

Enhancement and quality control of fungi distribution data from Fungimap in the Atlas of Living Australia

Lyn Allison¹, Myriam Amiet-Knottenbelt¹ & Tom May²



¹Fungimap Inc; ²Royal Botanic Gardens Melbourne.



Westgate Park, Melbourne



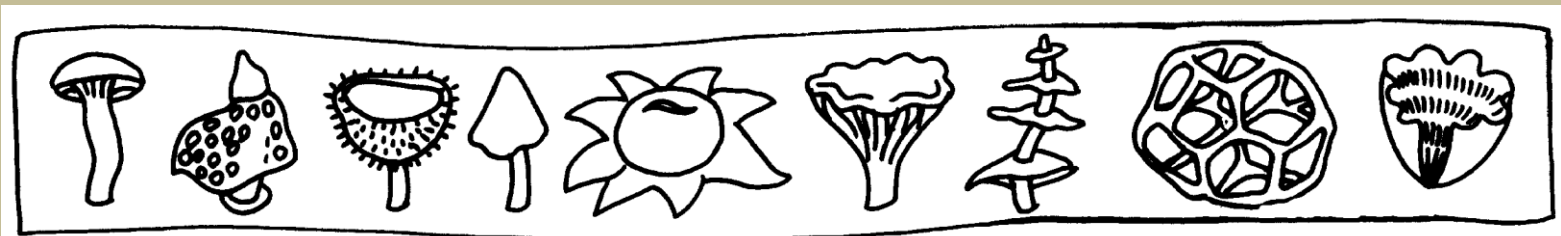


Fungi: the forgotten Kingdom



FUNGIMAP – Target species

- Readily recognisable in the field
- Some common, some rare, reps of most morphological groups
- Avoids difficult groups; *Cortinarius*, *Inocybe* and *Galerina*



Putting Australian fungi on the map

The Fungimap Guide to Australian Fungi

AGARICS – gills on underside of cap

Family Tricholomataceae

Austral Dripping Bonnet

Mycena austrororida

On decaying wood in wet forests. This tiny Bonnet has a short, white, very slimy stem which always has gluten accumulating in a thick layer at the base. The translucent-striate, convex cap can be white or brown, but characteristically has minute brownish dot-like scales in the centre.

Cap Diameter to 15 mm; convex or with depressed centre; white to brown with minute, brownish dot-like scales in the centre; dry; margin translucent-striate.

Gills Adnate to decurrent; widely spaced; white; various lengths.

Stem Central; length to 35 mm, diameter 2 mm; narrowing towards apex; white; slimy, thick gluten at base.

Spore print White.

Habit In groups and clusters; common, fairly widespread.

Substrate Decayed logs and branches; saprotrophic.

Habitat Wet forests.

Look-alikes The very rare, white, slimy Bonnet *Mycena yirukensis* is smaller and grows on the ground in leaf litter and bryophytes, not on wood.



89 records
Main fruiting period April–July



This variant of Austral Dripping Bonnet has white caps

AGARICS – gills on underside of cap

Family Tricholomataceae

Pixie's Parasol

Mycena interrupta

On dead wood in wet areas. This tiny, fragile agaric with a translucent blue cap is usually found in small colonies on the sides of large fallen logs and branches. White gills show through the top of the cap as lines. A curved, translucent stem is attached to the substrate by a bluish tufted basal disc.

Cap Diameter to 15 mm; convex; blue, slightly darker at centre, fading to pale blue or white; sticky when wet; faintly translucent-striate.

Gills Adnate to almost free; widely spaced; white with a blue edge; various lengths.

Stem Central; length to 20 mm, diameter to 3 mm; translucent white; dry; basal disc blue, tufted.

Spore print White.

Habit In small colonies; fairly common.

Substrate Sheltered sides of dead, wet, fallen logs and branches of native wood; saprotrophic.

Habitat Wet areas of native forests in southern temperate Australia.

Look-alikes None; it is the only blue *Mycena*. Blue-coloured **Pinkgills** (*Entoloma* spp., p. 36) have a pink spore print and do not grow on dead wood.



Mature caps of Pixie's Parasols and young deep-blue 'buds'



Pixie's Parasols usually grow on large fallen timber



515 records
Main fruiting period March–August

FUNGIMAP – records transfer to ALA

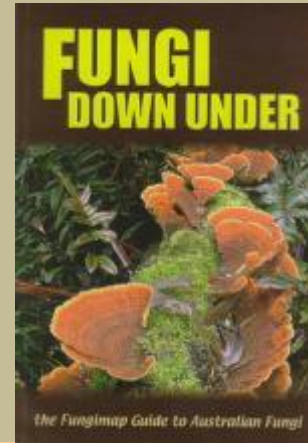
- Fungimap as filter
- Feedback stimulates more records
- 1000/year unsolicited
- Aware of pitfalls in data collection by citizen scientists

Unusual and rare species

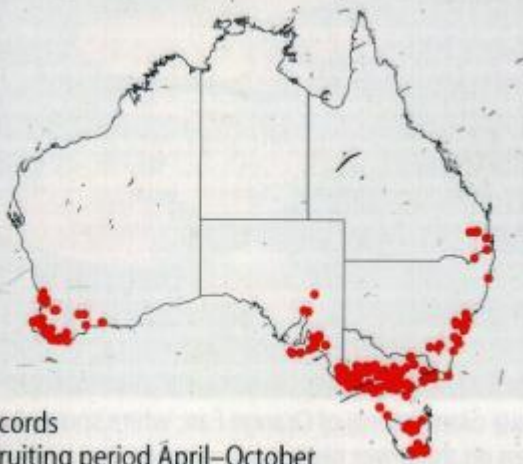


Distribution maps in fungi field guides

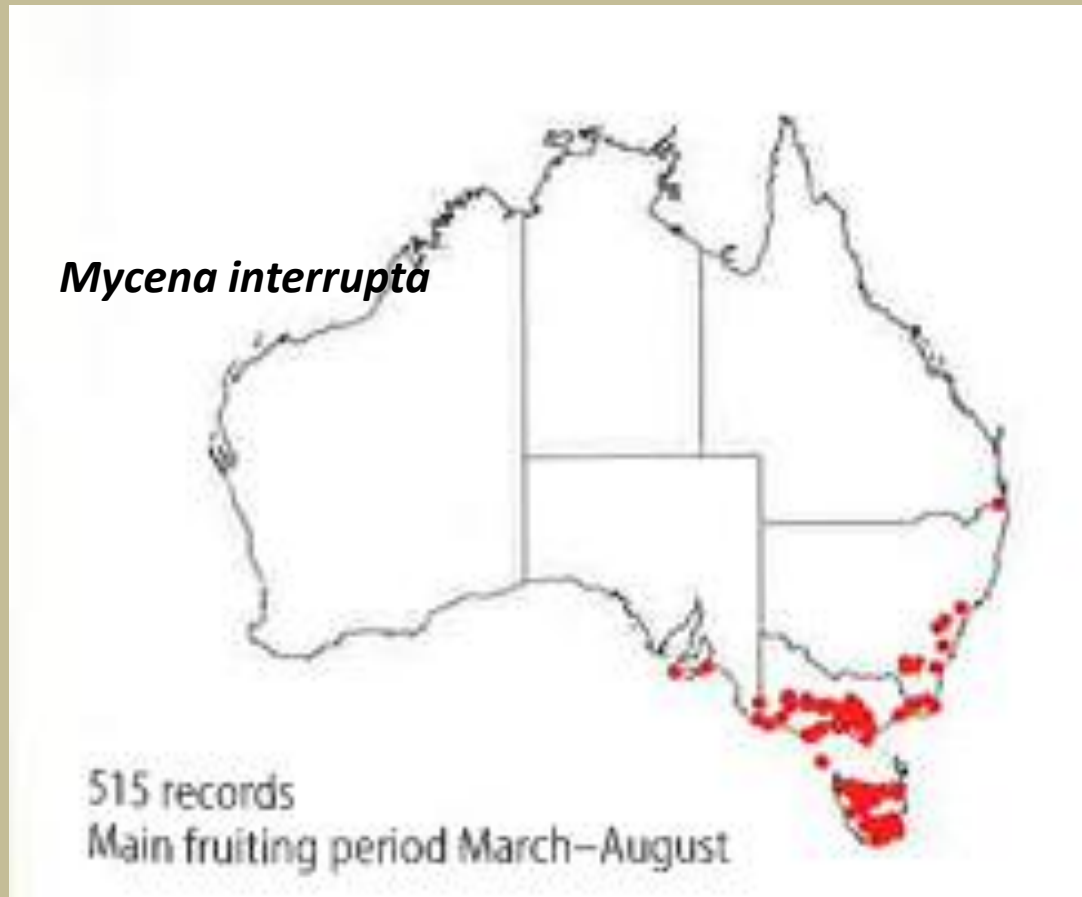
Fungimap CD-ROM (2001)



