



Manaaki Whenua
Landcare Research

Assessing the conservation status of the most threatened fungi in New Zealand and Australia (Project 182518969)

Prepared for: Mohamed bin Zayed Species Conservation Fund (MbZ)

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Assessing the conservation status of the most threatened fungi in New Zealand and Australia (Project 182518969)

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Summary

Project and Client

- This report addresses the much-appreciated funding from the Mohamed bin Zayed Species Conservation Fund to support a practical workshop in Melbourne on IUCN Red Listing of Australasian Fungi.

Objectives

- Engage mycological community in Australasia to submit relevant data on 50 threatened fungal species
- Generate initial assessments of selected fungal species to meet IUCN standards
- Submit Red List recommendations to IUCN for consideration in December 2019
- Conserve threatened species of Australasian fungi

Methods

- Data for over 80 species of Australasian fungi were compiled on the Global Fungal Red List Initiative (GFRLI) website in advance of the Workshop. The venue for the Australasian Red List workshop was The Herbarium, Royal Botanic Gardens Victoria (RBGV), Melbourne, Vic., Australia. Representatives from IUCN UK, Sweden, Malaysia, USA, Chile, Australia, and New Zealand participated in the workshop, held on 22–26 July 2019, and preceded on 21 July by a fungal foray to observe threatened fungal species.

Results

- The workshop began with a day of instruction about the nature of the IUCN Red Listing system, with detailed information about terminology and assessment of criteria. On Days 2–5, participants divided into (2–) 3 groups, often organised geographically (e.g. NZ vs Australia vs New Caledonia). Each group was led by an experienced overseas expert to address a selected list of species. Existing data were added to each species and discussion led to agreement on the Red List status of each, with follow-up checking by Janet Scott, IUCN Red List Unit, and amendment following consultation (if needed) with the Australasian lead participants.

Conclusions

- As at 30 October 2019, 84 species had been dealt with at the Melbourne workshop, with 51 species assessments finalised to IUCN Red List standards. Of these, 3 species are recommended to IUCN as Critically Endangered, 12 as Endangered, 9 as Vulnerable, 6 as Near Threatened, 7 as Least Concern, and 14 as Data Deficient. These 51 assessment recommendations have been passed over to the IUCN SSC Red List Authority for evaluation at their meeting in December 2019.

1 Introduction

The Workshop was initiated through a funded proposal by P. Buchanan to the Mohamed bin Zayed Species Conservation Fund for Australasia's first practical IUCN Fungal Red List Workshop. Subsequently, discussions to plan this workshop, involving Janet Scott (IUCN), Anders Dahlberg (Sweden), Greg Mueller (USA), Tom May (Royal Botanic Gardens Victoria, Melbourne), and Peter Buchanan (Manaaki Whenua, Auckland, New Zealand), led to the allocation of additional funding by IUCN to expand the initial scope and level of participation at the intended workshop.

2 Background

Until recently, fungi globally have been overlooked in terms of those threatened with extinction. Fungi, as the second largest kingdom of multicellular life, was represented in the November 2009 edition of the IUCN Red List of Threatened Species by only 3 species, along with 17,288 species of animals and plants. The initiative by Dahlberg & Mueller to develop, with Michael Krikerov, the Global Fungal Red List Initiative (GFRLI) resulted in the first specialised repository for information required for Red List assessments of fungi. This was preceded by a landmark paper (Dahlberg & Mueller 2011) in which challenges in application of Red List criteria to fungi were articulated and interpreted to enable defensible assessments to be prepared. As a direct result of both moves, mycologists internationally were better able to embark on Red List Assessments, by applying rationale and a common set of interpretations and guidelines as articulated by Dahlberg & Mueller. Most progress since has been centred in Europe and elsewhere in the Northern Hemisphere.

3 Objectives

- Engage mycological community in Australasia to submit relevant data on 50 threatened fungal species
- Generate initial assessments of selected fungal species to meet IUCN standards
- Submit Red List recommendations to IUCN SSC Red List Authority for consideration in December 2019
- Conserve threatened species of Australasian fungi

4 Methods

Planning for the Red List Workshop occurred via Skype meetings (January–July 2019) involving members of the organising committee from UK, Sweden, USA, Australia, and New Zealand. In early discussions about location of the Workshop, Melbourne was considered to be the most central and accessible location for Australasian and international participants. Tom May (Royal Botanic Gardens Victoria (RBGV), Melbourne) offered Mueller Hall and other facilities at his workplace as host venue for the workshop,

and Peter Buchanan (Auckland) assisted with invitations to overseas experts and bookings for travel and accommodation. Most participants from outside Melbourne stayed adjacent to RBGV at the Season Botanic Gardens Hotel; most bookings were made individually by Peter via Agoda.

In addition to experts in fungal conservation from the Northern Hemisphere, we also invited a representative from each of Asia and South America to encourage future Fungal Red Listing Workshops in these regions.

