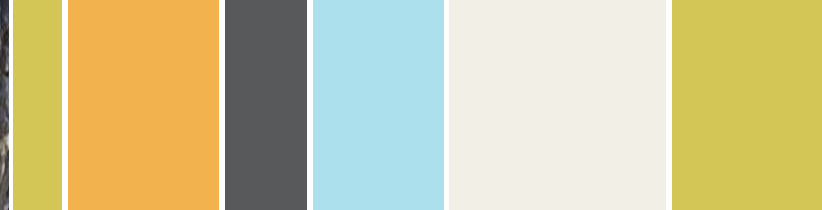


ACT NOW  
FOR THE FUTURE



Department of  
Environment and  
Conservation

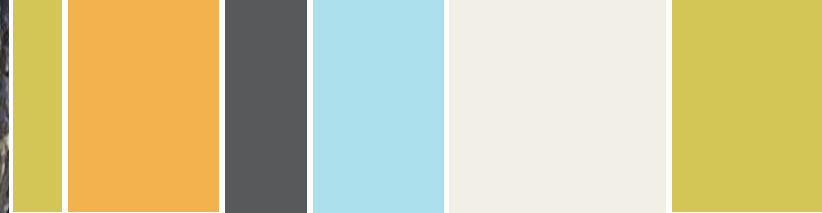
Our environment, our future



# DEC's Flora Conservation and Herbarium Program - an Overview

Kevin Thiele

Curator, Western Australian Herbarium



## Science Division Neil Burrows (Goldfields)

### Science Applications Paul Gioia (Swan)

Bioinformatics (Naturebank, Naturemap). Data integration, partnerships and science uptake.

### Science Support Margaret Byrne (Pilbara)

Work centre finance & budgets, administration, infrastructure, library. Vegetation Health Service.

### Biogeography

#### Steven van Leeuwen (Kimberley)

Patterning and inventory of biodiversity. CAR reserve system

### Landscape Conservation

#### Lachie McCaw (South Coast, Warren)

Ecology of ecosystems and communities. Landscape restoration & monitoring. Fire.

### Fauna Conservation

#### Keith Morris (South West)

Animal ecology, biology, genetics. Threatening processes including feral animals.

### Flora Conservation and Herbarium

#### David Coates (Wheatbelt, MidWest)

Plant ecology, biology & genetics. Threatening processes. Collections & Taxonomy

### Marine

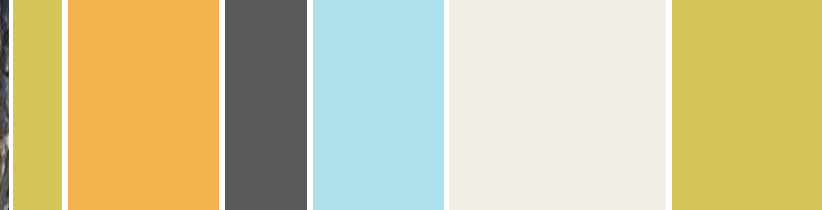
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### Observatory

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Astronomy information. Astronomy research. Astronomy education



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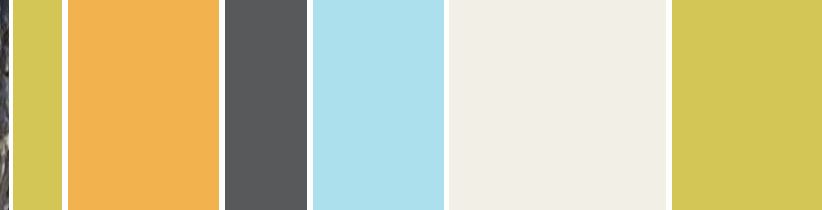
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*Phytophthora* detection, identification and advice

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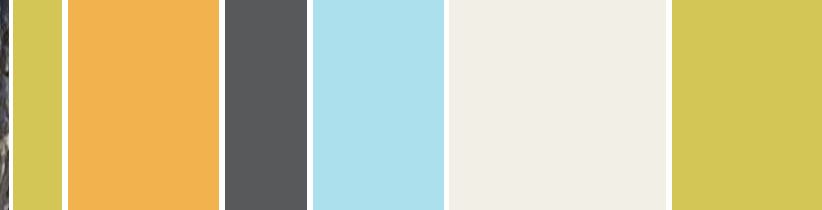
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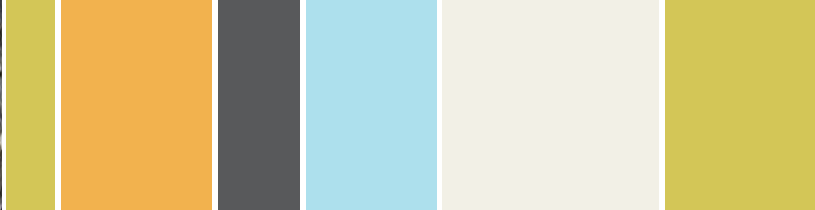
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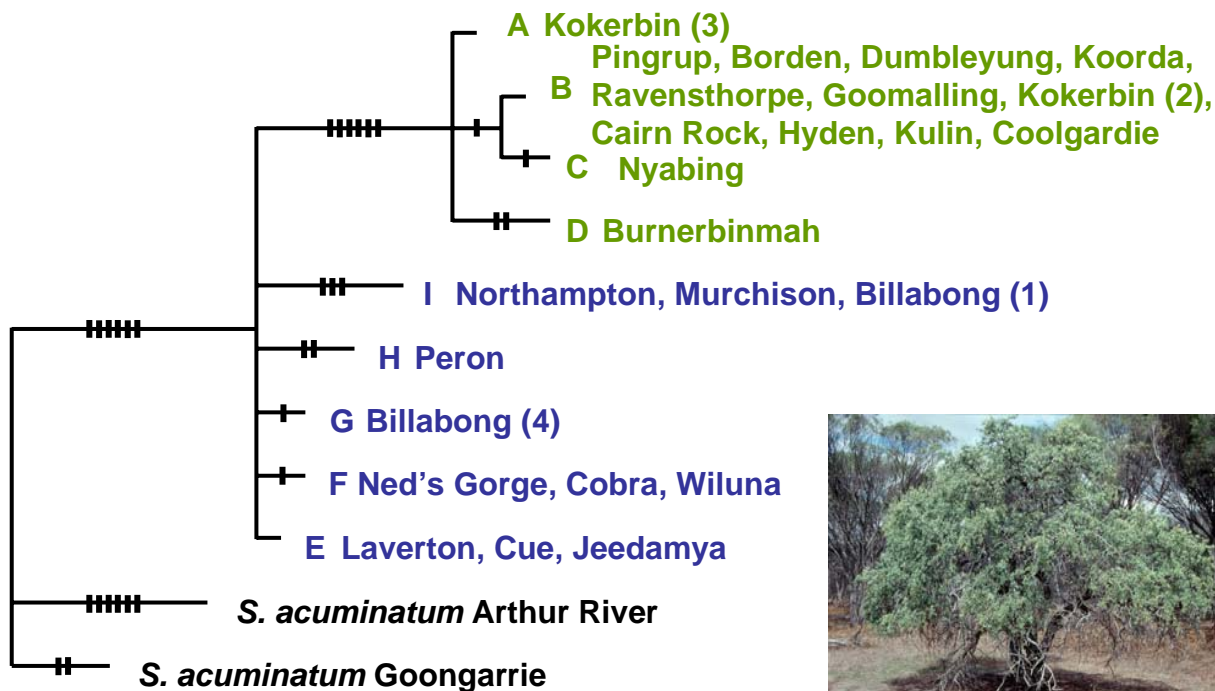
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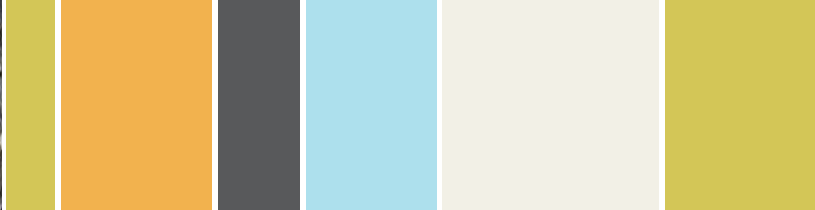




