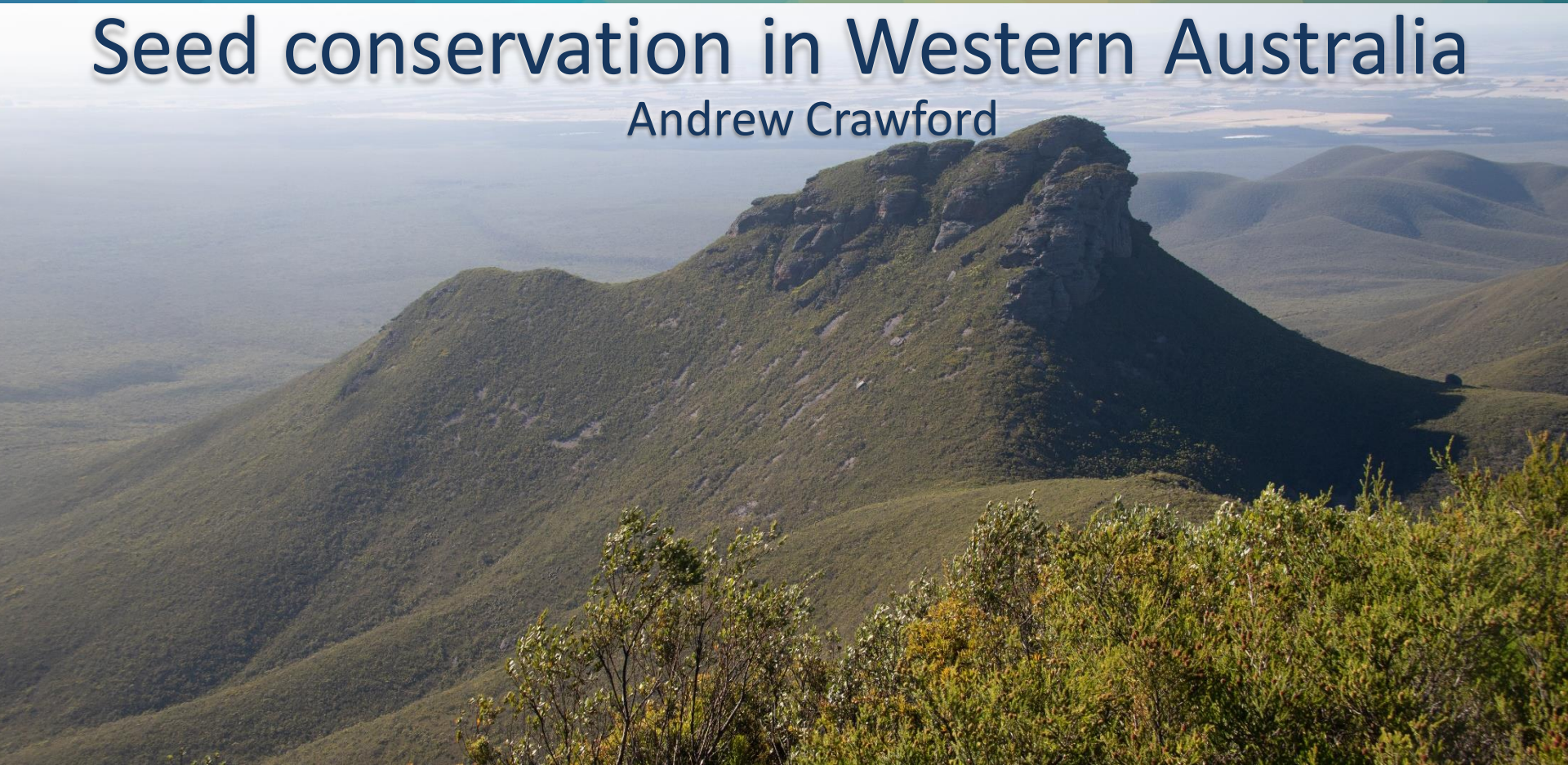
Seed conservation in Western Australia

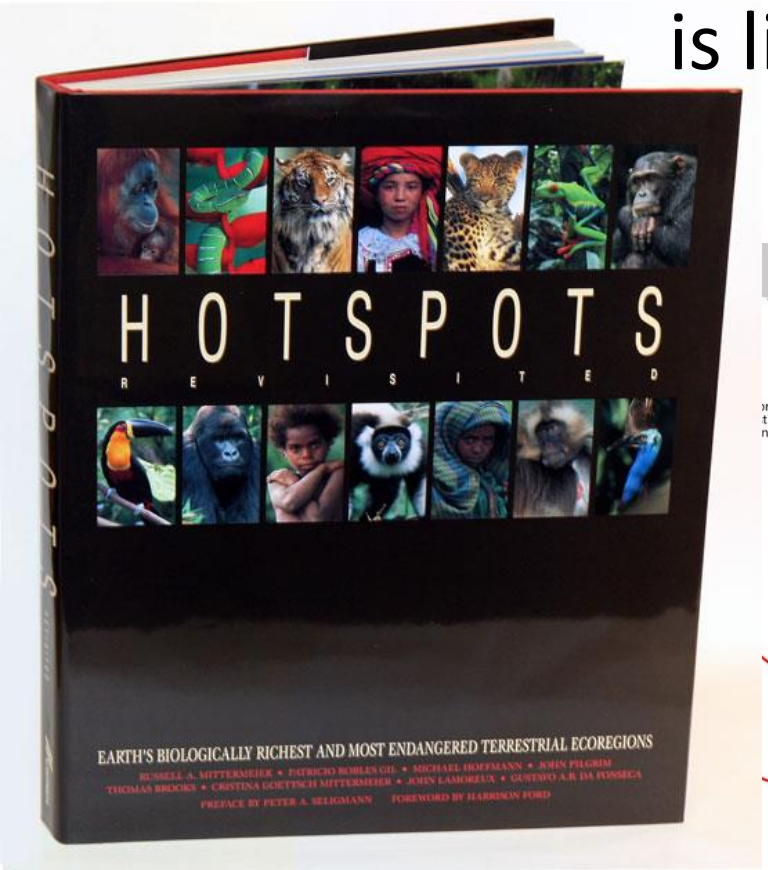
Andrew Crawford

