteria and nomination form for Flora and Fauna. The two *Torrencia* species were subsequently accepted as category Priority 2, adding to the previous two P2 listed *Amanita* species in WA.

Firstly presented below is an outline of the conservation codes and the nomination process in WA, followed by extracts from the discussion document.

WESTERN AUSTRALIAN FLORA CONSERVATION CODES

Fungi are protected Flora under the *Wildlife Conservation Act 1950* administered by the Department of Environment and Conservation (DEC). Under this Act, the Minister for the Environment may declare species of protected flora to be Rare Flora if they are considered to be in danger of extinction, rare or otherwise in need of special protection. Such species are referred to as Threatened Flora, and receive special management attention. There are also three categories of Priority Flora defined to cover poorly known species. The categories are arranged to give an indication of the priority for undertaking further surveys based on the number of known sites, and the degree of threat to those populations. A fourth category of priority flora is included for those species that have been adequately surveyed and are considered to be rare but not currently threatened. Special consideration should be given to the management of these species. The *Wildlife Conservation Act 1950* may be soon replaced by the *Biodiversity Conservation Act*.

RARE FLORA

R: (NOTE: DEC will be coding R: as T: in line with Fauna designation, as from May 2009) **Declared Rare Flora - Extant Taxa (= Threatened Flora = Endangered + Vulnerable)**

Taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State’s Endangered Flora Consultative Committee.

X: Declared Rare Flora - Presumed Extinct Taxa

Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State’s Endangered Flora Consultative Committee.

PRIORITY FLORA

P1: Priority One - Poorly Known Taxa

Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as ‘rare flora’, but are in urgent need of further survey.

P2: Priority Two - Poorly Known Taxa

Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as ‘rare flora’, but are in urgent need of further survey.

P3: Priority Three - Poorly Known Taxa

Taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.

P4: Priority Four - Rare Taxa

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 NOMINATION PROCESS IN WA

In WA the Threatened Species Scientific Committee (TSSC) assesses nominations for Declared Rare Flora (DRF) around March each year. This panel includes experts within DEC and external to DEC. Species nominated as Priority Flora do not have to go through the same process but are assessed by the Species and Community Branch of DEC (current Manager, Ken Atkins). There is a standard form and set of accompanying guidelines available from DEC for nominating DRF species. Forms are not mandatory for nominating Priority species but it is desirable to use the form in order to provide the required level of detailed information required for assessment.

EXTRACTS FROM DISCUSSION DOCUMENT PROVIDED TO DEC BY NEALE BOUGHER
(PRECEDING THE LISTING OF TWO TORRENDIA SPECIES)

- **Fungi need formal listing and more fungi will be nominated**

In recent times an increasing number of fungi species have received various conservation designations in many countries including Australia. The IUCN formally recognizes the Kingdom Fungi e.g. via fungi subcommittees. Red lists have been established for fungi in some countries. Currently in WA only two species of fungi out of potentially about 140,000 species are formally listed on conservation codes (both P2). As recognition increases of the biodiversity of fungi and their roles in ecosystem health, it is likely that more of WA's fungi will be nominated for formal listing. Listing of more fungi species will in turn promote awareness and knowledge about WA's fungi, stimulate further survey data, and ultimately benefit the conservation of WA's biodiversity and ecosystems.

- **Decision making process**

For DEC and the TSSC to be able to better interpret the conservation status of fungi as well as plants and fauna in WA, the unique biology of fungi and the poor status of survey knowledge about our fungi species need to be taken into consideration. Such considerations will inevitably impinge on the decision making process when assigning the level of conservation status of any fungi species nominated to DEC and the TSSC.

- **Basis for surveys and listing of fungi**

Observations of fruit bodies of macrofungi are currently our main realistic and practicable method of including fungi in WA's biological surveys and for judging conservation aspects such as where each fungus species occurs in WA. DEC and the TSSC will most often have at hand data based on fruit bodies when considering fungi nominated for conservation status. As discussed below, fungi fruit body data has some implications relevant to assessing their conservation status and nominations for formal status.

INDIVIDUALS AND POPULATIONS, AND FUNGAL FRUIT BODIES

- **Concept of fungi individuals and populations**

The concepts of "individuals and populations" for fungi need to be treated in a different way to with plants. Recorded/vouchered collections of any particular fungus species may comprise many fruit bodies from one or more locations. But unlike the way each plant is treated as an individual (as per the purposes of the nomination form), each fungal fruit body does not necessarily represent different individuals. Instead, an individual fungus is comprised an individual mycelium (a network of fungal hyphae/threads). An individual mycelium may either

exclusively dominate a particular area ranging from microsites to metres (or kilometres?) in scale, or co-exist with any number of individuals of the same and/or different fungi species. Therefore the number and distribution of fruit bodies belonging to each individual (a fungal mycelium) cannot easily be assessed in biological surveys.