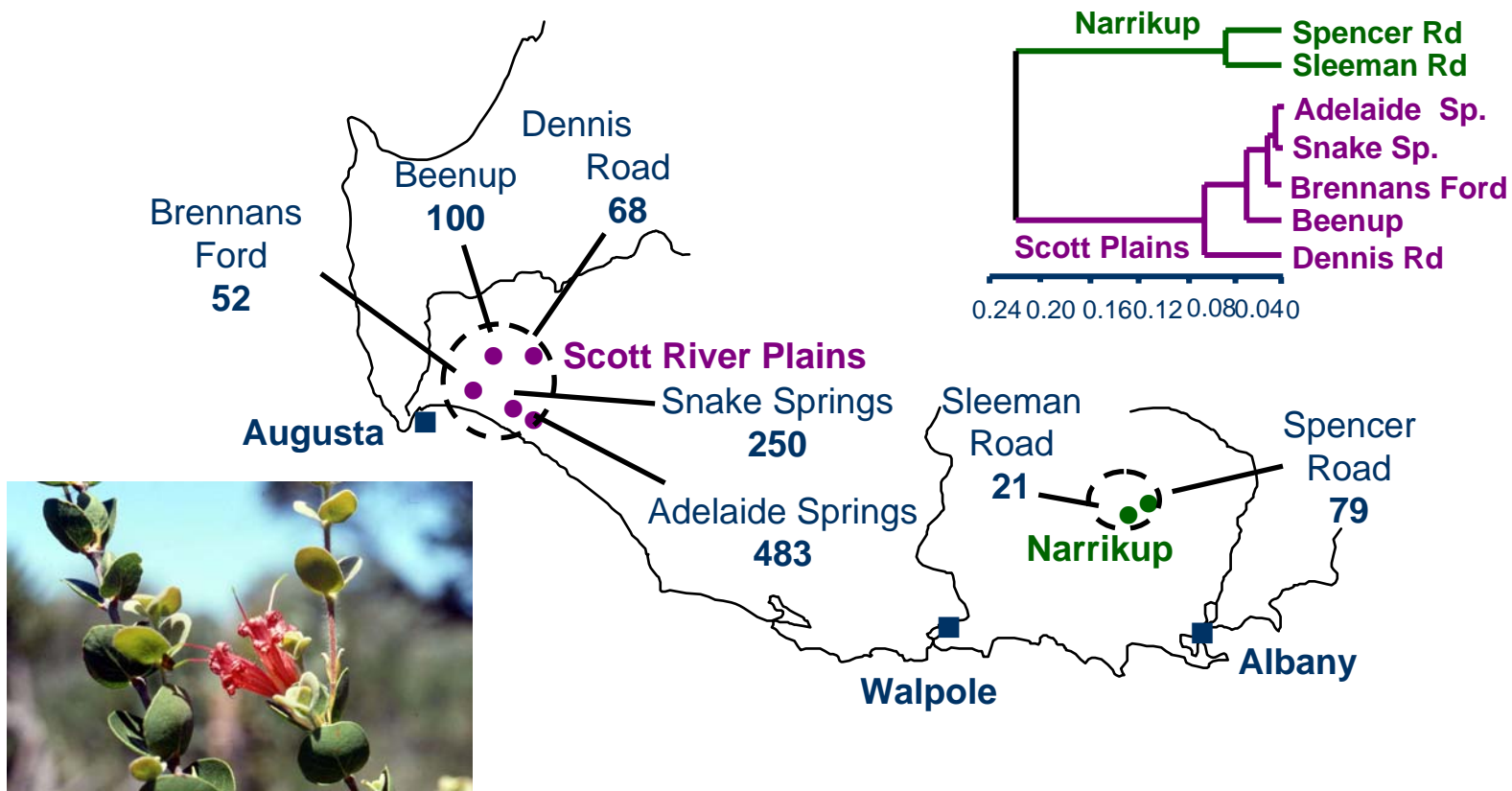
## Chloroplast DNA variation in Sandalwood (*Santalum spicatum*)

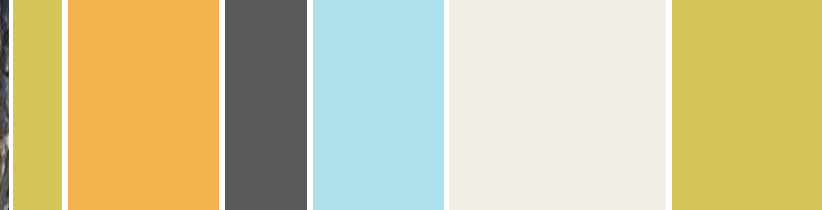
Two distinct lineages derive from historical fragmentation (c. 1Mya)



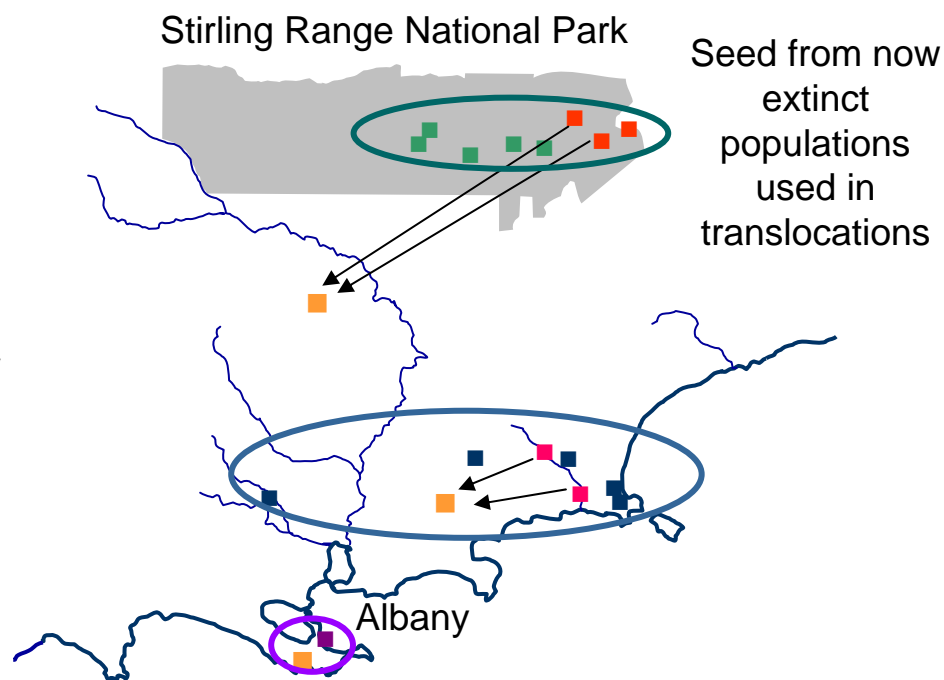
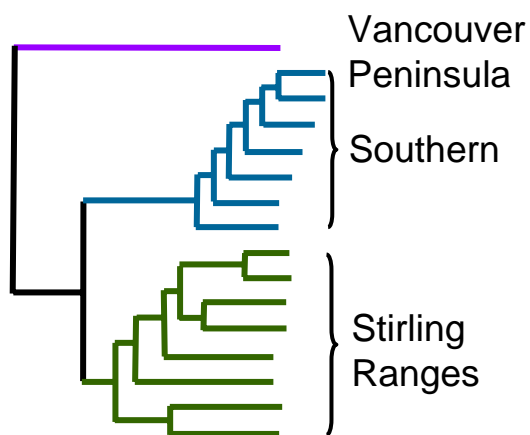