Invited participants from outside Australia were:

- Janet Scott (IUCN, UK)
- Anders Dahlberg (Swedish Univ. Agricultural Sciences, Sweden)
- Greg Mueller (Chicago Botanic Gardens, USA)
- Andrew Ngadin (Universiti Malaysia Terengganu, Malaysia)
- Giuliana Furci (Fundacion Fungi, Chile)
- Caroline Wood (Editor, Forest & Bird Magazine, New Zealand)
- Lois Allison-Cooper (New Zealand Department of Conservation)
- Jerry Cooper (Manaaki Whenua – Landcare Research, New Zealand)
- Peter Buchanan (Manaaki Whenua – Landcare Research, New Zealand)

Australian participants included:

- Tom May (RBGV)
- Patrick Leonard
- Nigel Fechner
- Teresa Lebel (RBGV)
- Pamela Catcheside
- David Catcheside
- Julia Haska
- Susie Webster
- Susan Nuske (via Skype)
- Pat Grey
- Ed Gray
- Frances Guard
- Jasmin Parker
- Ema Corro
- Caine Barlow
- James Douch
- Angela Little
- Naveed Davoodian (RBGV)

A collation of expenditure is provided, along with receipts (if required) – acknowledging that some other items of expenditure, not covered here, were separately funded by the grant from IUCN.

Before the Workshop, participants enjoyed a day-long fungal foray led by Tom May to forest sites near Melbourne where, amazingly, we were able to view two highly endangered fungal species, *Hypocreopsis amplexans* and *Auriscalpium* sp. “blackwood”.

The Workshop was opened by Prof. David Cantrill, Exec. Director, Science, RBGV, who announced that the Victoria State Government had allocated AU\$400,000 for conservation action to protect *Hypocreopsis amplexans* – arguably the ‘poster species’ of the Workshop and a species we had observed just the day before.

The programme for the first day (Monday 22 July) was a series of presentations concerning the Red List process, definitions of IUCN terms and criteria, demonstration assessments, and an overview of fungal conservation in Australia and New Zealand. The next 4 days were for species assessments, undertaken by (2–) 3 groups of participants each focused on selected species of most relevance to their expertise – and each group led by one of Janet Scott, Anders Dahlberg, and Greg Mueller on a daily rotating basis.

On Tuesday evening, public were invited to RBGV for several presentations covering Red Listing, and various perspectives on fungal conservation from global to continental to country. On Friday evening, to close the workshop, participants enjoyed a meal together kindly hosted at the home of Sara & Tom May.

A copy of the Workshop programme is enclosed.

5 Results

Data for 70 species of Australasian fungi were entered on the Australasian pages of the Global Fungal Red List Initiative website ahead of the Workshop. These data had then been copied over by Janet Scott into IUCN’s Species Information Service (SIS) database.

Species assessments during Tuesday to Friday evaluated current knowledge and data for each species, sourced additional information where needed, and debated the appropriate and most defensible threat classification using the IUCN criteria. Good progress was made, with daily improvements as the mostly new assessors gained experience and as Janet, Anders, and Greg shared their expertise and advice.

Following the workshop, Janet Scott worked with Tom May and Peter Buchanan at RBGV, providing access and instruction on use of the SIS database to help finalise the assessments on each species. Contact continued by email until late October when the last species assessments were fully completed.

As at 30 October 2019, the Workshop and subsequent work resolved final assessments as recommendations to IUCN for 51 species, with the following breakdown by recommended threat category and country:

Table 1. Finalised Assessed Species – IUCN Category by Country

IUCN Category	AUS	AUS+NZ	NC	NC+AUS	NZ	Total
CR		1	1		1	3
EN	4		2		6	12
VU	7				2	9
NT	1	1			4	6
LC	2				5	7
DD	2	1	1	1	9	14
Total	16	3	4	1	27	51

(AUS = Australia; NC = New Caledonia; NZ = New Zealand)

In addition to the above, 33 other species were assessed to varying degrees. The status of these species' assessments is summarised as follows:

Table 2. All Species dealt with at Australasian Workshop – Status of Assessment

IUCN Category	Draft, finalise in next round	Final draft, to be confirmed by Rust & Smut Specialist Group	Finalised	Non-Australasian	Remaining as Proposed on GFRLI website	Total
EW					2	2
CR			3		1	4
EN			12	5	5	22
VU			9	1	5	14
NT		1	6	2		9
LC	2	1	7			10
DD	1	2	14			18
N/A	4				1	5
Total	7	4	51	8	14	84

Three species of threatened fungi were selected for specific mention in the Project Description of the initial funding application. As detailed below, two of these species were recommended to IUCN as Critically Endangered, and one as Endangered. Some extracted text from the submitted IUCN assessments has been included:

Hypocreopsis amplexans (tea-tree fingers) – recommended to IUCN as Critically Endangered C2a(i).

"Hypocreopsis amplexans is an extremely rare endemic fungus in southeastern Australia and the South Island of New Zealand. It is probably a myco-parasite on fruitbodies of *Hymenochaete*, growing on dead fine wood mainly of Myrtaceae in forests with an understorey of myrtaceous shrubs. Despite intense survey effort for this readily recognisable and persistent fungus for more than 30 years, it has only ever been seen at seven sites, at some of which it no longer can be found."

Russula pleurogena – recommended to IUCN as Endangered C2a(ii).

"The only known collection of this species is from Waitakere Ranges, near Auckland, New Zealand. ... from 1981 ... *Russula pleurogena* is ectomycorrhizal with tea-tree (Myrtaceae). ... This species has a small population size estimated as up to 1500 mature individuals, all in a single subpopulation, which is continuing to decline due to decreasing extent and quality of its habitat."

Deconica baylisiana – recommended to IUCN as Critically Endangered D.

"The species is known from three records, of only a few sporocarps, in three sites over an 83-year period. ... This is a conspicuous species associated with alpine/upland grasslands in southern New Zealand. Secotioid species do not have

active spore dispersal and rely on animal vectors. The identity of the vector is unknown.”