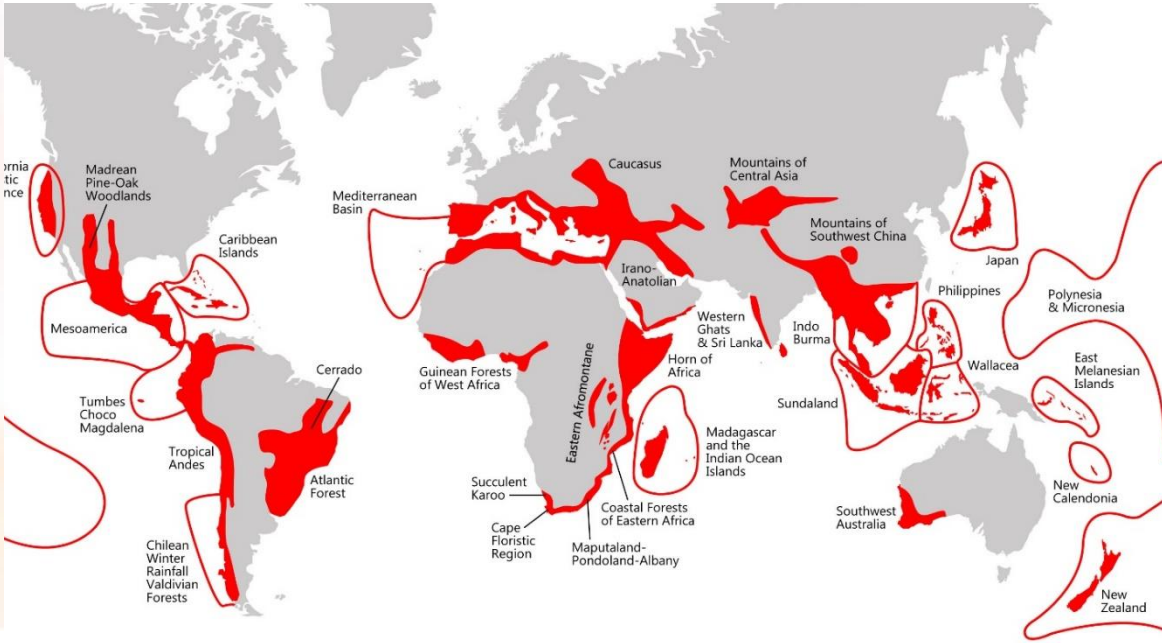



Western Australia has
over 12,500 native
plant species

~ 70% of the native vegetation in south west Western Australia has been cleared