## Genetic relationships between populations of the endangered *Lambertia orbifolia*

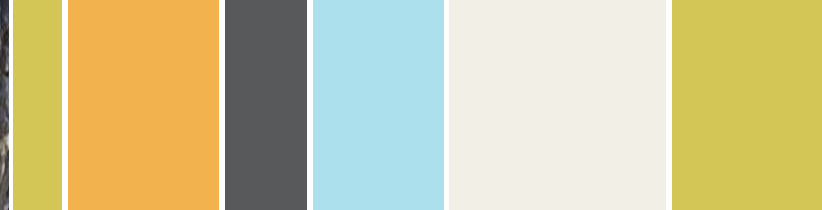




## Microsatellite variation and translocation of the critically endangered *Banksia brownii*







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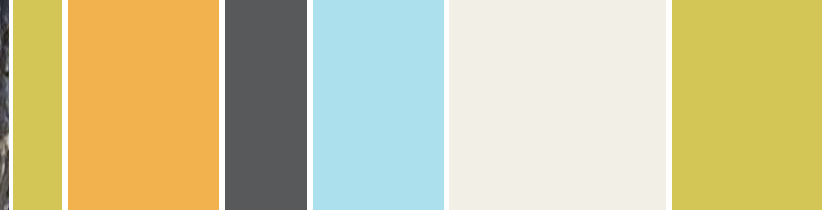
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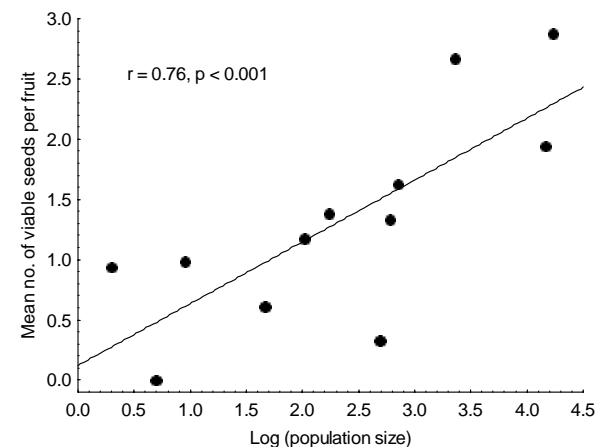
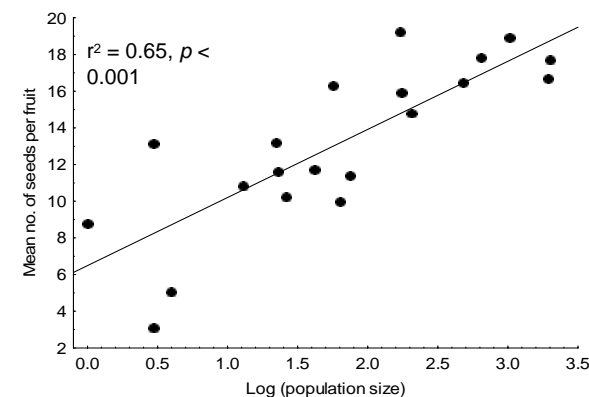
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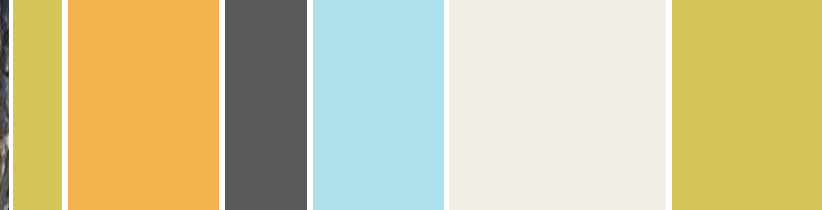


## Population size, seeds set and gene flow in *Calothamnus quadrifidus* and *Eucalyptus wandoo*



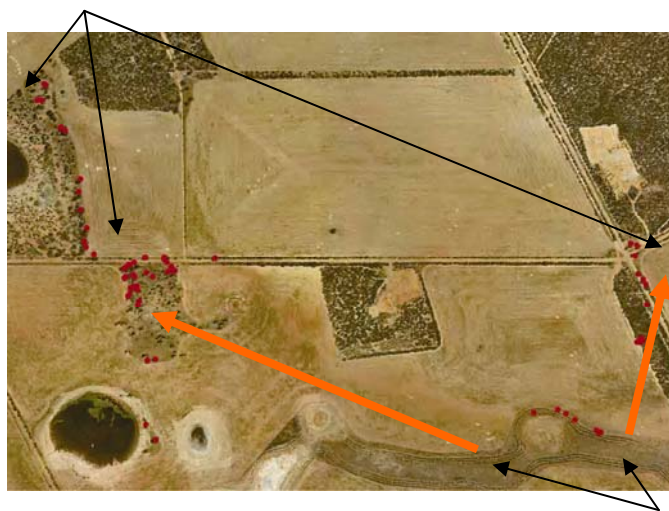
As populations get smaller:

- Fewer seeds produced per fruit (increased seed abortion)
- Thresholds of size (100-200 plants?)
- Increased inbreeding depression



## Pollen dispersal in *E. loxophleba* determined using DNA microsatellites

Natural *ssp. supralaevis*

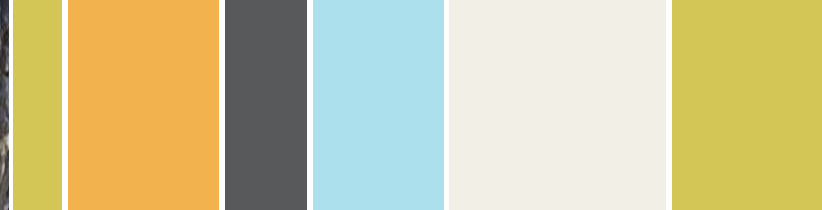


Planted *ssp. lissophloia*

Pollen dispersal over 2 km from  
planted populations into natural  
populations







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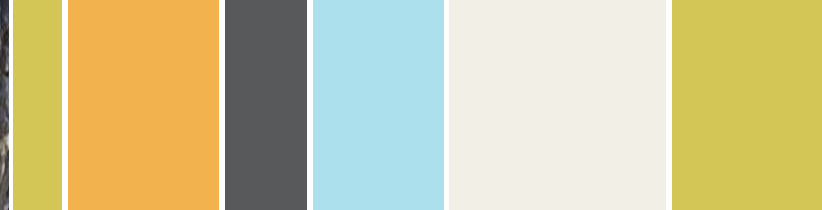
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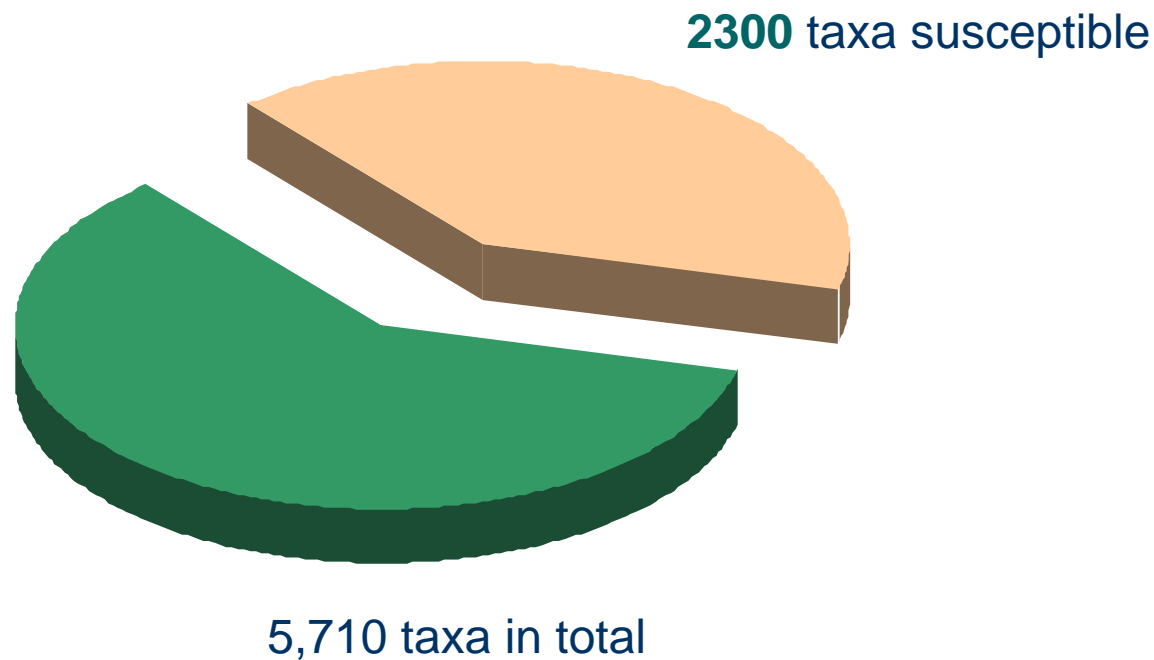
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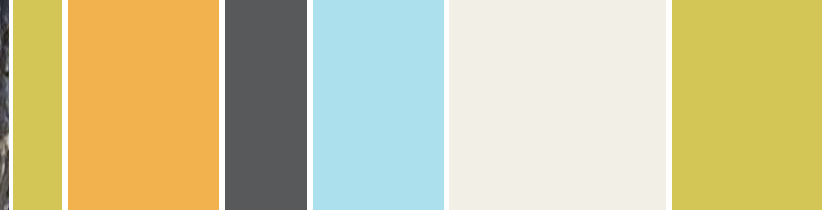