6 Conclusions

Finalised assessments for at least 51 species of fungi from Australia, New Caledonia, and New Zealand will be submitted to IUCN SSC Red List Authority for their December 2019 Red List evaluation. Progress has been made on assessments for another 33 species, with assessments in various stages of completion.

The Workshop also enabled Peter Buchanan to deliver a day’s workshop on IUCN Fungal Red Listing to participants at the Asian Mycological Congress in Mie, Japan, on 1 October 2019, with funds from MbZ also applied to participant’s food costs for the day, and MbZ thanked for sponsorship.

Publicity from the Workshop was via the public evening lectures, and through print media in Australia and New Zealand. I enclose two press releases from Manaaki Whenua and from RBGV (Anon. 2019 a,b), and the article published by Caroline Wood (Wood 2019); Caroline was invited to the workshop as editor of Forest & Bird Magazine, which has the widest circulation among environmental publications in New Zealand.

7 Acknowledgements

All members of the Organising Committee, along with participants in the Workshop, are very grateful to MbZ for the funding support that enabled this Workshop to occur and for assistance with expenses of travel and accommodation for participants outside Melbourne. MbZ’s sponsorship was acknowledged on several occasions during the Workshop, as well as at the later workshop in Japan.

We are also grateful for the generosity of RBGV, Melbourne, for their excellent organisation and provision as host for the Workshop, and to Manaaki Whenua – Landcare Research for considerable support of staff time to manage bookings and reimbursements for participants, and other administrative tasks.

8 References

- Anon. 2019a. Press Release, Manaaki Whenua – Landcare Research, 19 July 2019: Scientists campaign to have NZ fungi on global red list. <http://pacific.scoop.co.nz/2019/07/scientists-campaign-to-have-nz-fungi-on-global-red-list/> [copy enclosed]
- Anon. 2019b. Press Release, Royal Botanic Gardens Victoria, 25 July 2019: Australasian Fungi Red List Workshop: Conserving our overlooked but ecologically imperative fungi. <https://www.scimex.org/newsfeed/australasian-fungi-red-list-workshop-conserving-our-overlooked-but-ecologically-imperative-fungi> [copy enclosed]

Dahlberg A, Mueller GM 2011. Applying IUCN red-listing criteria for assessing and reporting on the conservation status of fungal species. *Fungal Ecology* 4: 147–162.

Wood C 2019. Secret life of fungi. *Forest & Bird* 373: 20–22 + cover [copy enclosed]

Appendix 1

Workshop Programme

Wood (2019) Forest & Bird Magazine article

Anon. (2019a, b) Press Releases

Financial reconciliation:

MbZ provided funding of US\$15,500 to support the Australasian Fungal Red Listing Workshop (= NZ\$22,677.40)

In \$NZ, this was committed to:

Labour (Jerry Cooper, Peter Buchanan– for administration, bookings, planning):	\$ 7,880.69
Airfares, Accommodation, Meals, Transport:	\$10,469.40
Hosting costs at RBGV venue, including catering	\$ 4,327.31
Total	\$22,677.40

See also:

Collated Operating Expense Detail Report (separately for July 2018 – June 2019 financial year, and current July 2019 – June 2020 financial year).

Receipts to support Operating Reports are available if required.

Australasian Fungi Red List Workshop

22-26 July, 2019

Royal Botanic Gardens Victoria, Melbourne

Programme

	morning	afternoon	evening
Monday 22	General session: Threat Status Assessment of Fungi		
Tuesday 23	Assessments	Assessments	Fungal Conservation Forum – public event
Wednesday 24	Assessments	Assessments	
Thursday 25	Assessments	Assessments	
Friday 26	Assessments	Assessments	End of workshop dinner for assessment team

Public events (in green) are in **Mueller Hall**, Royal Botanic Gardens Victoria, Birdwood Avenue at intersection with Dallas Brookes Drive. Public transport – train to Richmond Station and 20 minute walk (across Morell Bridge and through Botanic Gardens), or all trams southbound on St Kilda Road except No. 1 (alight stop 19 and walk through Shrine of Remembrance). There is also pay parking along Birdwood Avenue and Dallas Brookes Drive.

Monday 22 July: General Session: Threat Status Assessment of Fungi

Purpose

- Engage and educate people interested in carrying out threat assessments of fungi
- Demonstrate that fungi can be assessed using IUCN criteria
- Deal with issues about making assessments of fungi, prior to working through 100 species proposed for assessment
- Establish connections between mycologists, citizen scientists, threat assessors and policy staff

Audience:

- Those interested in learning how to make the formal assessments of fungi
- People with information about fungi that is necessary background for assessments
- Government officials responsible for enacting threat status legislation and developing policy in this area
- Members of Technical Advisory Committees under threatened species legislation
- Representatives of conservation NGOs