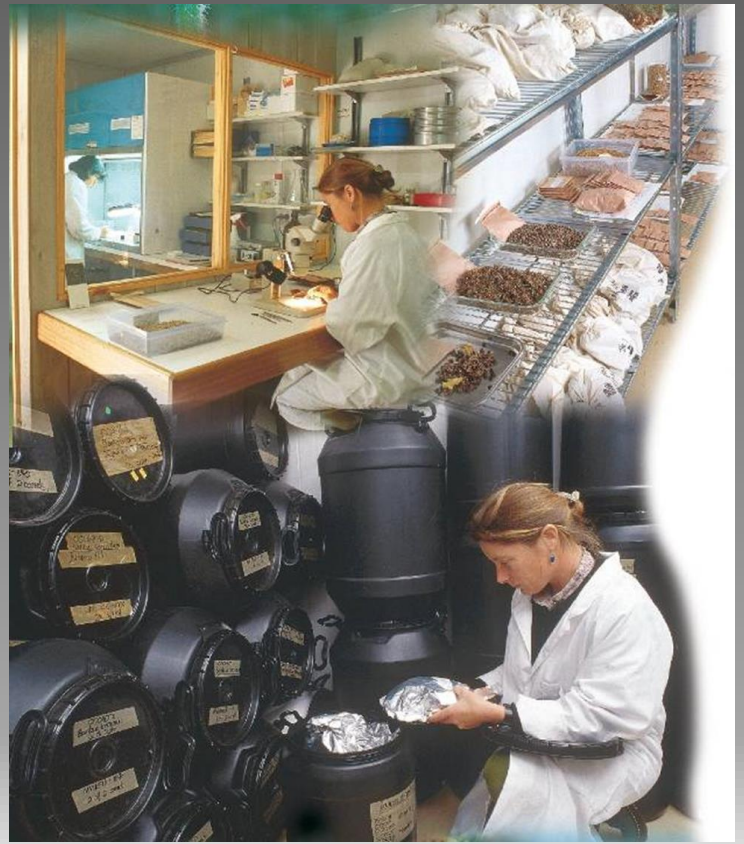
South west Western Australia is listed as one of 36 international biodiversity hotspots.