## Susceptibility of plants in the SW Botanical Province to *Phytophthora*





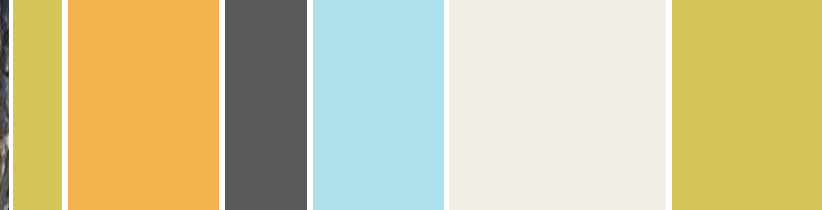
## *Banksia montana* in the Eastern Stirling Range montane thicket and heath community



Highly susceptible to *Phytophthora*

- Total plants: 51
- No recruitment - biologically extinct?
- Successful seed orchard established
- One of ten species on the verge of extinction in the Stirling Ranges





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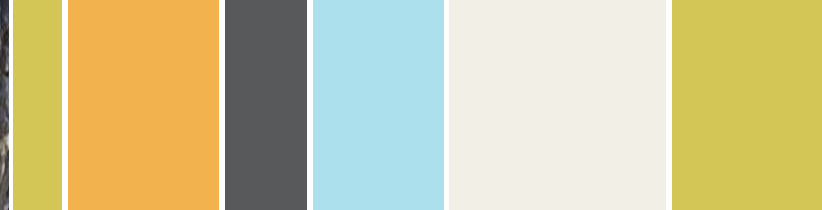
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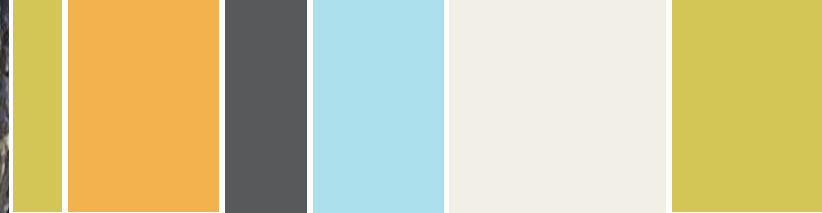
**RESEARCH EXPERTISE**





## Translocations of 55 critically endangered flora currently underway



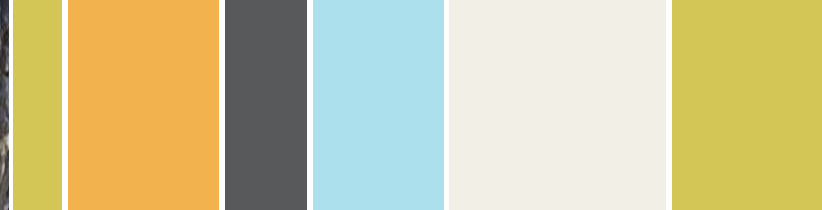


## WA is the only place in the world to achieve the Global Strategy for Plant Conservation Target 8 for 2010

- 70% of WA threatened flora in *ex situ* conservation (target 60%)
- 13% used in reintroductions (target 10%)







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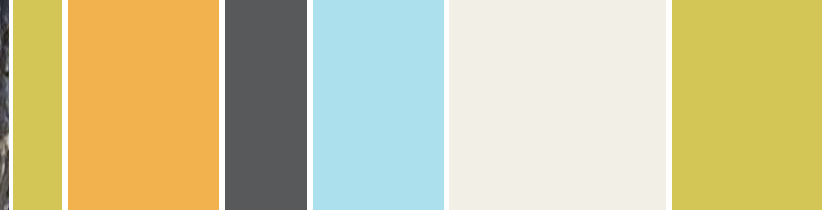
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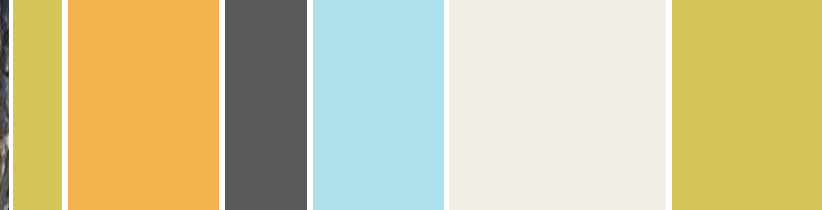


## WA Threatened Flora Seed Centre, part of the Millennium Seed Bank



- Established 1993 to focus on *Phytophthora*-threatened taxa
- Subsequently broadened to target all Priority Flora and DRF (2813 taxa)
- 1382 taxa, 2283 accessions
- 283 threatened taxa (DRF)





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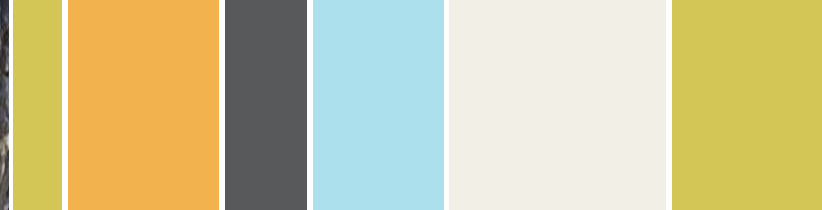
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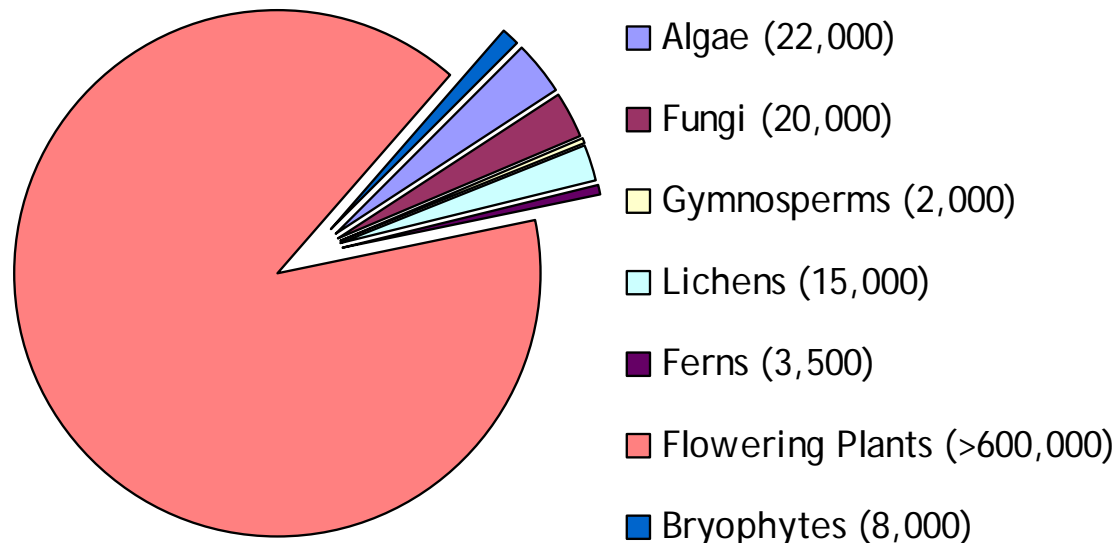