9:00 am	Registration
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9:30	Welcome from Prof. David Cantrill (Executive Director, Science, RBGV) (5 mins)
9:35	Explanation of purpose of Workshop and outline of program – <i>Peter Buchanan & Tom May</i> (10 mins)
9:45	How to red list fungi – <i>Anders Dahlberg, Greg Mueller & Janet Scott</i> (session 1: 1 hour 15 mins) Concepts: EOO, AOO, population, subpopulation, location, fragmentation, reduction and decline, generation time, mature individuals Practical estimation for fungi of key measures such as number of mature individuals
11:00	Morning tea & coffee break
11:15	How to red list fungi – continued – (session 2: 1 h 15 minutes) Red listing process Categories (CR, EN, VU, NT, DD, LC) Criteria (A, B, C, D, E) Examples of assessed species of fungi, such as from recent European Initiative Workshop Common scenarios for threatened fungi
12.30 pm	Lunch
1:30	Background data for Red listing <i>Tom May</i> (20 mins) Distribution data sources – NZFungi, Atlas of Living Australia, Fungimap, iNaturalist Use of the Global Fungal Red List Initiative website for compiling background data
	Demonstration assessments – live worked examples – Assessment team (70 minutes) Using examples from species from other regions already assessed, and Australasian species to be assessed.
3:00	Afternoon tea & coffee break
3:15	Fungi under Australian and New Zealand threat status legislation <i>Tom May & Peter Buchanan</i> (30 mins) Review of existing process for proposals and assessments of species of fungi under the various national and state jurisdictions Summary of species of fungi already formally listed Conservation actions for listed species
3:45	Panel discussion on application of IUCN threat status listing to fungi (45 mins) What are challenges to assessing fungi under current legislation? How can these challenges be addressed?
4:30	Close

Tuesday 23 July: Advancing the Conservation of Fungi : Evening Public Forum

Purpose

- Showcase exciting recent advances in conserving fungi from around the globe, with a focus on the Southern Hemisphere
- Demonstrate how fungi are being included on formal threat status lists, globally (IUCN Global Red List of Threatened Species) and under national and regional threatened species legislation
- Provide practical examples of how to advance conservation of fungi, through appropriate legislation and programs
- Highlight individual threatened fungi and what is being done to conserve them

Audience

- General public, fungi mappers, field naturalists, mycologists, science journalists, ecologists, conservation scientists, staff of environment & biodiversity departments

7:00 pm	Welcome from Prof. Tim Entwisle, Director and Chief Executive, RBGV
7:05	Janet Scott (International Union for Conservation of Nature) – The IUCN Red List of Threatened Species
7:20	Gregory Mueller (Chicago Botanic Garden) – Conserving fungi, a global perspective
7:35	Anders Dahlberg (Swedish Species Information Centre - Swedish University of Agricultural Sciences) – Conserving fungi in Scandinavia
8:50	Giuliana Furci (Fundación Fungi, Chile) – Conserving fungi in Chile
8:05	Andrew Ngadin (Universiti Malaysia Terengganu) – Fungal conservation projects in Southeast Asia
8:20	Peter Buchanan (Manaaki Whenua – Landcare Research) – Conserving fungi in New Zealand
8:35	Tom May (Royal Botanic Gardens Victoria) – Conserving fungi in Australia
8:50	Panel discussion – what can you do to assist fungi conservation
9:00	Close

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Acid ocean impacts



Forgotten pests



**Forest
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TE REO O TE TAIAO
Giving Nature a Voice

Cover story



Some of the fabulous fungi found in New Zealand (clockwise from top left) *Gliophorus*, *Chlorociboria*, *Calostoma rodwayi*, *Ramaria*, *Cortinarius* 'small purple pouch', *Laccaria masoniae* on possum claw, *Pisolithus*, and *Mycena*. Photos: Noah Siegel



SECRET LIFE

Caroline Wood travels to Australia to meet some of the scientists trying to save the world's rarest mushrooms and moulds from becoming extinct.

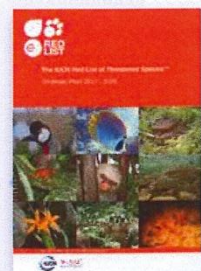
Some of our mushrooms are so rare they could disappear tomorrow and nobody would even know. New Zealand is a global hotspot for fungal diversity, but more than half our species haven't even been named. Even for those that have been formally recorded, there are hundreds we know very little about. Fungi are critically important in nature, and yet there are no national recovery plans for endangered species, even those unique to Aotearoa and on the edge of extinction.

The need for urgent action to protect these earthy treasures is why some of the leading experts in global fungi conservation are gathered around a table at the Herbarium, in Melbourne's Royal Botanic Gardens, in July. Scientists from New Zealand, Australia, Malaysia, the USA, Sweden, the UK, and Chile have come together for a week to assess the threat status of 70 of Australasia's most precious fungi species, 40 from New Zealand and 30 from Australia. It is part of a worldwide push, initiated by scientists, to get more recognition for some of the world's most threatened fungi.

Listening to these experts speaking at Australasia's first IUCN Fungal Red List Workshop, it becomes clear that yeasts, moulds, and mushrooms are the poor relatives of conservation in most parts of the world, not just in New Zealand. They are ignored and unloved by most decision-makers (with the possible exception of Nordic countries). And yet fungi are the second largest kingdom of life and play critical roles in ecosystem function, including in forests, swamps, sand dunes, and alpine grasslands.

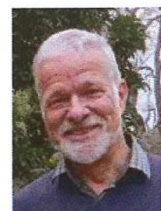
What is the IUCN Red List?

The International Union for Conservation of Nature's Red List of Threatened Species is recognised as the most comprehensive global approach for evaluating the health of the world's biodiversity. It has a large impact on the setting of conservation priorities for animal, fungal, and plant species threatened with extinction. Dubbed the "Barometer of Life", it provides information about the range, population size, habitat and ecology, usage, threats, and conservation actions that help inform a species' protection.