Number of conservation significant plant species in Western Australia

Threatened	429
Priority	3254
Presumed extinct	15



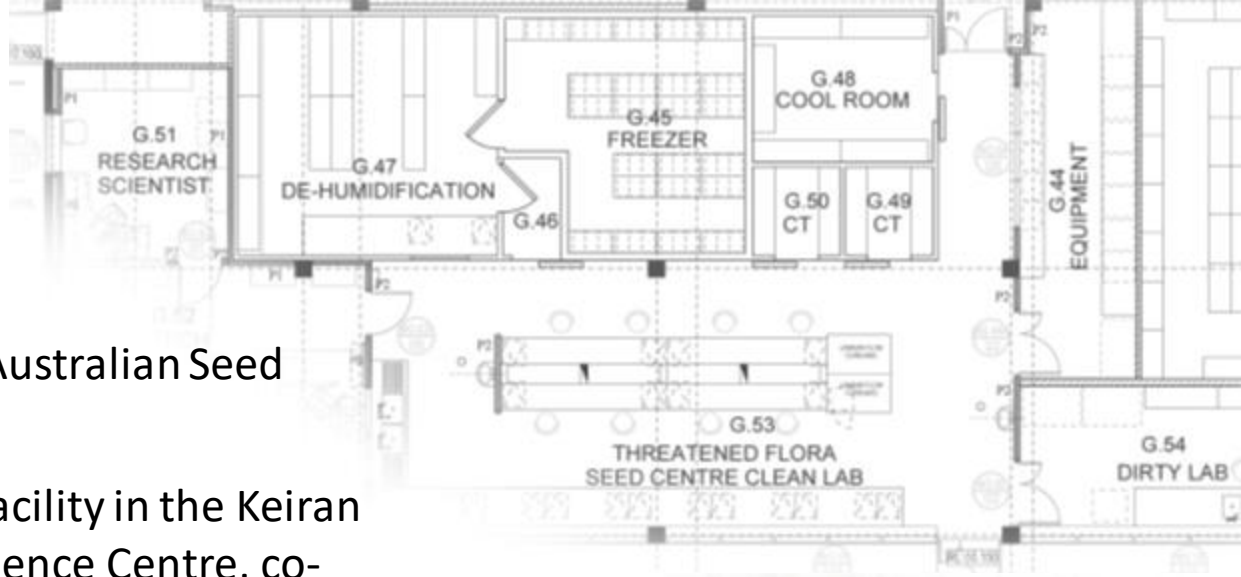
Threatened Flora Seed Centre

Established 1992

- Established as a conservation seed bank
- Set up to collect and conserve seed of species threatened by *Phytophthora cinnamomi*
- Originally housed in transportable buildings at the WA Herbarium

Help Stop the Rot

And now …

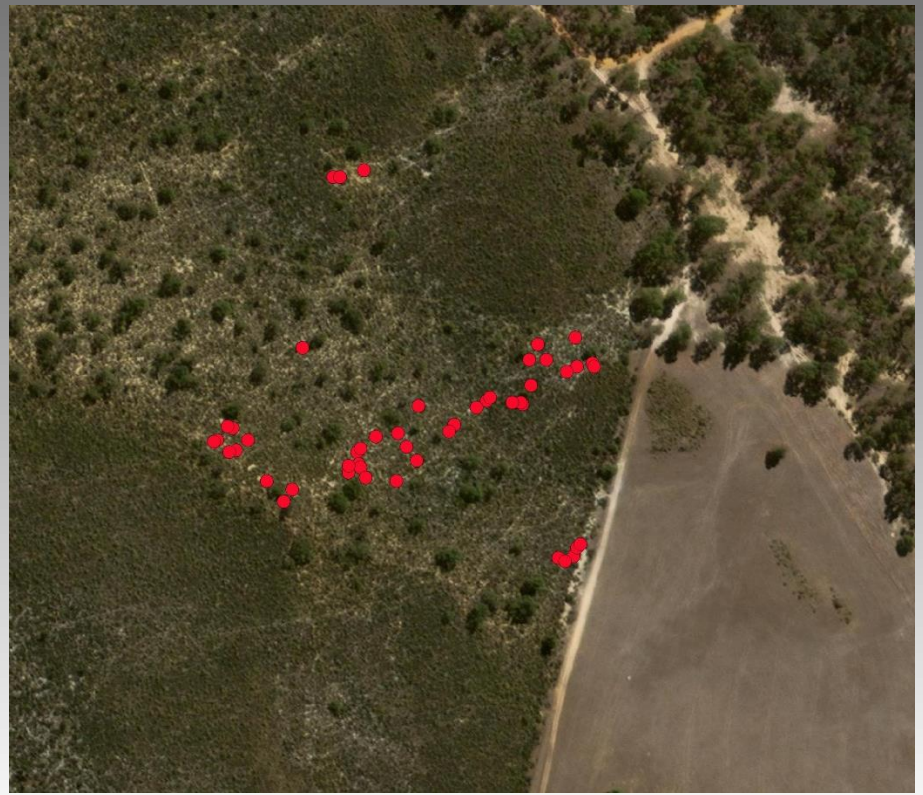


- Forms part of the Western Australian Seed Centre
- Located in a purpose-built facility in the Keiran McNamara Conservation Science Centre, co-located with the WA Herbarium
- Primary repository for seed of Western Australia's conservation significant plant species