Fungi Down Under (2005)



Maps show what we know



and inspire further observations

Unprecedented access to point distribution data

- Databasing of herbarium specimens –
Australia's Virtual Herbarium: c. 160,000 records
- Fungimap: >120,000 records, mainly of target species
- **Atlas of Living Australia** – single portal



HERBARIUM RECORDS

Specimen search results

[Advanced search](#)


 159,881 results for **Kingdom: Fungi : Fungus**

Refine results

Taxon name (processed)

- *Abrothallus* (3)
- *Abrothallus bertianus* (4)
- *Abrothallus caerulescens* (1)

[choose more...](#)

Taxon name (provided)

- ? *Toninia* sp. (1)
- ? *catenella* (1)
- ? *cladonia* (1)

[choose more...](#)

Determination qualifier

- No issues (154,979)
- Matched to homonym (4,252)
- Species uncertain (398)

[choose more...](#)

Identified to rank

- genus (85,819)
- species (61,639)
- family (7,399)

[choose more...](#)

Kingdom

- Fungi (159,881)

Phylum

- Ascomycota (118,578)
- Basidiomycota (38,299)
- Chytridiomycota (39)

[choose more...](#)

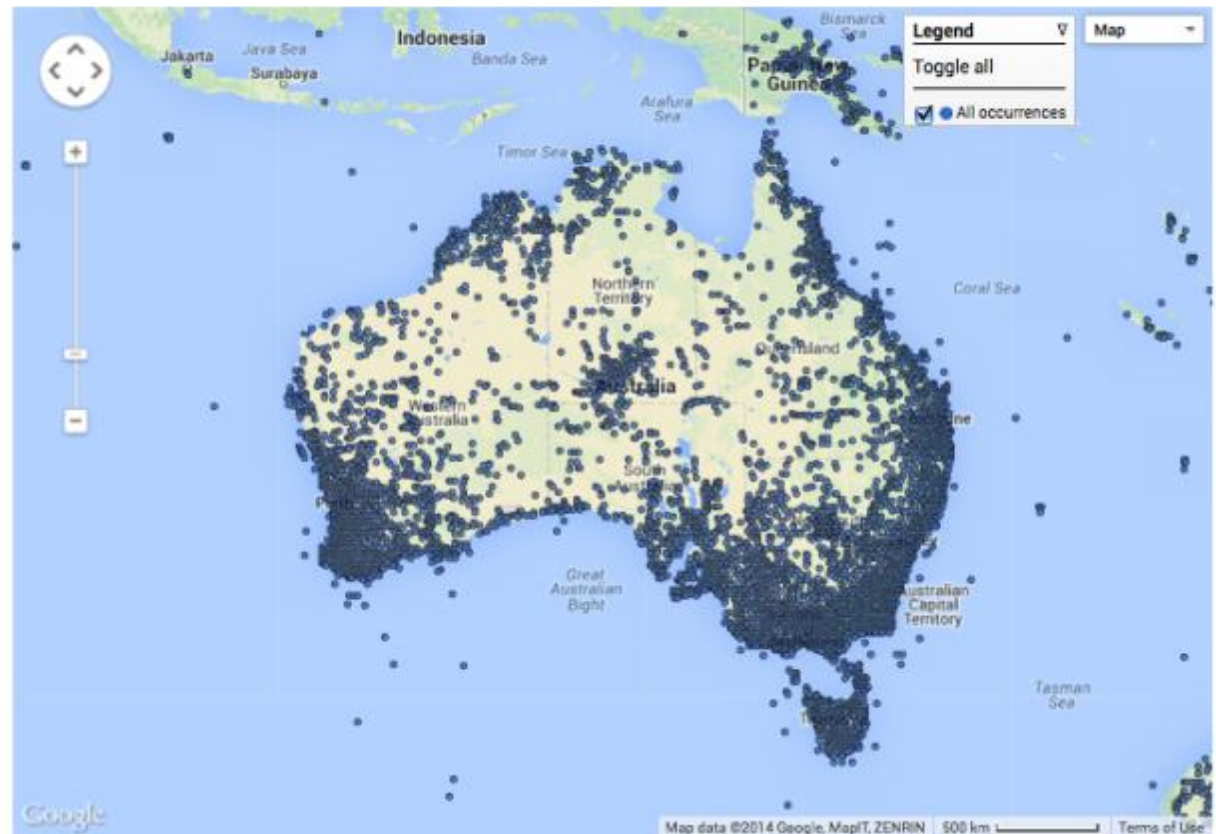
Class

- Agaricomycetes (34,896)
- Agaricostilbomycetes (4)

 Colour by:

 Environmental layer:

 Size: 2



Google

 Map data ©2014 Google, MapIT, ZENRIN | 500 km | [Terms of Use](#)

FUNGIMAP RECORDS



Advanced search

Occurrence search results

Quick search

120,691 results for fungimap

Refine results

Scientific name

- Abortiporus biennis (3)
- Aecidium eburneum (2)
- Aecidium soleniforme (1)
- choose more...

Common name (processed)

- (german: Kuhroehrling) (1)
- Amethyst Deceiver (2)
- Anemone Fungus (466)
- choose more...

Subspecies

- Amanita grisella luteolovelata (28)
- Cortinarius austrocyanites brunyensis (1)
- Hygrophorus involutus albus (21)
- choose more...

Species

- Abortiporus biennis (3)
- Aecidium eburneum (2)
- Aecidium soleniforme (1)
- choose more...

Family

- Agaricaceae (4,276)
- Amanitaceae (3,240)
- Amylocorticiaceae (676)
- choose more...

Lifeform

- Fungi (84,390)
- Protozoa (612)
- choose more...