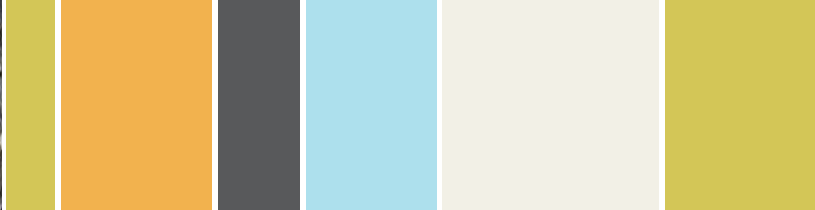
## The State Collection: c. 700,000 specimens of plants, algae and fungi



92% of specimens are from WA



c. 25,000 new specimens p.a. (4.5% p.a. growth)



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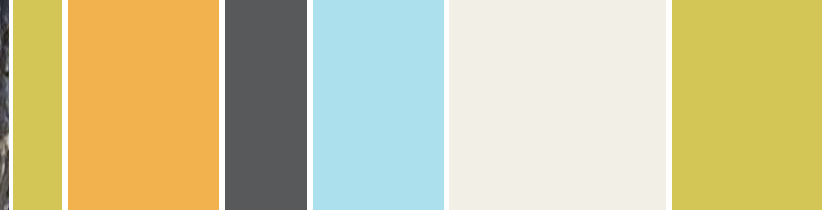


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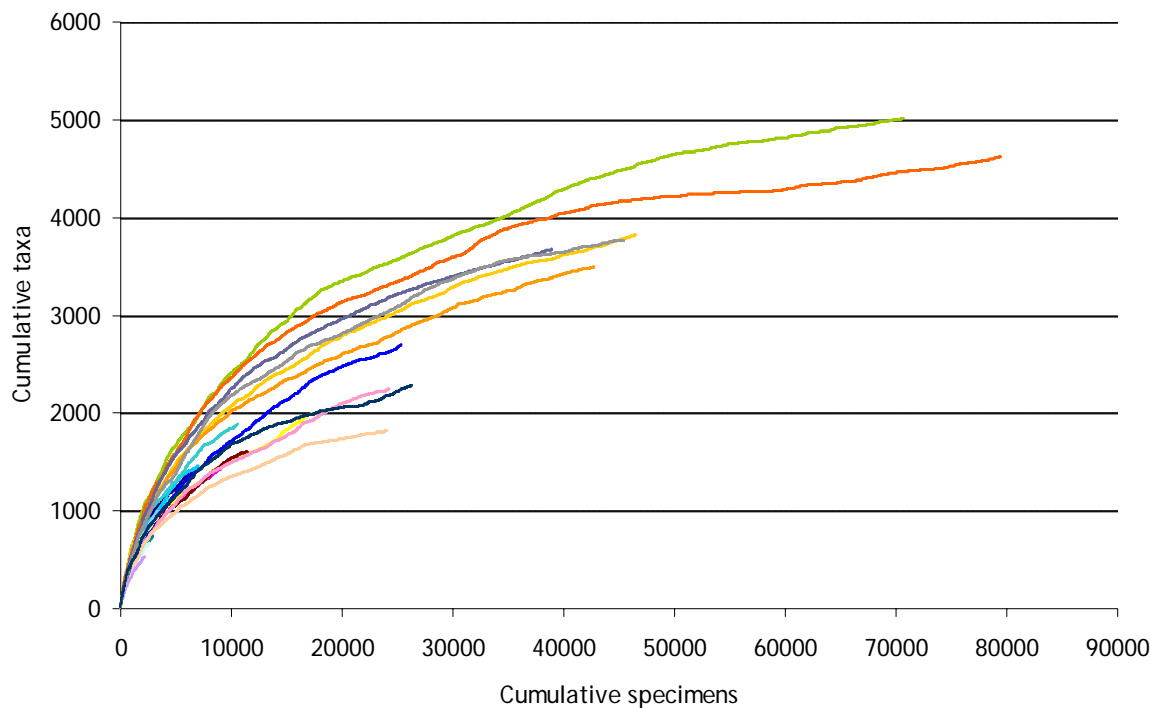


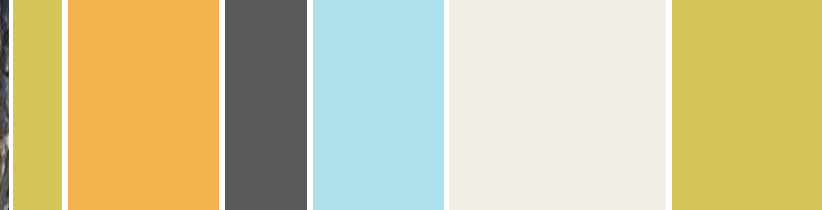
### Curation:

- Accessioning of new specimens
- Mounting and maintenance of specimens
- Insect and pest control
- Maintenance of taxonomic currency
- Specimen exchange and loans
- Management of volunteer program

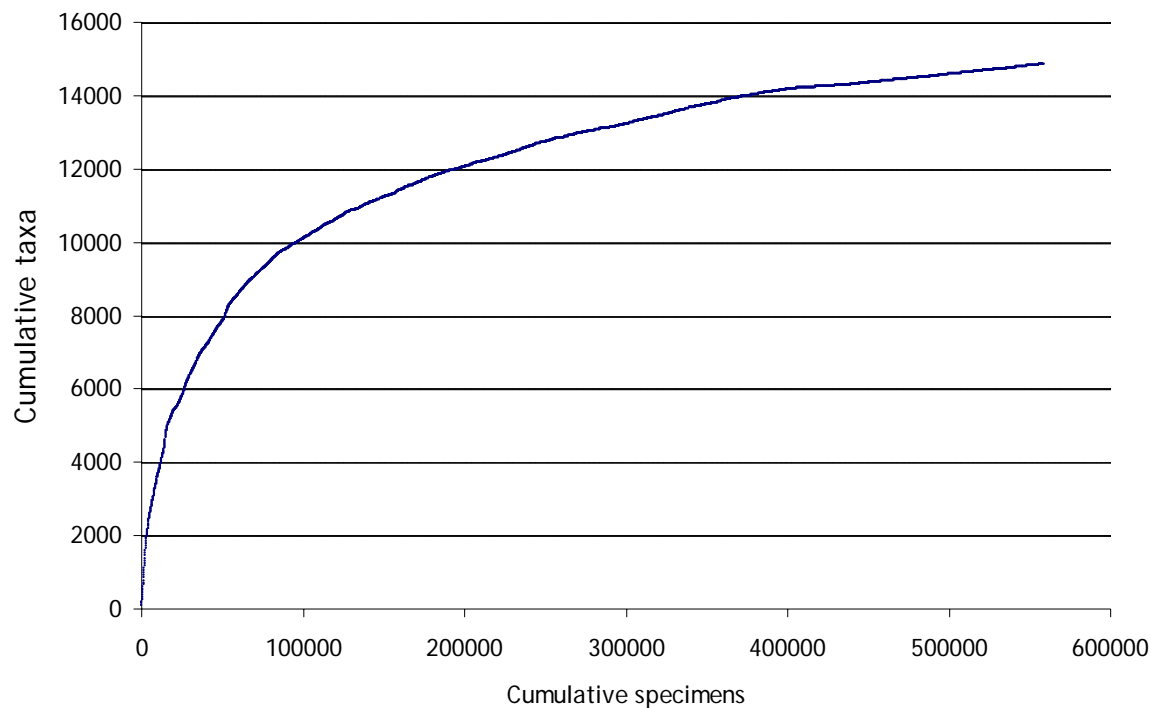


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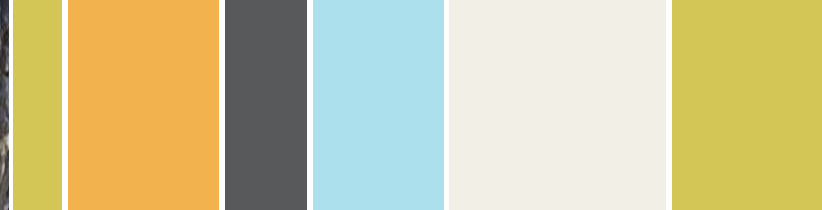