Purpose of the Western Australian Seed Centre, Kensington

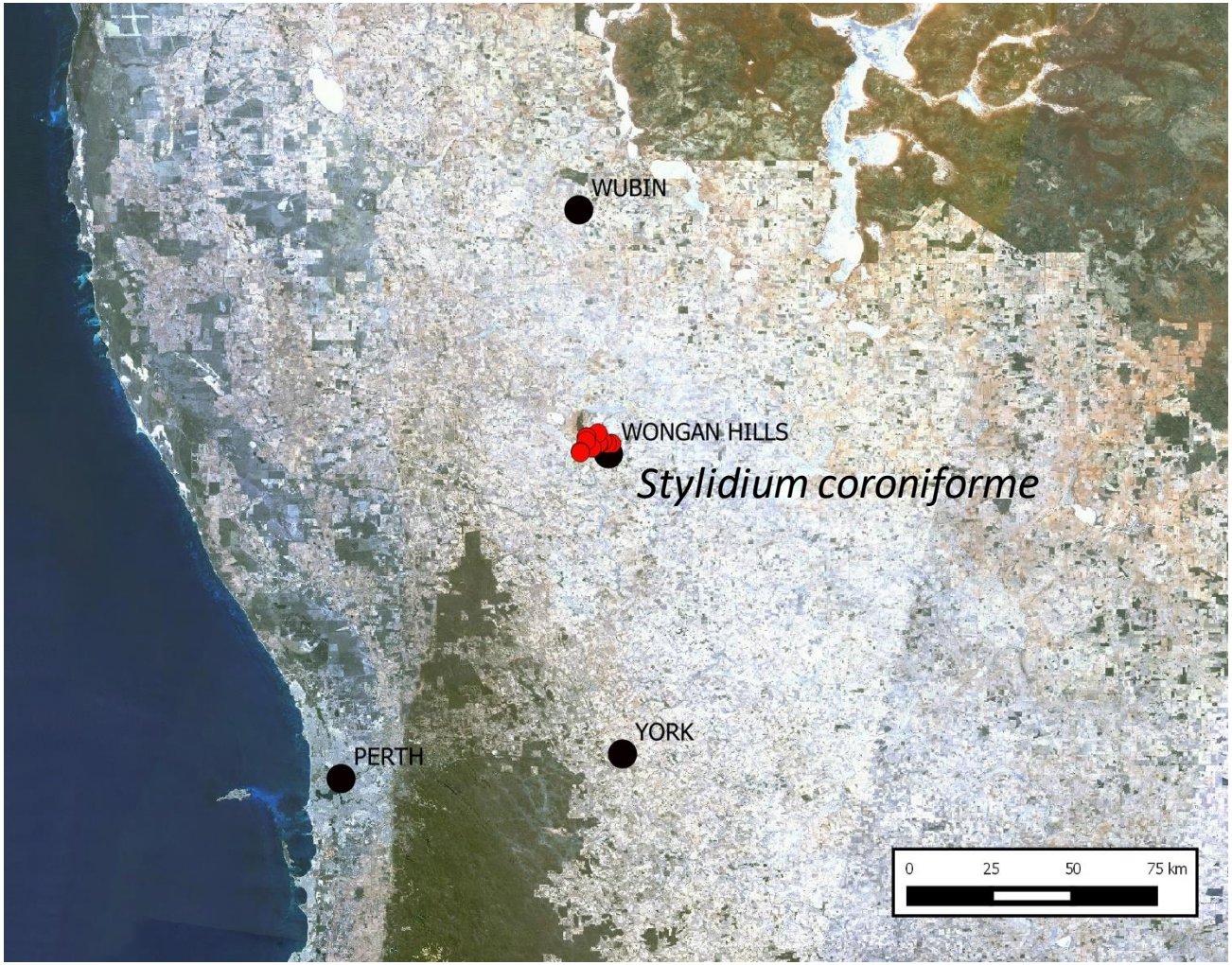
- Store genetically representative collections of seed of conservation significant plant species
- Ensure sufficient seed is available for use in species recovery
- Store seed under conditions that will maintain seed viability