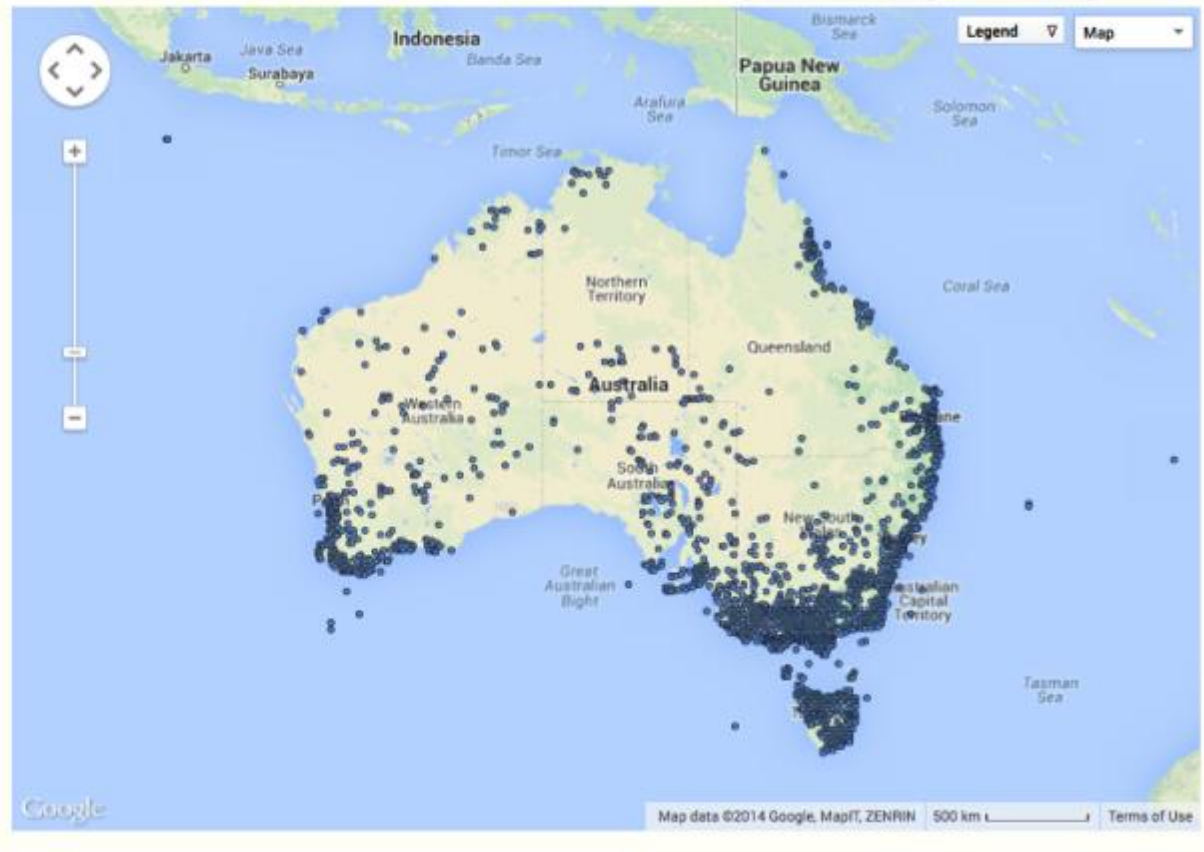
Records Map Charts Species images

Colour by: None

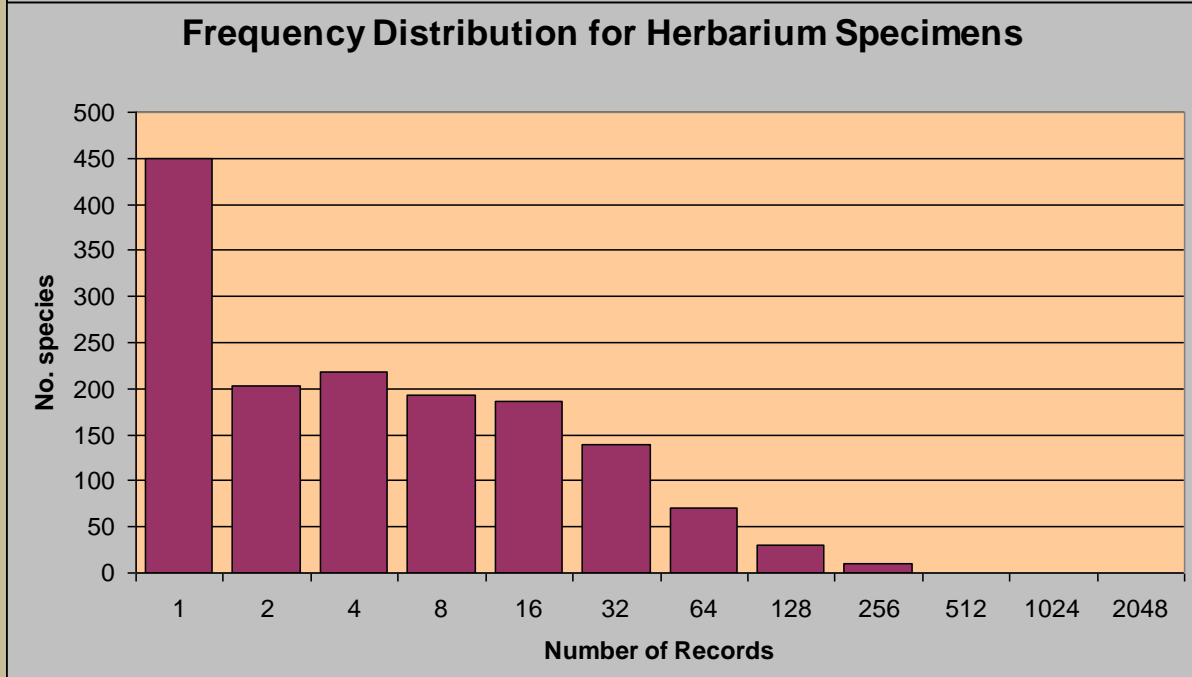
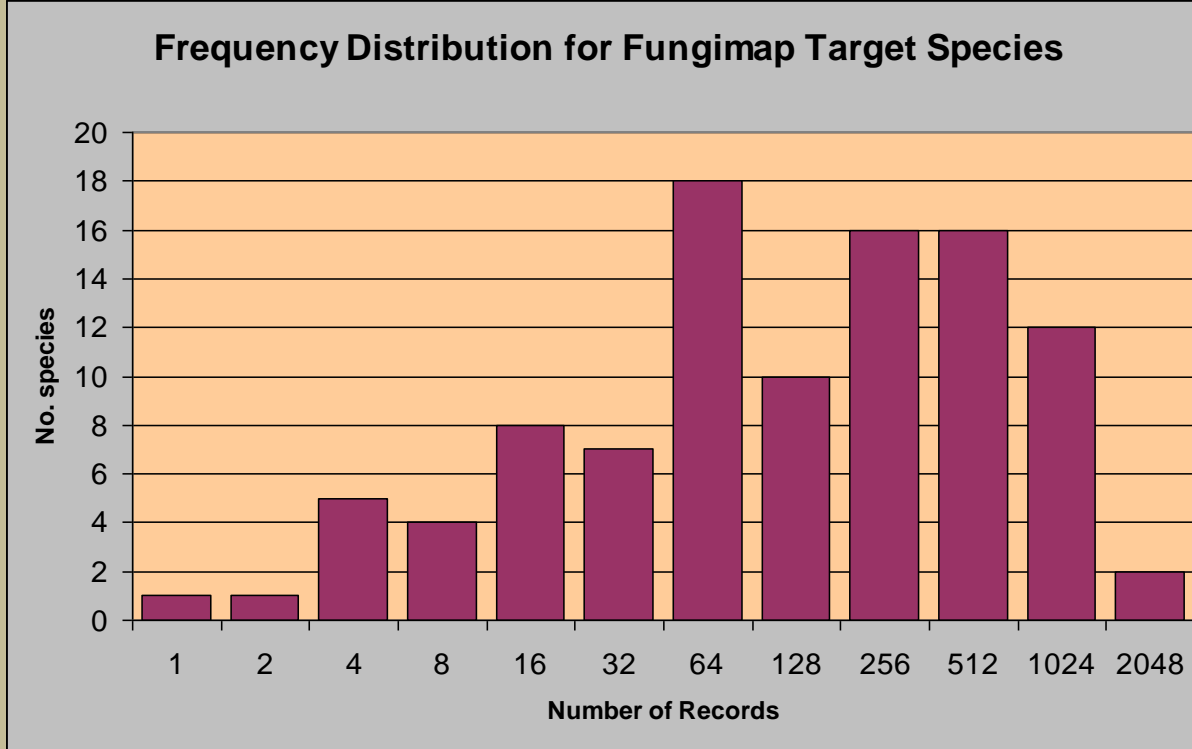
Size: 2