There are only 145 fungal species on the IUCN's global Red List, including three from New Zealand. In comparison, 10,570 plant species and an even larger number of animal species fill out the list. How is it that such an important contributor to ecosystem health is treated like an unwelcome uncle at a wedding?

"Humanity has a temptation to over-value and prioritise conservation of the colourful, cute, and cuddly and ignore other less charismatic forms of life," says Dr Peter Buchanan, of New Zealand's Manaaki





OF FUNGI

Whenua – Landcare Research, one of the organisers of the Australasian IUCN fungal workshop.

“Getting more New Zealand fungi onto the Red List will mean global recognition for these species. It will also serve as a reminder to the government and the public that we need to value and conserve fungi as well as our plants and animals. Once listed, there is an evidence base from which conservation action, such as habitat protection, can be developed.”

This recognition needs to happen fast. New Zealand’s native biodiversity is in big trouble, and fungi could be said to be the canary in the mine.

NEW ZEALAND’S RARITIES

The perilous state of some of our fungi becomes clear when New Zealand mushroom expert Dr Jerry Cooper introduces the first candidate for formal IUCN assessment, *Deconica baylisiana*. It’s a bright orange mushroom that’s so rare it hadn’t been seen for 50 years until a member of the public spotted it while out tramping in 2014 and posted a photo on iNaturalist.



Deconica baylisiana.
Photo: K Warburton

The mushroom is found only in alpine grasslands near the treeline in New Zealand. It’s been sighted three times since it was first collected 83 years ago, in two locations 20km apart in the South Island, and in one area on Rakiura/

Stewart Island. Its threats include global warming and introduced animals.

At one point during a discussion to determine whether there are likely to be more or less than 36–90 mature adults left in the wild, Peter Buchanan points out that, if this species was a native bird, the community would be jumping up and down demanding a species recovery plan and investment in its protection. But because it’s a humble fungus, it doesn’t receive the same care and attention.

After assessing the likely number of other sites the fungus could be found, it is agreed that this alpine pouch fungi is “critically endangered” under criterion D.

The second candidate for assessment is an endemic sand-dune puffball mushroom (*Abstoma purpureum*), which has a very hard surface like a brown golf ball. It hasn’t been seen for 70 years, raising the prospect that it may already be extinct because of a significant decline to its native dune habitat. Or, suggests one scientist, perhaps it’s because no-one has been looking?

The mushroom has been recorded seven times between 1920 and 1949 at three sites, including Levin, in the lower North Island, and at Karitane, in Otago, raising the prospect that it could have quite a wide range. The assessors crunch the data and agree a threat status of “endangered” because of its unknown potential range, even though it could already be extinct.

The third New Zealand assessment for *Cordyceps kirkii* – aka “the body snatcher” – has to be halted because of lack of data. It lives only on giant weta, but because no-one is researching it the assessors can’t be sure how rare the fungus really is, whether it kills its host, what its range is, and whether it’s declining.

Cover story

Data are vital for assessing fungal threat status, but little funding is currently being channelled into research in New Zealand. There are only a handful of fungal experts (mycologists) working in the country, and there is no committed succession plan to replace retiring mycologists.

The Department of Conservation, which manages New Zealand's threat classification process, doesn't currently employ a specialist fungal expert. Manaaki Whenua – Landcare Research, keeper of the nation's fungal collection, relies on the unpaid services of two retired mycologists to bolster its small specialist team.

A national threat assessment of New Zealand's fungi was first carried out in 2002 and revised in 2011, but another revision is long overdue.

Lack of funding for fungal taxonomy and conservation and an apparent government disinterest in the threats they face means our rarest fungi are not receiving the urgent action required to describe them, understand their roles, or protect their habitats.

But there is hope.

BAROMETER OF LIFE

In 2011, a small group of mycologists from around the world decided to raise awareness that some fungi, like all other groups of life, are threatened with extinction because of the same factors that affect the survival of animals and plants. These threats include climate change, habitat loss, invasive alien predation, and pollution.

This led the IUCN to launch the Global Fungal Red List Initiative, with the aim of significantly boosting the number of species listed.

Dr Anders Dahlberg, from the Swedish University of Agricultural Sciences, helped put together the protocols for developing Red List fungal assessments. He is one of the international experts who have come to Melbourne to help Australasian scientists work their way through the complex process of assessing local fungal species.



Some of the world's leading mycologists helped local scientists add 70 new Australasian species to the Red List. From left, Dr Tom May, Dr Anders Dahlberg, and Dr Greg Mueller during a field trip to a native forest near Melbourne looking for some of Australia's rarest fungi. Photo: Peter Buchanan



Photo: Noah Siegel



New Zealand's best-known mushroom is arguably the bright blue *Entoloma hochstetteri*, which is also on our \$50 bank note.

Anders stresses the importance of experts and citizen scientists working together to record fungi in the wild to help gather vital data about rare species.

"Your life will be richer if you fall in love with fungi," he tells the audience at a public seminar about fungi conservation held during the Melbourne workshop.

"Keep your eyes down, look down at the ground, who knows what you might find?"

He talks about the secret life of fungi, how many of them are hidden from view, and therefore how scientists have to become detectives sifting through different sources of information to assess their threat level, including scientific studies and field research.

Dr Greg Mueller, chief scientist at the Chicago Botanic Gardens, heads up the IUCN's Mushroom, Bracket and Puffball Specialist Group.