- **Criteria on nomination form about population size**

A population of plants is taken as the total number of individuals of the species (as per definition on the nomination form and population size as asked at 4.1 on the form). In difference to with plants, fungi fruit bodies do not easily tell us how many individuals are present. For fungi it is rarely valid to total up the number of individual fruit bodies to determine a population because fruit bodies may or may not arise from different mycelia (the fungal individual). Similarly it is difficult to determine the number of mature (or any aged) individuals of fungi (equates to population size as per question 4.1 on the nomination form). Fungi individuals may live for short, medium or long periods of time and may produce fruit bodies over all of that time, at predictable intervals or intermittently or rarely.

- **Criteria on nomination form about changes with time**

With plants and animals, the number of individuals observed over time is often used as a guide to determining whether a species is increasing, stable, or declining. But in a significant difference to this, fruit bodies do not necessarily tell us how well any particular fungus species is doing (as per section 4.2 on the nomination form) – e.g. does the sighting of abundant fruit bodies at a particular location indicate the mycelia is thriving there better than at a time when less fruit bodies are observed? And if so would it be only one, or more, individuals thriving at that location? If no fruit bodies are seen at that same location the next year or for several years following does that then mean the fungus is struggling or reducing over time? Probably not necessarily, but variation in fruit bodies is more likely to be a reflection of such factors as environmental/seasonal conditions, the underlying lifecycle strategy of particular mycelia, and coincidence with an observer making observations of the usually ephemeral fruit bodies on a particular date. Counts of fruit body numbers and differences in numbers observed during different times do not necessarily have direct relevance to the conservation condition or status of the species unless observations are made in the same way at the same location over many (? 10+) successive years.

SURVEY EFFORT

- **Interpreting survey effort for fungi**

Because fruit bodies are ephemeral and unpredictable, requirements such as recommended period for surveys of fungi can be different to those of perennial plants. The issue of “need for further survey” as a criterion for category needs consideration with fungi. Most of WA’s fungi species are recorded from few locations, and fungi are currently under-represented in the WA Herbarium. Obviously most parts of WA have not been adequately surveyed for fungi. Does this always preclude any fungi species in WA from formal listing on Schedule 1 and at most only allow inclusion in the category of poorly known? It is likely that among the poorly surveyed fungi are species that may be truly rare and species that are abundant. Further survey may discern them, but for most fungi the survey effort required is unlikely to be achieved for a long time if ever. In the example case of the two wheatbelt *Torrendia* species in the present nominations it could be argued that there is need for further survey: potentially these species may occur in similar high quality wheatbelt remnants having mycorrhizal host understorey plants and uncompacted soil with surface litter. However so far work in many nearby and more distant parts of the wheatbelt have failed to observe them outside the cluster of limited known locations (while another member of the same genus discovered only in the 1980’s has been observed more frequently and widely in the wheatbelt and south-west). That the nominated species were only discovered and named in the 1990’s and recorded only a few times since can be taken either as a sign that they may be: (a) truly quite rare, or (b) fruiting only very

intermittently and unpredictably even though they may be present as mycelia over wide areas, or (c) no one capable of recognizing them had looked well enough, and no one has been looking well and widely enough since.

- Which way DEC chooses to interpret such things will determine whether fungi species, such as the currently nominated species, are to be formally designated on Schedule 1 or in the 'poorly known' category - Priority status.

NOTES ABOUT THE APPLICABILITY OF THE DEC TSSC NOMINATION FORM TO FUNGI

- **Alterations to the form are recommended**

The nomination form for listing is generally well applicable to fungi as similar general conservation principles apply to fungi as for plants and animals. However there are some parts of the form that may need some consideration as to how they may affect the nomination of fungi species. To help deal with the issues outlined above I suggest that some things be considered for the nomination form. This would require more development but it may include adding a brief guideline and some additional or altered fields on the form to accommodate fungi.

- **Guidelines specific for fungi are required**

A guideline might include pointing out to the user the concept of fungi individuals compared to that of plants and animals. A guideline might also include about how to deal with sections on the form which are appropriate for plants and animals but may not be as simply applied to fungi, such as sections:

2.5 about reproduction

2.6 about population dynamics, life expectancy

4.1 about population size in terms of number of mature individuals, estimating number of individuals, any known reductions...

- **Additional sections applicable to fungi are required**

Perhaps some sections that only apply to fungi nominations may be added to the nomination form (such as sect 2.7 and 2.8 are exclusively for fauna). In particular, a crucial point for conservation and biogeography of fungi is whether a fungus species is biotrophic, i.e. associated with particular plant or animal species, and in what way – e.g. proven or putative mycorrhizal association, pathogenic ... A separate section to highlight biotrophism for any fungi nominations would be highly appropriate.

Another additional section might ask: how many fungal fruit bodies of the species being nominated were observed at each location – which can become valuable data if observations have been or will be accumulated at the same location over many successive years.