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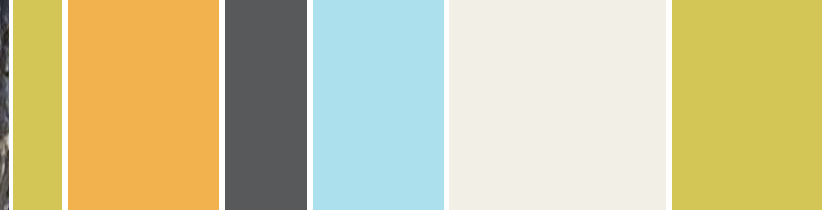
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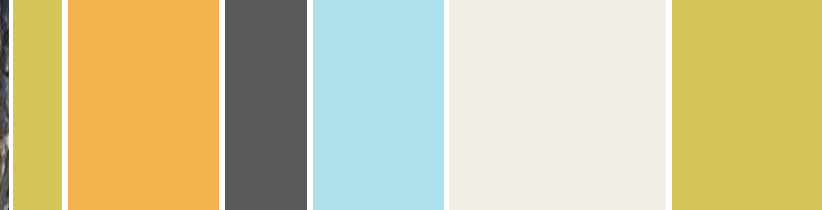
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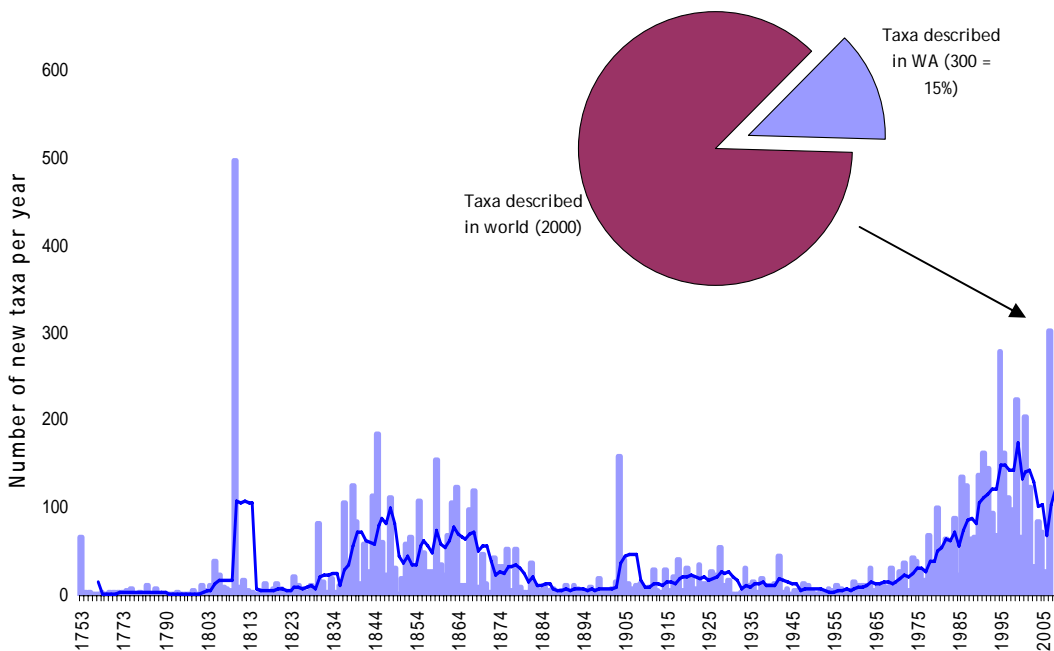
## Taxonomic research



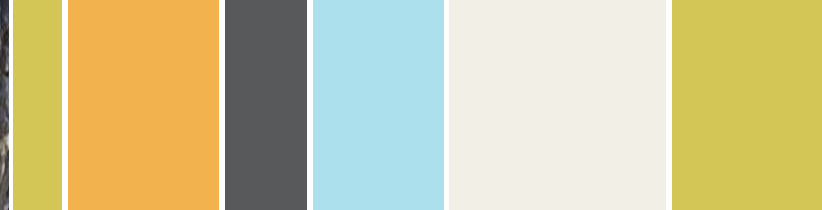
- Identification (assigning specimens to taxa)
- Discovery (new species and other taxa)
- Naming and scientific description of new taxa
- Maintaining scientific standards & authority
- Phylogeny and classification



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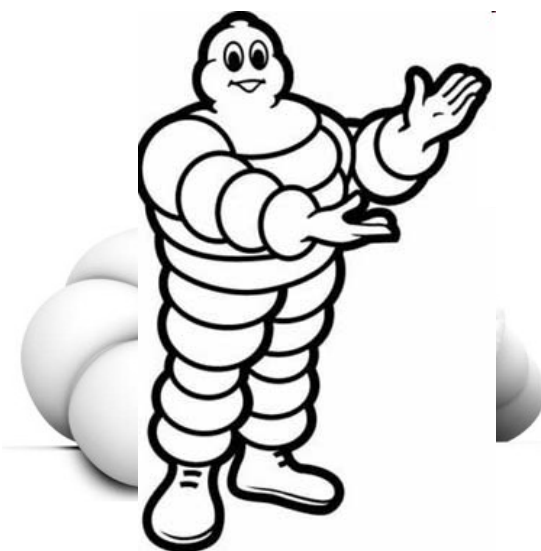




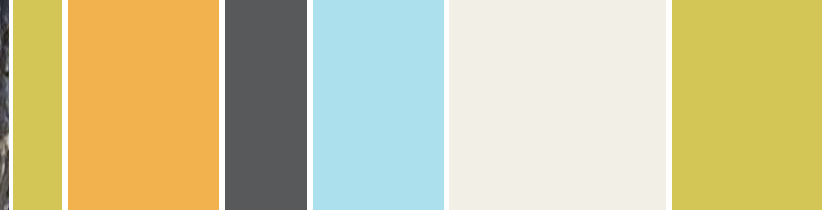


## Taxonomic research

*Tecticornia bibenda* (a world Top 10 species for 2007)

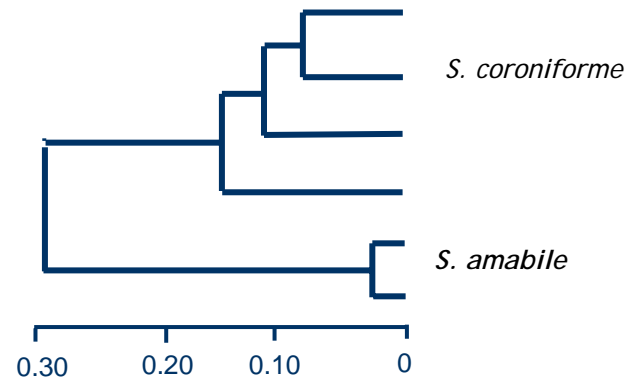
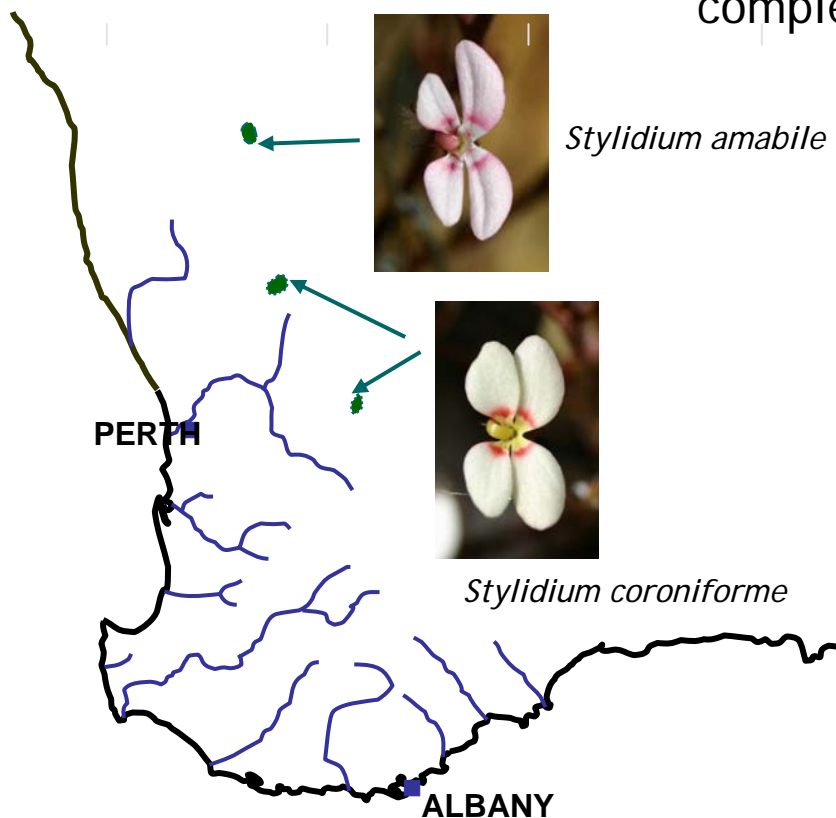