He says it's important to remind the public and policymakers about the importance of fungi to the natural world. Some are edible, some provide medicine, they recycle dead wood in the forest, they help plant roots absorb water and minerals, and they perform many other vital functions.

"In short, life on the planet as we know it wouldn't exist without fungi," he says.

"Determining which are declining or thriving is a crucial first step. Many funding and conservation organisations use the IUCN Red List to prioritise action."

Greg says it's also important to identify gaps in knowledge – as omission invites the mistaken conclusion that fungi are not threatened or mycologists don't care about them.



One of Australia's most threatened fungi *Hypocreopsis amplexans* or tea-tree fingers. Photo: Peter Buchanan

Dr Giuliana Furci heads up the Fundacion Fungi, in Chile, which is the only e-NGO in the world dedicated solely to fungi.

She explains how in 2012 the Chilean government passed legislation that means there must be a fungal baseline study carried out for every major infrastructure development in the country. This created a much-needed community of fungal expertise from a base of zero.

"Until a few years ago, Chile didn't even have a fungal field guide. It shows what you can do [in a short period of time]. We got the legislation first and then the mycologists and students came, there are jobs, and they are contributing to building this [protection] framework."

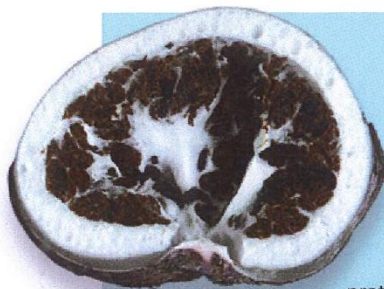
As well as advocating for fungi, the Fundacion makes conservation fun. They work with artists, chefs, teachers, and actors to produce lots of communication tools, run a fungal fest, and sponsor a pop-up fungal museum that travels the country.

The lead workshop organiser and our host at Victoria Herbarium was Dr Tom May, a world-leading expert in mushrooms and an experienced fungal conservationist. He tells us about tea-tree fingers (*Hypocreopsis amplexens*), one of the most threatened fungi in Australia. It was discovered in Victoria in 1993 by a member of a local field naturalist club.

"If it was a bird, we'd be doing an active breeding programme," says Tom.

All the experts agreed that the IUCN Red List is a good starting point for saving a species.

But first each has to be put through a stringent assessment process that considers a prescribed list of data categories. This includes population size, fragmentation, generation length, decline over 10 years, whether it's continuing to decline, species range, location, and the threats it faces.



Claustula fischeri (Fischer's egg) pictured left, *Lactarius novae-zelandiae*, and *Boletopsis nothofagi* are the only New Zealand fungi currently on the Red List. It doesn't give them legal

protection but helps guide conservation decisions. For example, Nelson City Council moved a planned mountain bike trail to avoid a known population of Fischer's egg.

The assessors sit together working from data entered earlier before the workshop and synthesising that data onto an IUCN database projected onto the screen above them. After sometimes lengthy discussions, and testing of assumptions, the assessors will agree a threat status: data deficient, least concern, near threatened, vulnerable, endangered, critically endangered, extinct in the wild, and extinct.



Ileodictyon cibarium (basket fungi) is one of many fungi endemic to New Zealand. Photo: Bernard Spragg

The data and threat recommendations uploaded in Melbourne will be formally ratified by IUCN experts and species officially added to the Red List, hopefully by the end of this year.

One of the reasons fungi are massively under-represented on the Red List is that you need to have good data about them, says Janet Scott, who works for the IUCN, in Cambridge, UK.

"Until recently, that was not possible. But changes in technology and the rise of citizen science websites are helping," she said.

FIND OUT MORE ABOUT FUNGI

Dr Jerry Cooper, who is based at Landcare Research's Lincoln office, is a rare breed in Aotearoa, the only professional mushroom specialist in New Zealand and one of the few scientists actively engaged in taxonomic research and DNA sequencing of our mushrooms.

Jerry submitted many of the 40 New Zealand species for consideration during the Melbourne fungal workshop.

He relies on sharp-eyed citizen scientists for sightings of mushrooms in the wild. As a volunteer on the iNaturalist website, Jerry has identified 25,000 observations, including some exciting discoveries of new and rare species.



Why does he think fungi are unloved in New Zealand?

"One of the reasons is that we don't have many edible species, so people aren't going out there and looking for mushrooms. And the fungi we do have aren't properly studied, so not a lot is known about them," he says.

"It's critical we get better quality information about what is out there. For example, there are about 2000 species of mushrooms that we have named, usually the more distinctive ones, and at least another 2000 yet to be named.

"That means, for most people, one out of every three fungal species they see in the wild doesn't even have a name. This is not the same in other countries where foraging for mushrooms is more popular – for example, in Europe."

Jerry and Peter are currently working on an illustrated field guide to help amateur fungal enthusiasts identify any mushrooms and other fungi they find.

He urges people to upload the location and photographs of any specimens they find to www.inaturalist.nz so they can be identified.

■ The Australasian Fungal Red List Workshop was sponsored by the IUCN, the Mohamed bin Zayed Conservation Fund, the National Herbarium of Victoria & Melbourne Botanic Gardens, and Manaaki Whenua – Landcare Research.



Scientists campaign to have NZ fungi on global red list

July 19, 2019

Press Release – Landcare Research

Scientists are campaigning to have endangered fungi from across Australasia included in the Global Red List of threatened species. July 19, 2019

Scientists are campaigning to have endangered fungi from across Australasia included in the Global Red List of threatened species.