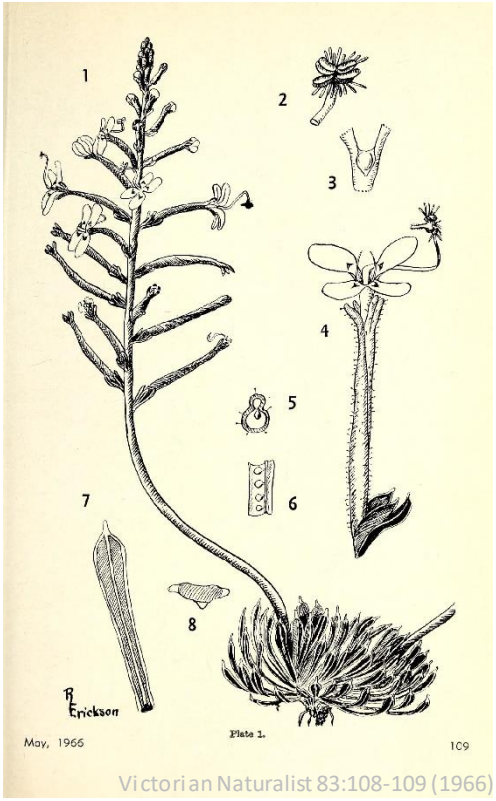
Sampling diversity within a population



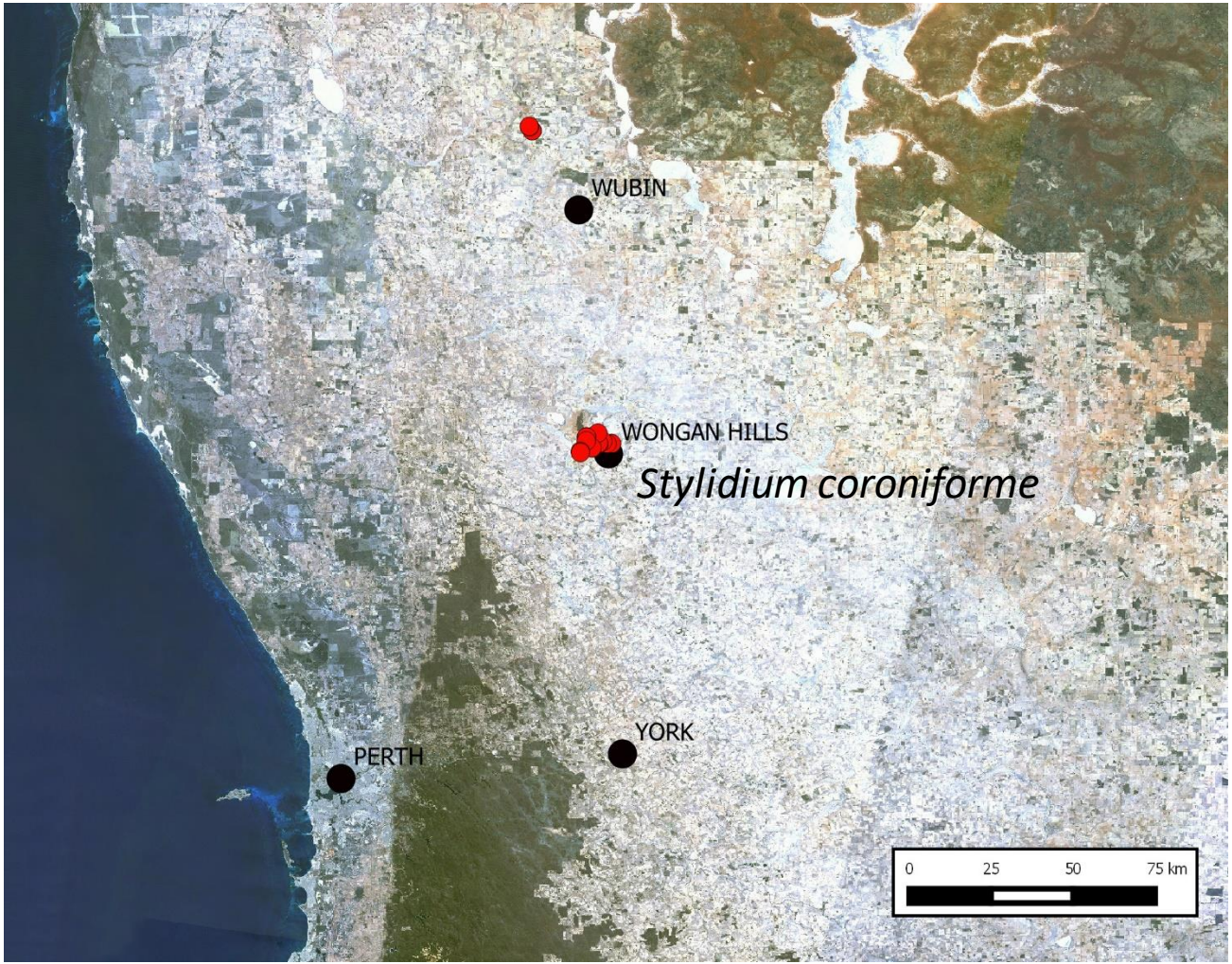
Foote's grevillea

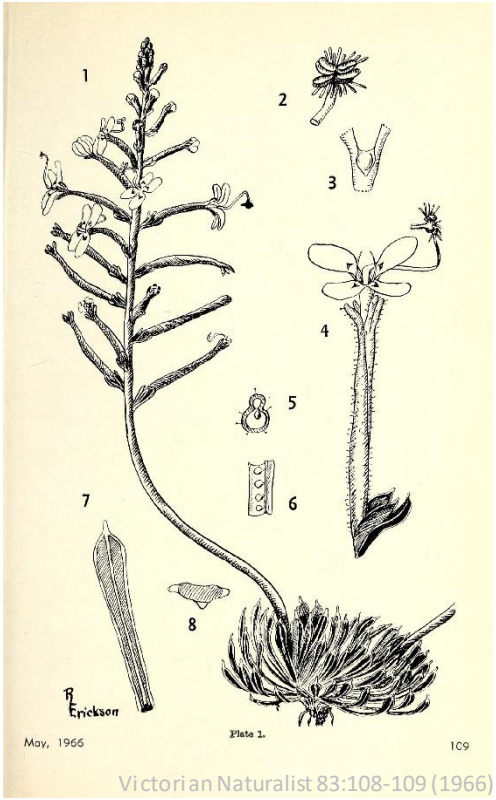