View in spatial portal

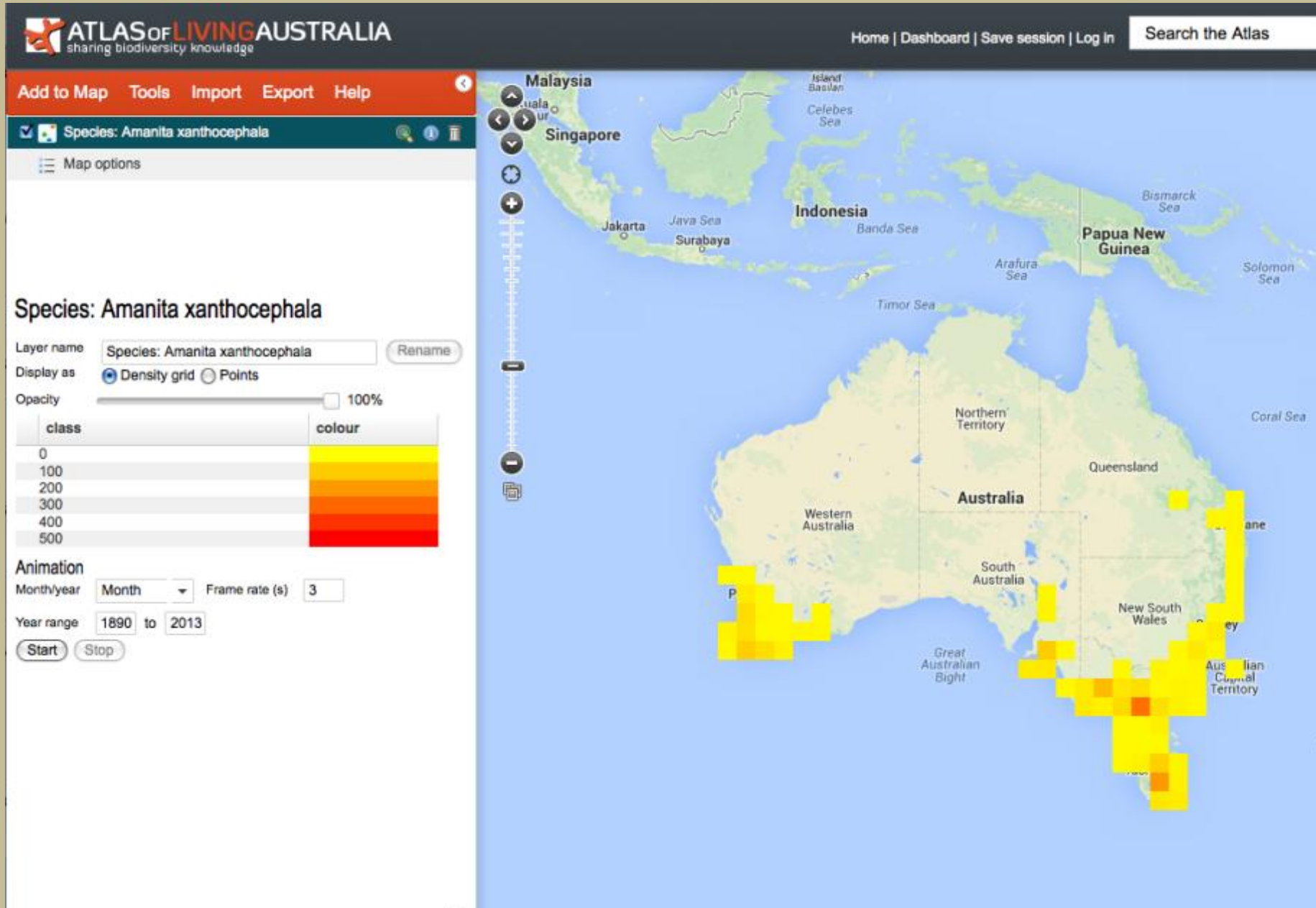
Download map



- **Fungimap target species** – most with numerous records
- Rare species can be identified with confidence
- **Herbarium specimens** – most species under-collected



Amanita xanthocephala – 1793 records



ENVIRONMENTAL NICHE MODELLING

BIOCLIMATIC MODELLING

The image shows a screenshot of the ATLAS of Living Australia website. At the top left is the logo with the text "ATLAS of LIVING AUSTRALIA" and the tagline "sharing biodiversity knowledge". Below the logo is a search bar with the text "Search the Atlas" and a search input field containing the word "fungi". To the right of the search bar is a magnifying glass icon. The background of the search bar area features a close-up image of a bird's head. Below the search bar is a section titled "Explore" with six grid items: "Australia's species" (with a lizard image), "Species by location" (with a dark landscape image), "Natural history collections" (with a green plant image), "Mapping & analysis" (with a map and data visualization image, circled in blue), "Data sets" (with a green plant image), and "FieldData software" (with a person using a tablet image).

ATLAS of LIVING AUSTRALIA
sharing biodiversity knowledge

Search the Atlas

fungi

Explore

- Australia's species
- Species by location
- Natural history collections
- Mapping & analysis
- Data sets
- FieldData software

ENVIRONMENTAL NICHE MODELLING

BIOCLIMATIC MODELLING

The screenshot shows a web browser window with the URL `spatial.ala.org.au/#`. The browser's address bar and menu bar are visible. The main content area displays the 'Atlas of Living Australia' logo and navigation options. A modal dialog box titled 'Add species' is open, allowing users to select record types and search for species. The dialog includes several radio buttons and checkboxes, a search input field, and a 'Next' button.

Spatial portal | Atlas of Living Australia - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Spatial portal | Atlas of Living Australia

spatial.ala.org.au/#

Most Visited Getting Started Login Successfully Latest Headlines the age The Age RBG Web Access Tasmanian Weather a... Google Scholar Esri Customer Care Po... Schol

ATLAS of LIVING AUSTRALIA
sharing biodiversity knowledge

Add to Map Tools Import Export Help

Map options

Map options

Base map

- Outline
- Minimal
- Normal
- Satellite

Add WMS Layer Download map Reset map

Add species

- Include spatially-valid records
- Include spatially-suspect records
- All species
- Search for a species by scientific or common name
 - Use the scientific names supplied with the records
 -
- For example: "Macropus rufus" or "Red Kangaroo"*
- Create new species list (log in required)
- Use existing species list
- Import points

Cancel Next

Amanita xanthocephala

Layer name: Amanita xanthocephala

Display as: Density grid Points

Facet: User defined colour



Red: 128

Green: 0

Blue: 128

Opacity: 100

Size: 3

Display spatial uncertainty as a circle

Animation: Month/year Month Frame rate (s) 3

Quick links: View metadata for "Amanita xanthocephala"

Step 3 of 5 - Prediction

1. Apply to an area

2. Select species

3. Select environmental layers

4. MaxEnt options

5. Set layer name

The colours against the layers are like traffic lights. Green implies the layer is uncorrelated to all selected layers, orange implies some correlation while red implies high correlation. As you select layers, the colours change to reflect correlation with already selected layers. For example a red layer implies high correlation with at least one selected layer while a green layer implies little or no correlation to any selected layer

Note: The correlations are currently based on full layer spatial extents and not any selected sub-area.

Select one or more environmental and/or contextual layers

The layer sets use layer 'short name': see [layers](#)

Add set a of layers:

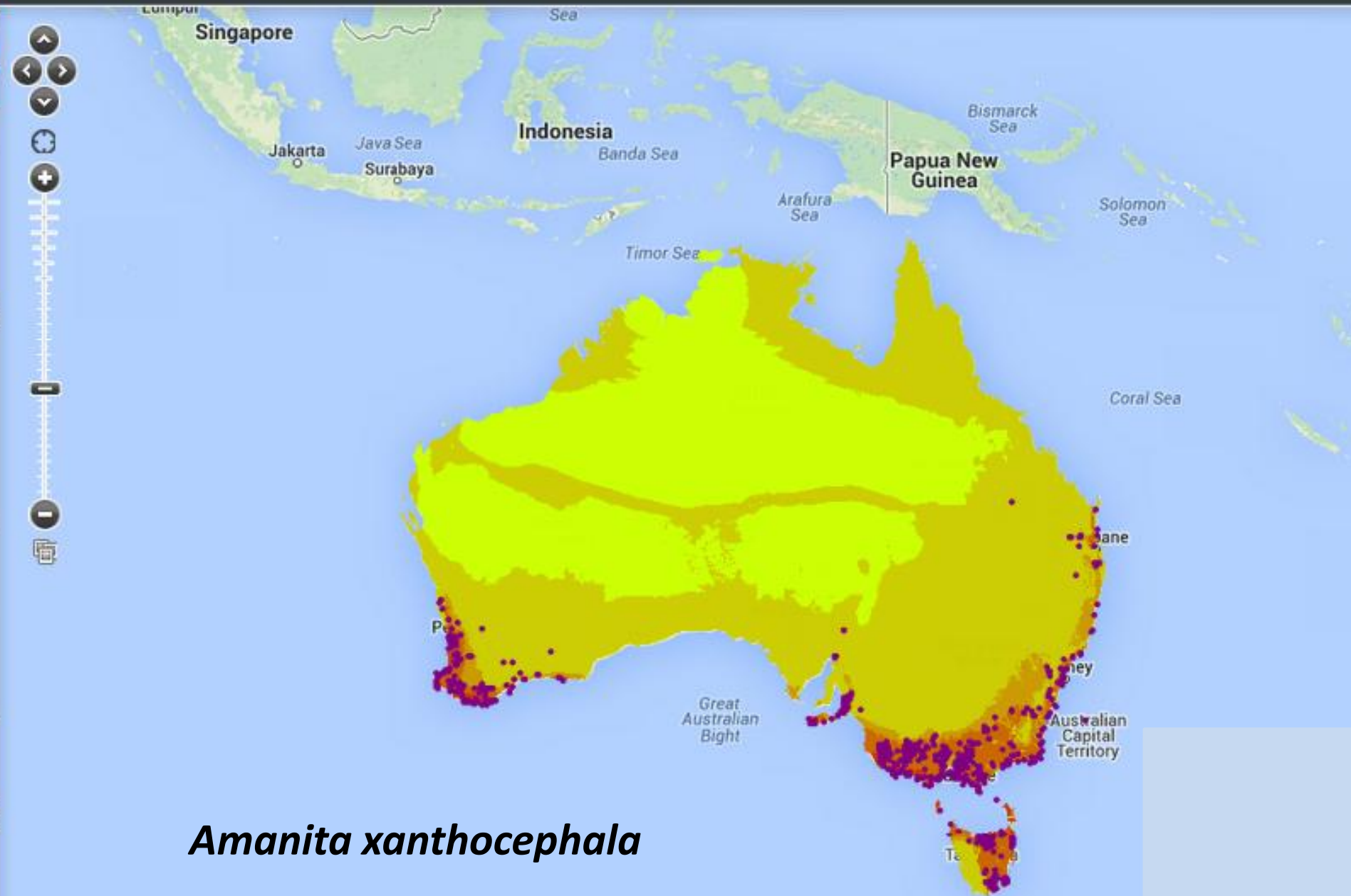
- Add from search:
- Paste a layer set
 - Import a layer set
 - Best 5 independent terrestrial environmental layers
 - Best 5 of Williams 1960 centred climate layers
 - Best 5 of Williams 2030 centred climate layers
 - My Scatterplot | 25/05/13 09:36:48 | 5 layers
 - Beenakia dacostae Classification | 25/05/13 10:14:47 | 6 layers
 - Amanita muscaria Classification | 25/05/13 10:24:52 | 6 layers
 - My Prediction 8 | 25/05/13 11:22:04 | 4 layers
 - My Scatterplot | 26/05/13 03:00:12 | 6 layers
 - My Prediction | 26/05/13 04:28:21 | 3 layers

Environmental layer category	Layer Name	Layers
<input type="checkbox"/> Area Management	Antarctic Protected Areas	1
<input type="checkbox"/> Area Management; Biodiversity	Areas for Further Assessment within the East Marine Region	1
<input type="checkbox"/> Area Management; Biodiversity	Australian Coral Ecoregions	1
<input type="checkbox"/> Area Management; Biodiversity	Australian Tropical Savanna	1
<input type="checkbox"/> Area Management; Biodiversity	Collaborative Australian Protected Areas Database (CAPAD) 2010	1
<input type="checkbox"/> Area Management; Biodiversity	Collaborative Australian Protected Areas Database (CAPAD) marine 2010	1
<input type="checkbox"/> Area Management; Biodiversity	Directory of Important Wetlands	1
<input type="checkbox"/> Area Management; Biodiversity	NRM Regions	1
<input type="checkbox"/> Area Management; Biodiversity	RAMSAR wetland regions	1
<input type="checkbox"/> Area Management; Coastal Wilderness	Atlas of Life in the Coastal Wilderness	1
<input type="checkbox"/> Area Management; Farming	Beef numbers	1
<input type="checkbox"/> Area Management; Farming	Dairy numbers	1
<input type="checkbox"/> Area Management; Farming	Dolomite (acidity)	1
<input type="checkbox"/> Area Management; Farming	Dolomite (physical)	1
<input type="checkbox"/> Area Management; Farming	Fallow practice - dominant (area)	1
<input type="checkbox"/> Area Management; Farming	Fallow practice - dominant (number)	1

Clear layers

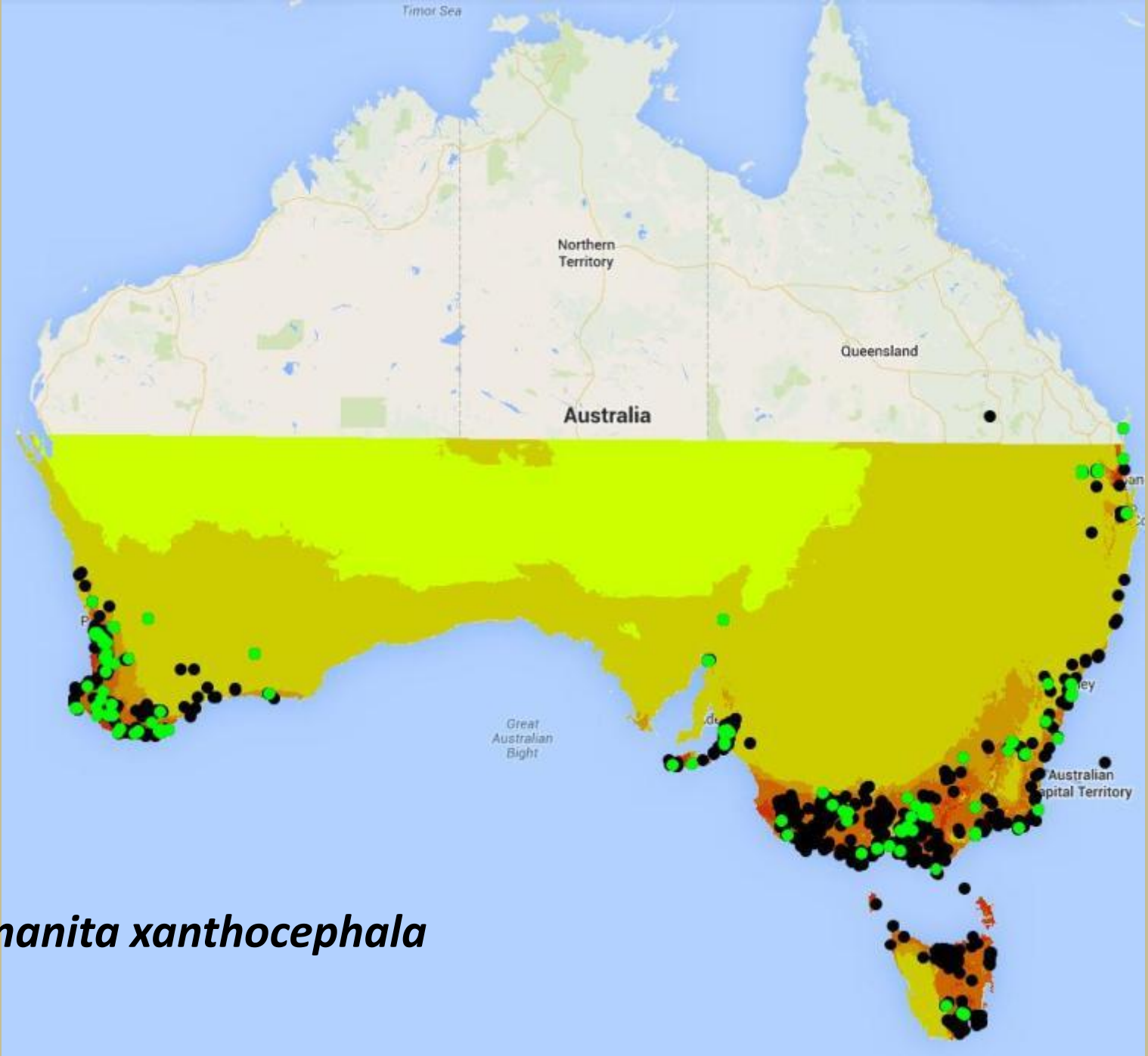
Export set

0 layers selected, INVALID: select at least 1 layers.