Manaaki Whenua – Landcare Research mycologist Peter Buchanan has helped organise the first International Union for Conservation of Nature (IUCN) Global Red List Workshop on Australasia’s threatened fungi.

The workshop takes place on 22–26 July at the Melbourne Botanic Gardens.

The workshop will examine up to 100 potentially threatened species of fungi from New Zealand, Australia and New Caledonia, and evaluate their predicted survival against the international criteria set by IUCN for inclusion in the Global Red List.

Dr Buchanan says the focus is on evidence to support conservation action to ensure survival of our native species (fauna, flora, and fungi), which will be helped by inclusion in the Global Red List of species of fungi that are threatened with extinction.

“Once listed, there is an evidence base from which conservation action, such as habitat protection, can be developed. For New Zealand, IUCN Red List status will add to our assessment of fungi according to DOC’s NZ Threat Classification System, which is modelled on IUCN criteria.”

Until 2014, the fungal kingdom, the second largest kingdom of life after the animal kingdom, was only represented by three species on the Global Red List. By comparison, 10,570 plant species and an even larger number of animal species fill out the list.

Dr Buchanan says around 2010 some mycologists decided to raise awareness that some fungi, like all other groups of life, are threatened with extinction due to the same factors – habitat loss, pollution, over-harvesting and global warming – that affect the survival of animals and plants.

Getting the fungi onto the list will mean global as well as New Zealand and Australian recognition from the government and public that we need to value and conserve our fungi as well as our plants and animals.

“Humanity has a temptation to over-value and prioritise conservation of the colourful, cute and cuddly, and ignore other less charismatic forms of life – yet life on this planet cannot exist without the so-called ‘non-charismatic’ majority of biodiversity,” Dr Buchanan says.

The workshop will cover the criteria used by IUCN to assess any organism for its potential Red List status, and, specifically, how these criteria are applied to fungi.

Dr Buchanan says fungi are quite challenging to assess because they can be invisible when in their “feeding stage” down in the soil, wood, or leaves.

“We typically only notice them when they reproduce and we see their fruiting bodies, including mushrooms, brackets, puffballs, or smaller fruiting bodies within spots on leaves.”

Up to 100 species of Australasian fungi have been nominated for consideration because of their rarity and threats to the continued survival of the species. Recommendations will then go to the IUCN for formal evaluation.

This workshop would not be possible without the financial assistance of the IUCN, the Mohamed bin Zayed Conservation Fund, the National Herbarium of Victoria & Melbourne Botanic Gardens, and Manaaki Whenua – Landcare Research.

<https://www.scimex.org/newsfeed/australasian-fungi-red-list-workshop-conserving-our-overlooked-but-ecologically-imperative-fungi>



Australasian Fungi Red List Workshop: Conserving our overlooked but ecologically imperative fungi

Publicly released: Thu 25 Jul 2019 at 1000 AEST | 1200 NZST

"You can't have the tree without the fungi". When it comes to conservation, it's often the cuter and cuddlier species that get most of the attention, despite them being just the tip of the iceberg for rare and threatened flora and fauna. What about the hidden kingdom of Fungi?

Organisation/s: Victorian Government, Royal Botanic Gardens Victoria

Media Release

Dr Tom May is passionate about conserving the hidden kingdom of fungi.

When it comes to conservation, it's often the cuter and cuddlier species that get most of the attention, despite them being just the tip of the iceberg for rare and threatened flora and fauna. What about the hidden kingdom of Fungi?

Mycologists (fungal experts) are meeting at Royal Botanic Gardens Victoria between July 22nd and July 26th for the Australasian Fungi Red List Workshop to assess the often-overlooked conservation status of fungi from the Australasian region. Workshop participants include representatives from UK, Sweden, Malaysia, USA, and Chile, in addition to Australia and New Zealand, and they will share the latest news regarding fungi conservation from around the world at a public forum on the evening of Tuesday 23rd July.

The first step for fungal conservation is to prioritise the species that require attention. The International Union for Conservation of Nature compiles the IUCN Red List of Threatened Species. Species proposed for assessment are often rare and experience threats to their survival such as habitat loss and the loss of their symbiotic partners. Already, there are nearly 100 species of fungi included on the IUCN Red List.

“Discovering and monitoring threatened species can be greatly aided by citizen science recording programs such as Fungimap, which have turbo-charged the rate of accumulation of fungi distribution data,” says Dr Tom May from Royal Botanic Gardens Victoria. “Fungimap has accumulated more than 100,000 observations, and now that we have many records of common species, we can start to see which species are rare.”

International participants in the workshop bring fresh perspectives on advancing fungal conservation. For New Zealand, Dr Peter Buchanan (Manaaki Whenua – Landcare Research) points out that “fungi are already included in the lists of species assessed under the New Zealand Threat Classification System.” In Chile, Giuliana Furci coordinates Fundación Fungi, whose advocacy led to inclusion of fungi into Chile’s environmental law.

Red listing is the first step. Ultimately, according to Dr Anders Dahlberg from the Swedish Species Information Centre, “inclusion of fungi in Red Lists should lead to practical efforts to ameliorate threats and manage habitats for vegetation and for fungi”.

The Australasian Red List workshop is supported by Royal Botanic Gardens Victoria, Mohamed bin Zayed Conservation Fund, IUCN, and Manaaki Whenua – Landcare Research.