Bibendum, the  
Michelin Man™

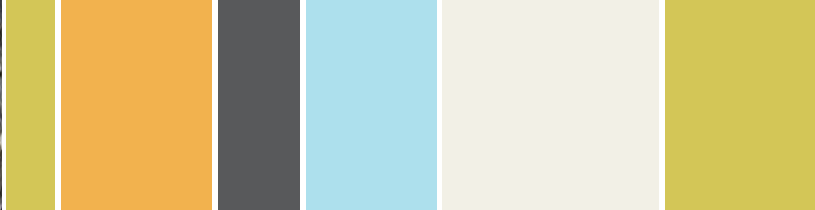


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Molecular studies confirm a new species in the *Stylidium coroniforme* complex

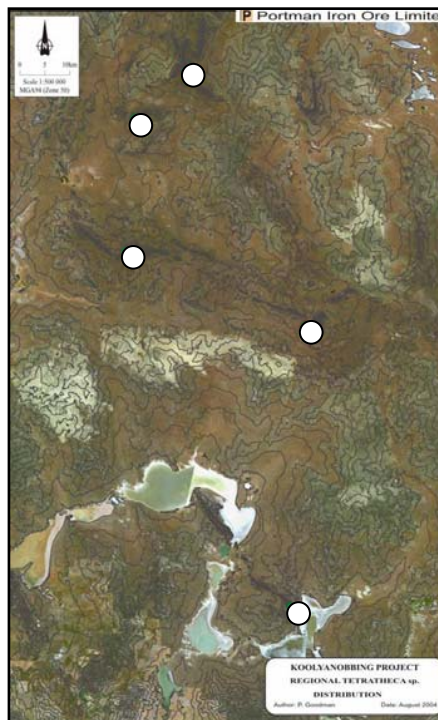
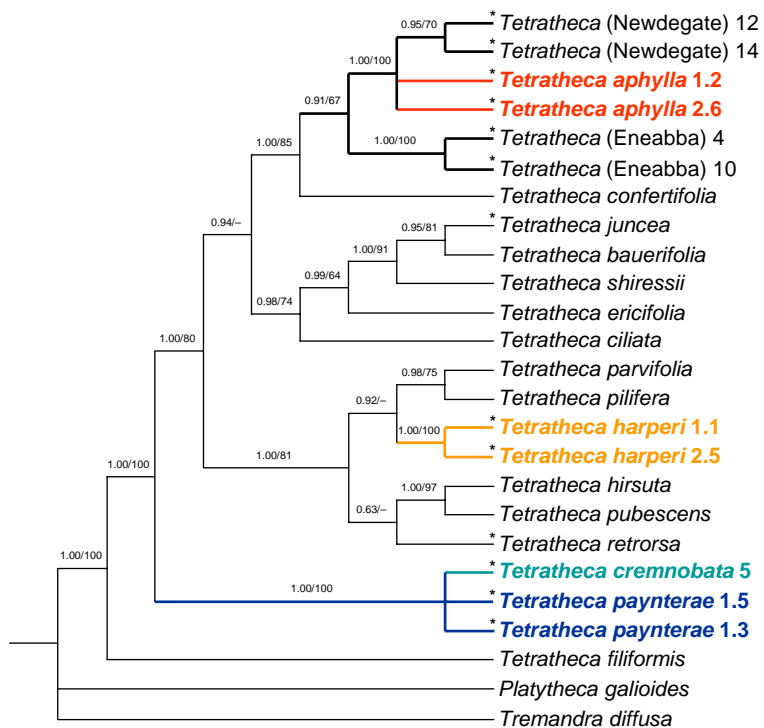






## Taxonomic research

Phylogenetic analyses help resolve taxonomy and relationships of BIF species of *Tetradtheca*



*Tetradtheca harperi*

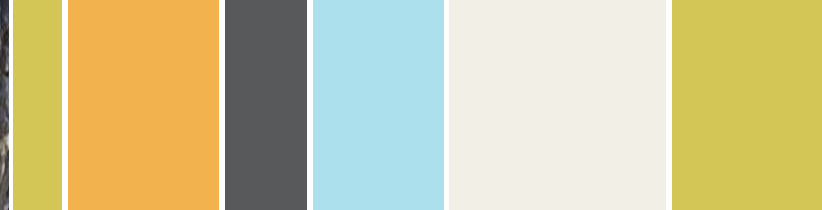


*Tetradtheca aphylla*



*Tetradtheca paynterae*





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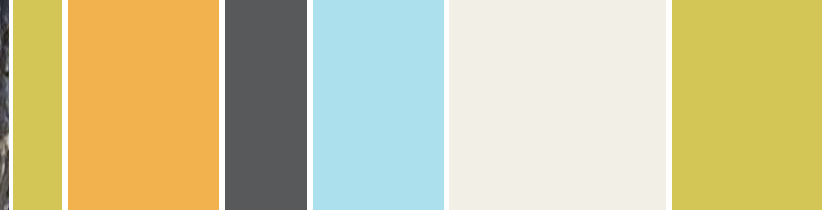
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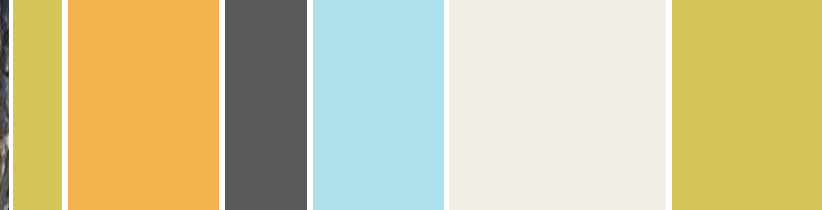


## The Herbarium's Identification Service

### Reference Herbarium:

- c. 14,000 specimens representing c. 11,000 taxa
- >3,000 visitors p.a., mainly consultants
- Maintained by volunteers
- Fully synchronised with main collection





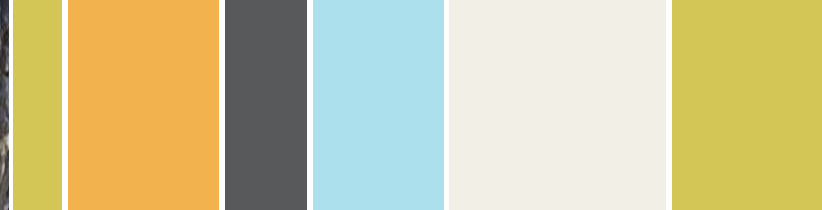
## The Herbarium's Identification Service