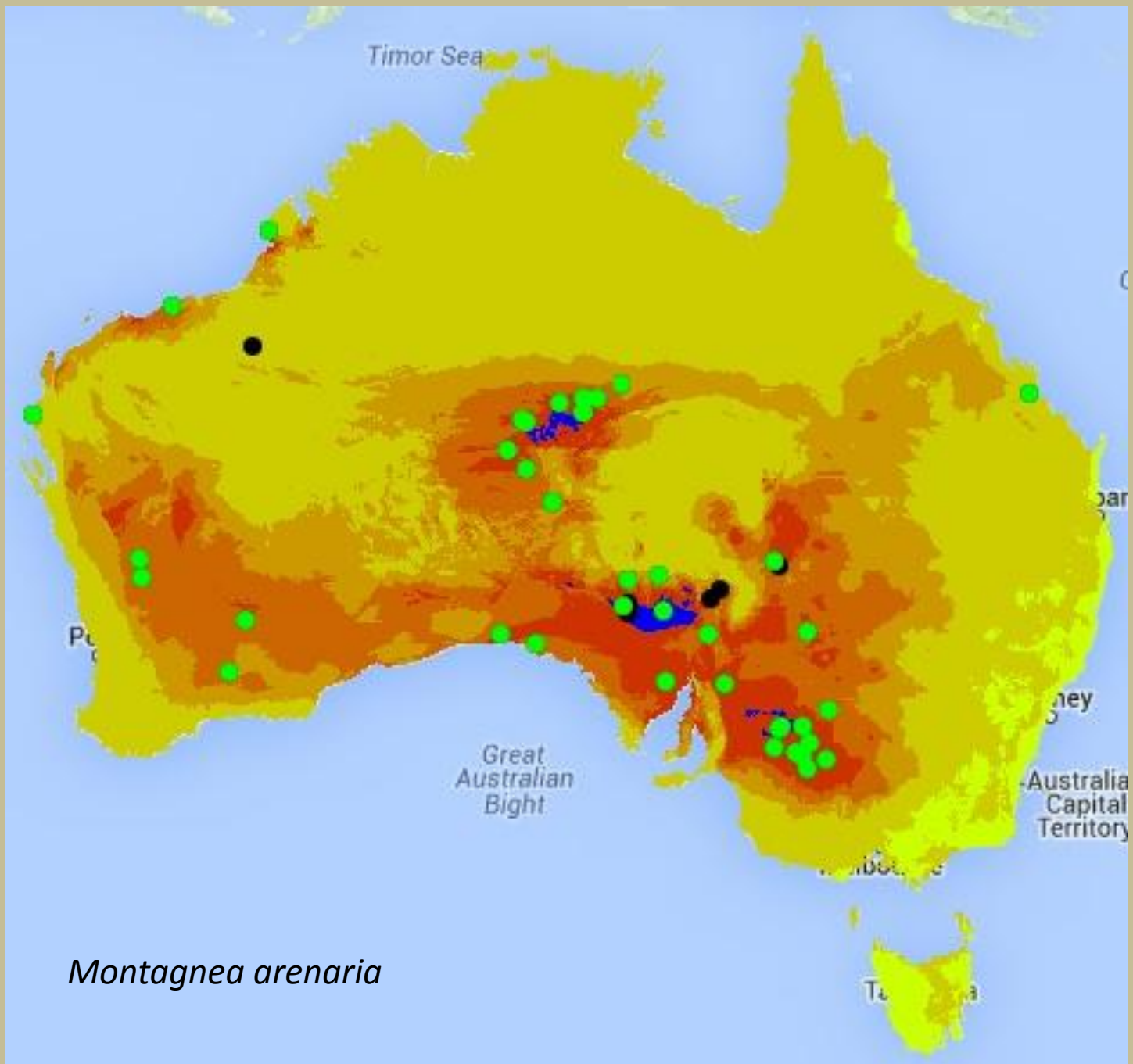


Black dots:
Fungimap
records

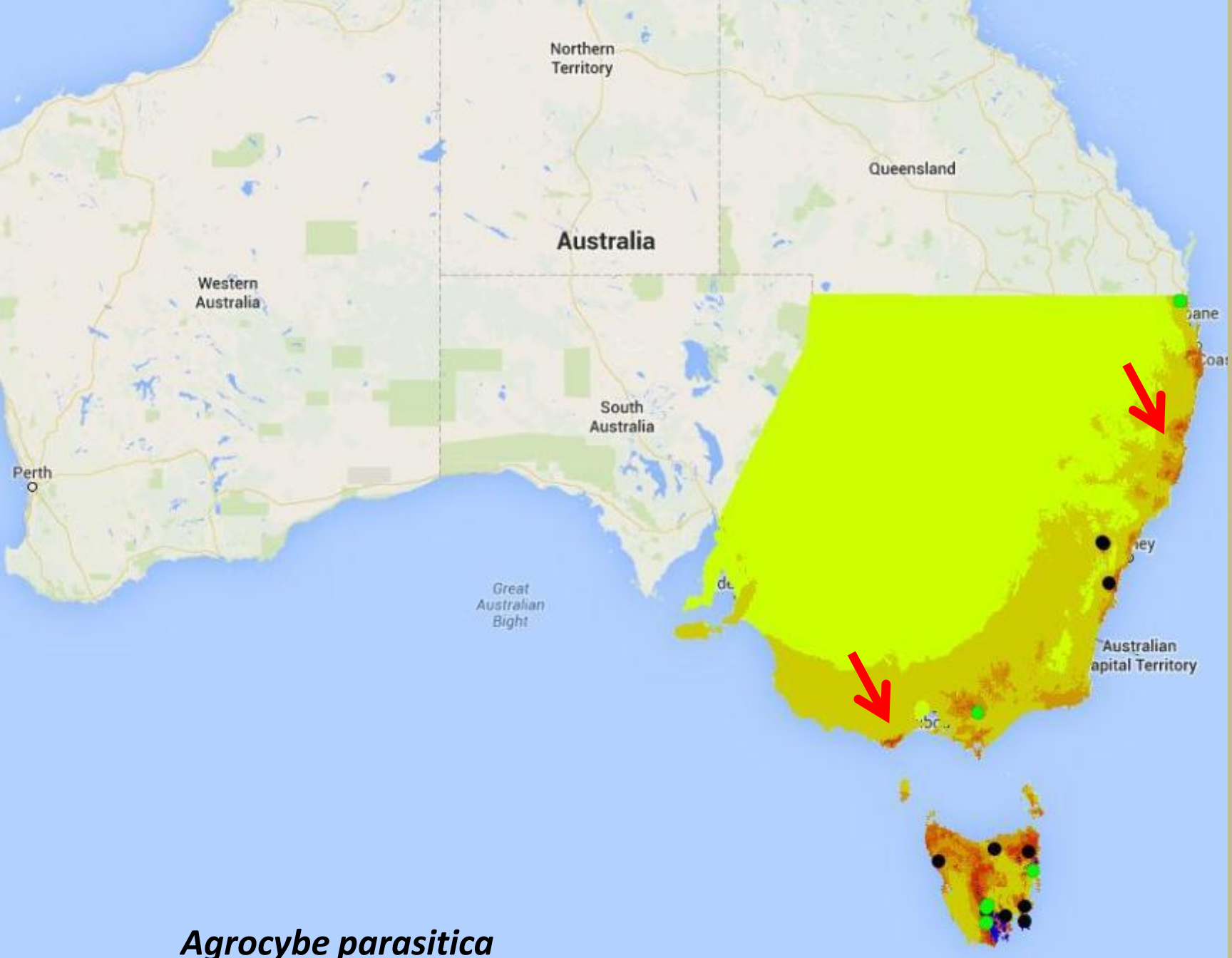
Green dots:
herbarium
specimens



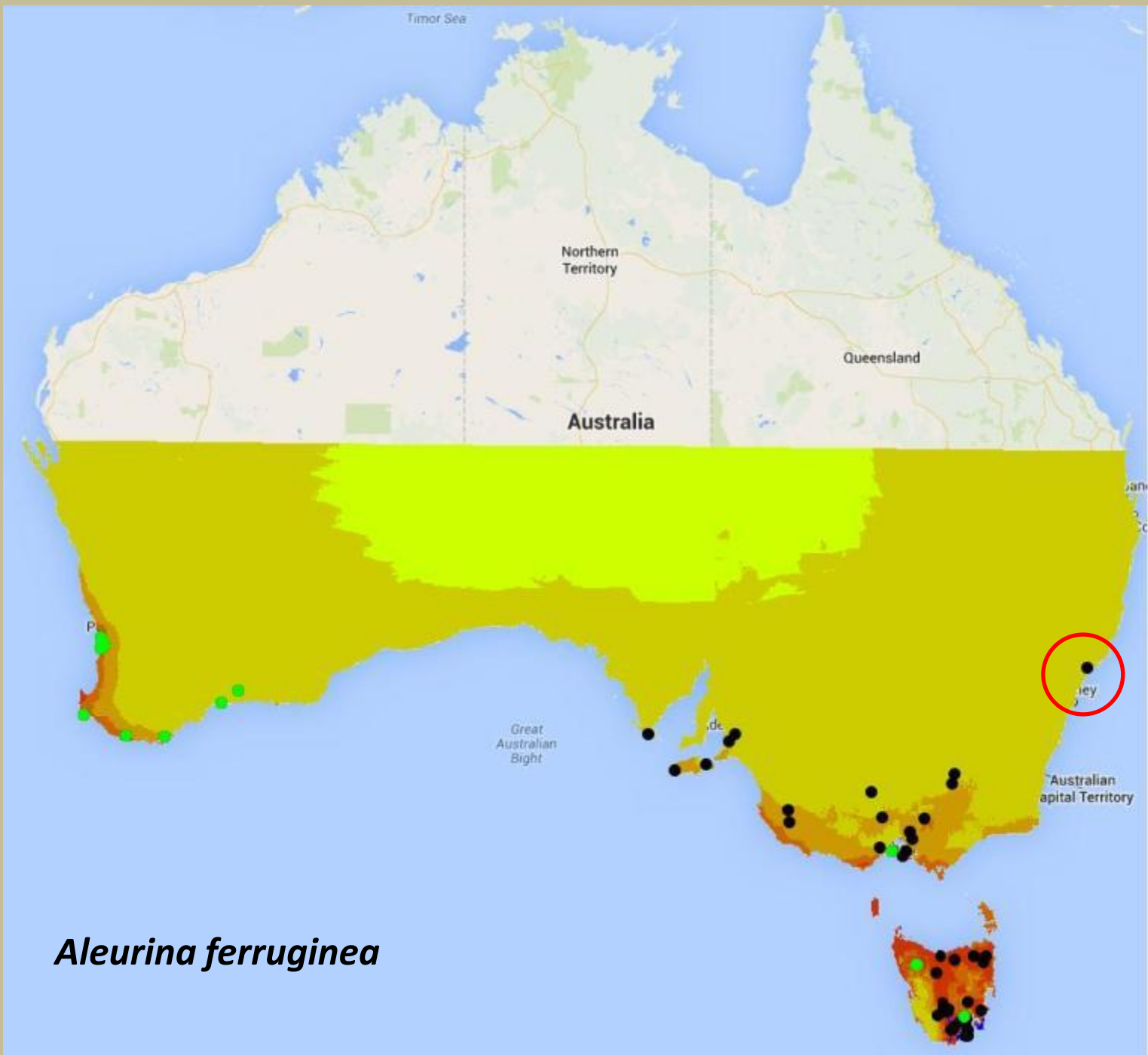
Amanita xanthocephala

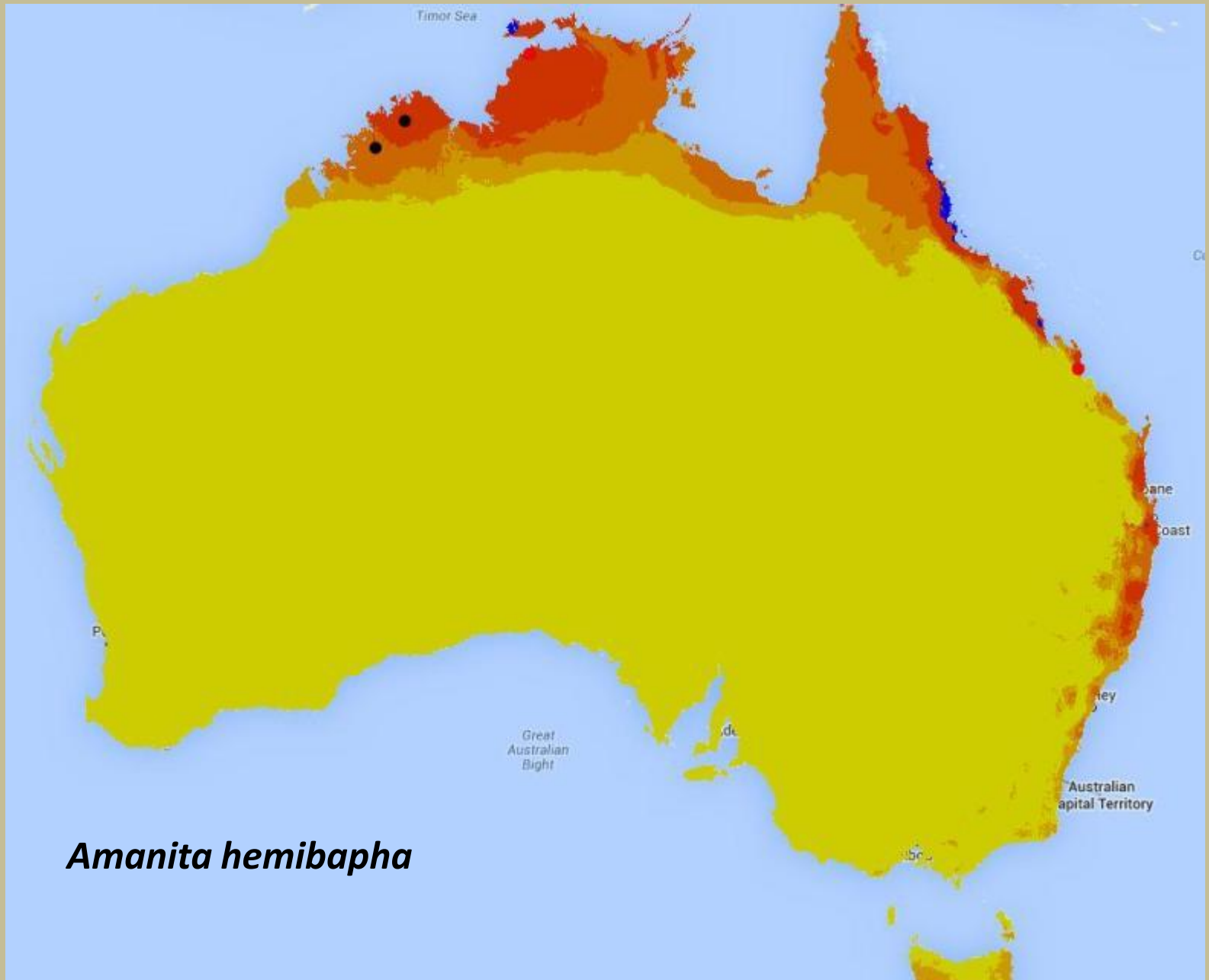


Montagnea arenaria



Agrocybe parasitica

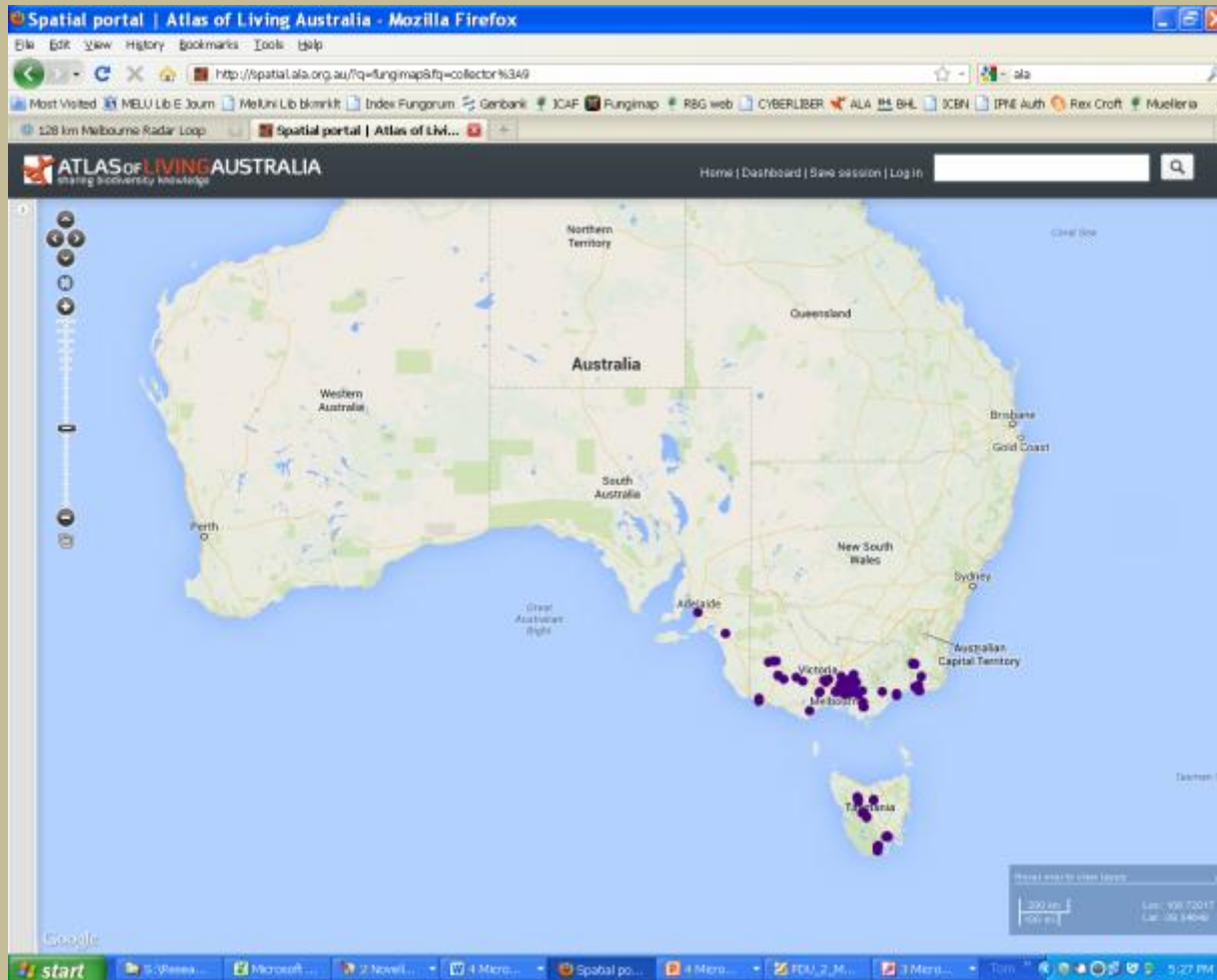


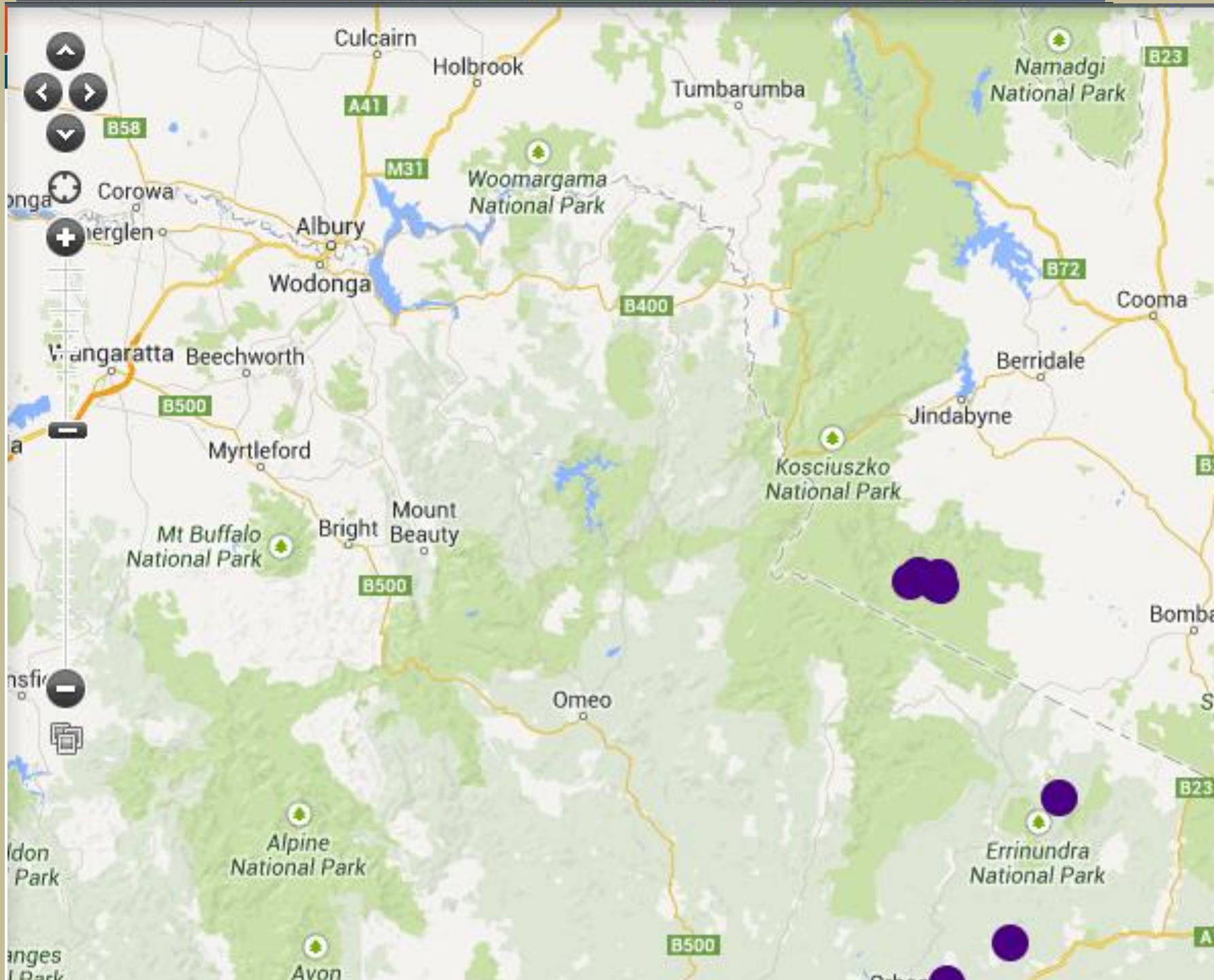


Amanita hemibapha

ALA – Data set: Fungimap

Refine results by: collector





Culcairn

Holbrook

Tumbarumba

Namadgi National Park

B23

B58

A41

M31

Woomargama National Park

Wodonga

Corowa

Merghen

Albury

Wodonga

B400

B72

Cooma

Wangaratta

Beechworth

Berridale

Jindabyne

B500

Myrtleford

Kosciuszko National Park

Mt Buffalo National Park

Bright

Mount Beauty

B500

B

nsfir

Omeo

Bomba

S

ldon Park

Alpine National Park

B23

Errinundra National Park

anges
Park

Avon

B500

A

Insights

- All records are valuable
- Precision of geocode is essential [e.g. +/- 100 m]
- Climate is a good predictor
- Good potential to build capacity with volunteers
- Mapping greatly increases capacity to check records and fill gaps