Free Public Events:

- * Threat Status Assessment of Fungi: a general session of the workshop. Mon. 22 July
- * Advancing the Conservation of Fungi: Evening Public Forum. Tues. 23 July

Venue: Mueller Hall, Royal Botanic Gardens Victoria

For more information and booking inquiries, click here: <https://www.rbg.vic.gov.au/science/projects/mycology/conservation-of-fungi>

Operating Expense Report for Fungal Red List Workshop – using funds from Mohamed bin Zayed Species Conservation Fund

1 Financial year ending 30 June 2019:

Job Operating Expense Detail Report



Report Parameters

Programme: 794201
Job: 0050
Financial Year: 2019
YTD Financial Period: 12

Date	Amount	Description	Src	Text Fields
Travel - International				
24-Jun-2019	1,619.48	Seasons Bot Gdns	ADJ	Peter Buchanan 43620 BNZ Card
1,619.48 YTD Total				

2 Financial year ending 30 June 2020

Job Operating Expense Detail Report



Report Parameters

Programme: 794201
Job: 0050
Financial Year: 2020
YTD Financial Period: 5

Date	Amount	Description	Src	Text Fields
Training Courses				
30-Oct-2019	4,327.31	ROYAL BOTANIC GARDENS IUCN W/S	AP	42742 WESTERN UNION BI 000295763
4,327.31 YTD Total				
Travel - International				
30-Oct-2019	531.50	DR JASMIN PACKER REIMB.IUCN EX	AP	42742 WESTERN UNION BI 000295773
30-Oct-2019	156.31	DR JASMIN PACKER REIMB.IUCN EX	AP	42742 WESTERN UNION BI 000295773
30-Oct-2019	95.77	Riz Cafe	ADJ	Peter Buchanan 43745 BNZ Card
30-Oct-2019	244.75	Riz Cafe	ADJ	Peter Buchanan 43745 BNZ Card
12-Sep-2019	-172.00	ANDERS DAHLBERG TAXI REIMBURSE	AP	42742 WESTERN UNION BI 000294399
12-Sep-2019	173.71	ANDERS DAHLBERG TAXIS	AP	42742 WESTERN UNION BI 000294400
11-Sep-2019	469.21	T W MAY & S L MAROSKE RED LIST	AP	42742 WESTERN UNION BI 000294333
05-Sep-2019	42.18	IUCN RED LIST WORKSHOP	AP	42819 JERRY COOPER TAXIS 98.87 000294152
30-Aug-2019	172.00	ANDERS DAHLBERG TAXI REIMBURSE	AP	42742 WESTERN UNION BI 000294031
1,713.43 YTD Total				
Travel - New Zealand				
05-Sep-2019	98.87	IUCN RED LIST WORKSHOP	AP	42819 JERRY COOPER TAXIS 98.87 000294152
30-Aug-2019	25.08	Eleven Inch Pizza Pt	ADJ	Peter Buchanan 43670 BNZ Card
30-Aug-2019	179.50	Seasons Bot Gdns	ADJ	Peter Buchanan 43664 BNZ Card
30-Aug-2019	149.75	Ducky Cafe Seville	ADJ	Peter Buchanan 43669 BNZ Card
30-Aug-2019	1,405.68	Agoda.Com	ADJ	Peter Buchanan 43668 BNZ Card
30-Aug-2019	1,382.96	Agoda.Com	ADJ	Peter Buchanan 43670 BNZ Card
30-Aug-2019	971.70	Agoda.Com	ADJ	Peter Buchanan 43668 BNZ Card
30-Aug-2019	472.62	G K Group Pty Ltd	ADJ	Peter Buchanan 43672 BNZ Card
30-Aug-2019	46.09	Coles 0512	ADJ	Peter Buchanan 43669 BNZ Card
30-Aug-2019	15.58	Krakatoa Cafe	ADJ	Peter Buchanan 43669 BNZ Card
30-Aug-2019	984.44	Agoda.Com	ADJ	Peter Buchanan 43670 BNZ Card
30-Aug-2019	984.44	Agoda.Com	ADJ	Peter Buchanan 43670 BNZ Card
30-Aug-2019	24.56	Aa Swan Street 3931	ADJ	Peter Buchanan 43669 BNZ Card
30-Aug-2019	13.43	Uber *trip	ADJ	Peter Buchanan 43669 BNZ Card
30-Aug-2019	40.56	Skybus Coach Service	ADJ	Peter Buchanan 43668 BNZ Card
29-Aug-2019	31.49	Woolworths3327	ADJ	Peter Buchanan 43676 BNZ Card
29-Aug-2019	36.85	Rising Sun Hotel	ADJ	Peter Buchanan 43675 BNZ Card
29-Aug-2019	178.52	Seasons Bot Gdns	ADJ	Peter Buchanan 43676 BNZ Card
29-Aug-2019	12.81	Long Dragon Dumpling H	ADJ	Peter Buchanan 43677 BNZ Card
29-Aug-2019	29.89	Delaware North Compa	ADJ	Peter Buchanan 43678 BNZ Card
29-Aug-2019	21.68	Sq *south Melbourne Fi	ADJ	Peter Buchanan 43675 BNZ Card
29-Aug-2019	29.99	Delaware North Compa	ADJ	Peter Buchanan 43677 BNZ Card
7,136.49 YTD Total				