### Identification Room

- Two dedicated and expert ID botanists
- Specialist taxonomists
- Two embedded industry botanists (Rio and BHP)







## Flora Conservation and Herbarium Program 20 Scientists (14.1 FTE), 30 Tech Officers (22.7 FTE)

SERVICES

### State Collection

Maintain the State's scientific research collection of plants, algae and fungi

### Flora Information Systems

Provide paper- and web-based, authoritative information on all WA plants

### Reference Herbarium and Plant Identification Service

Provide facilities for identifying plants

### Threatened Flora Seed Centre

Maintain the State collection of seed germplasm for rare and threatened species

### Vegetation Health Service

*Phytophthora* detection, identification and advice

### Taxonomy & Systematics

Discover, describe and document all WA plants, algae and fungi

### Genetics and phylogeography

Study genetic patterns in WA flora, in population, landscape & historical contexts

### Conservation ecology & genetics

Assess ecology of WA plants as it affects their conservation status & needs

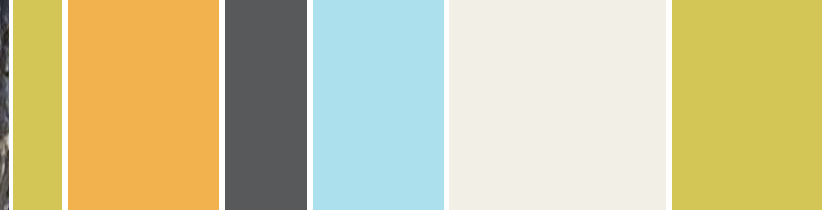
### Threatened Flora Translocations

Determine translocation strategies and protocols for rare and threatened flora

### *Phytophthora* control

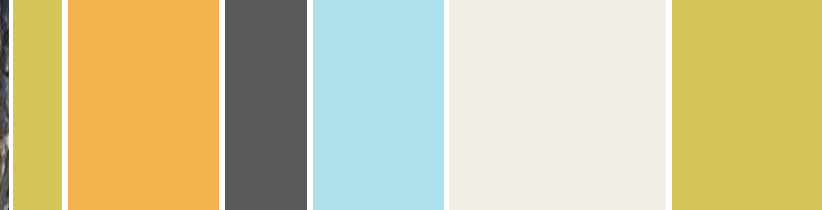
Understand, reduce and ameliorate the impacts of *Phytophthora* dieback

RESEARCH EXPERTISE

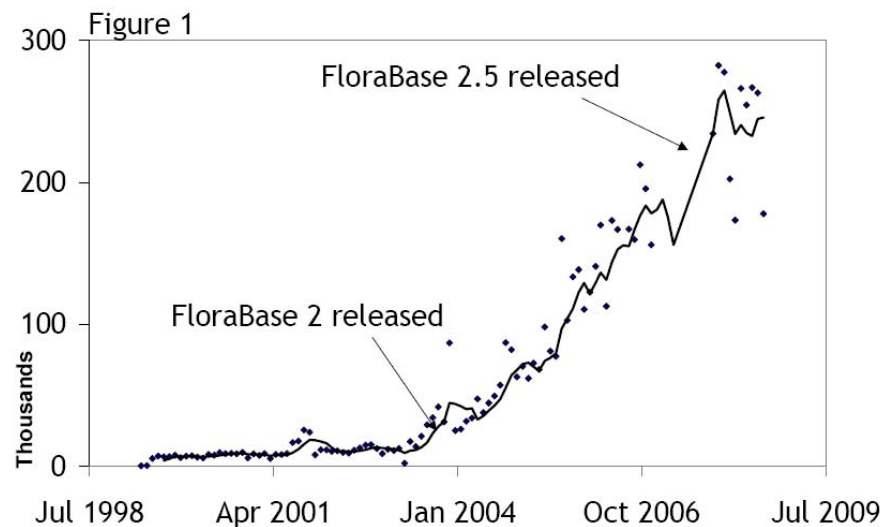
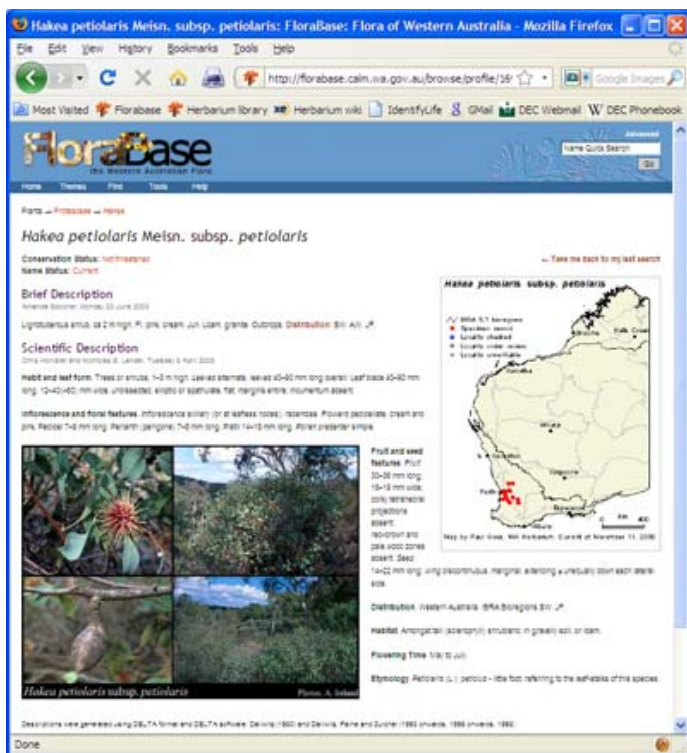


## WA Flora Information Systems



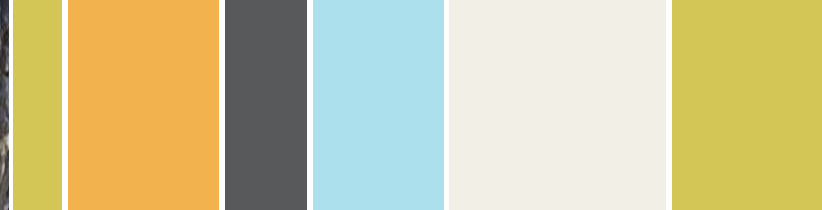


## WA Flora Information Systems



Monthly usage statistics - Florabase search page



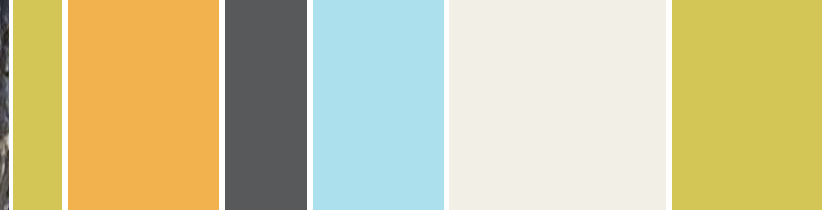


## Future Directions (2010-2020)



### Biodiversity Science Centre

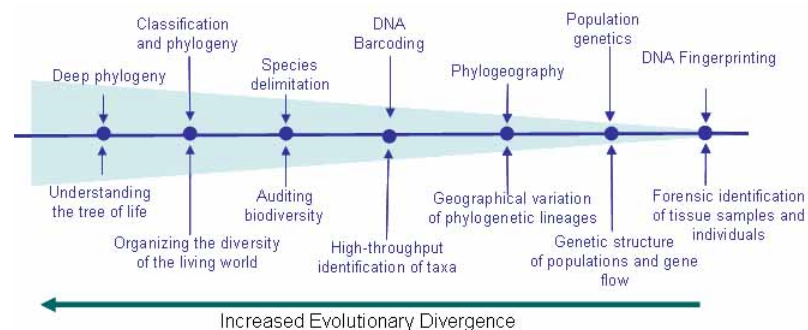
- Expansion space and new facilities for Herbarium
- Co-location of DEC Science
- New genetics research labs
- Due for completion end-2009



## Future Directions (2010-2020)

### Strategic Directions

- Molecular alpha taxonomy



- An Electronic Flora of Western Australia (Florabase 3)