Grevillea calliantha





Victorian Naturalist 83:108-109 (1966)





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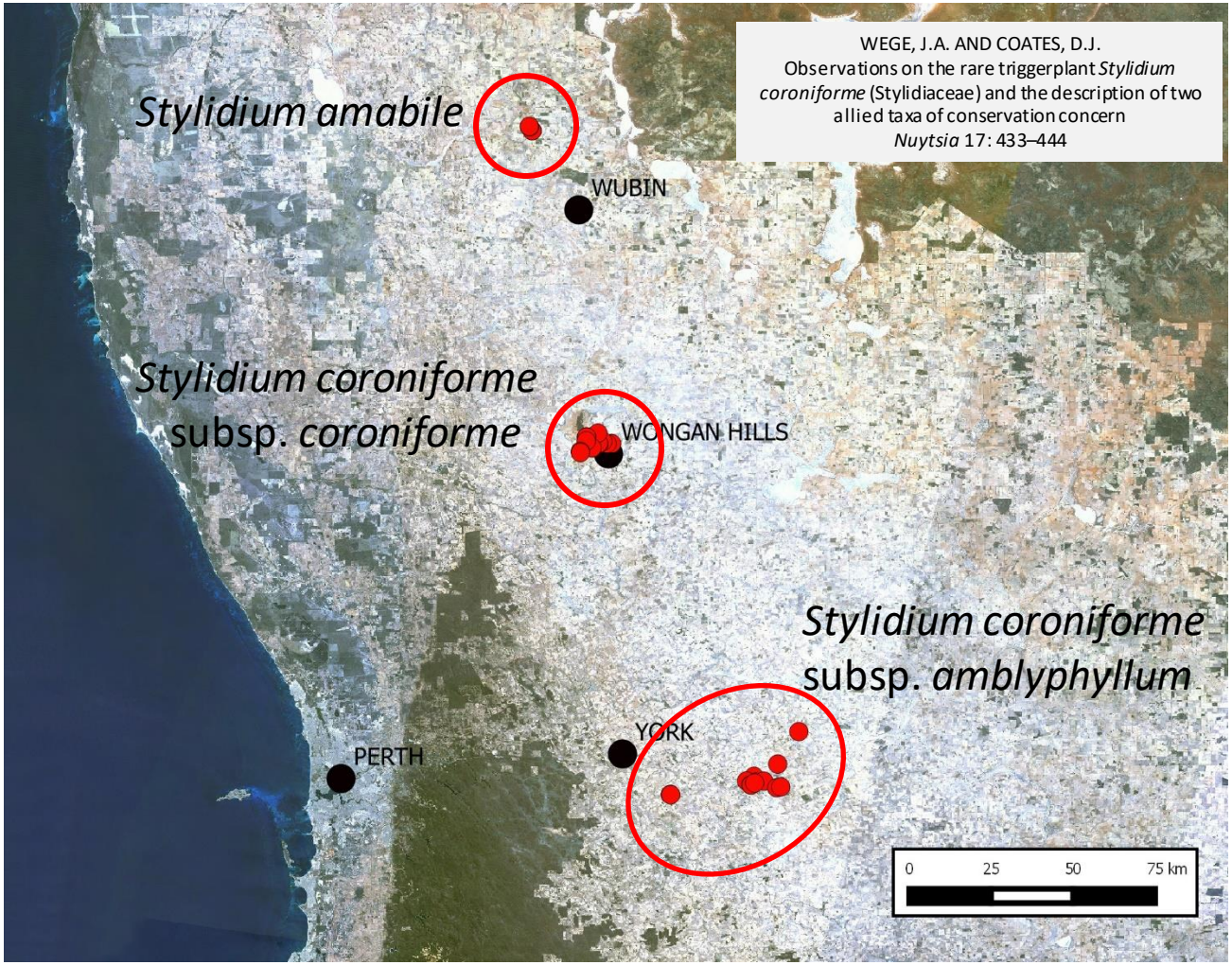


Stylidium amabile
Photo: J. Wege

Stylidium coroniforme
subsp. *coroniforme*
Photo: J. Wege

Stylidium coroniforme
subsp. *amblyphyllum*
Photo: J. Wege

Use of seed in species recovery

Translocation - the deliberate transfer of plants or regenerative plant material from an *ex situ* collection or natural
population to a new location

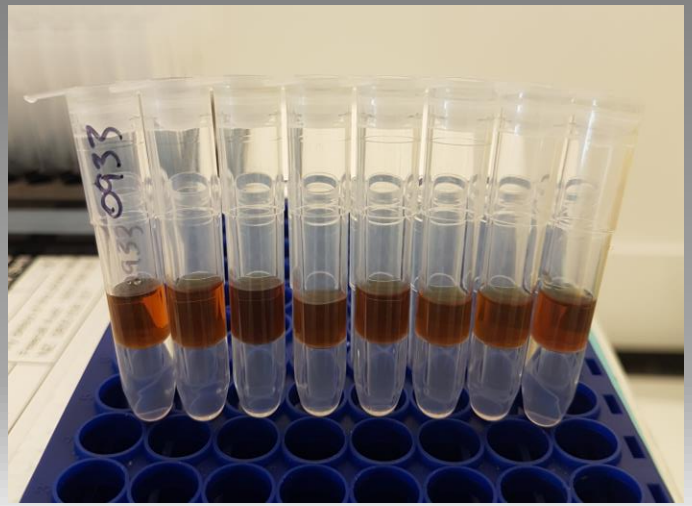
Seed of over 50 plant species has been used in translocations

Grevillea calliantha

- Currently 4 populations contain living plants
- 42 plants in total
- Critically Endangered

- Translocations have been established at 3 sites
- Currently 498 plants in translocations

Genetic studies to help resolve taxonomic issues



The Linnean Society of London — BOTANICAL Journal of the Linnean Society

Botanical Journal of the Linnean Society, 2015, **177**, 96–111. With 4 figures

Disjunct, highly divergent genetic lineages within two rare *Eremophila* (Scrophulariaceae: Myoporeae) species in a biodiversity hotspot: implications for taxonomy and conservation

TANYA M. LLORENS*, BRONWYN MACDONALD, SHELLEY MCARTHUR, DAVID J. COATES and MARGARET BYRNE

ELSEVIER

Biological Conservation

journal homepage: www.elsevier.com/locate/bioc

Significant genetic diversity loss following pathogen driven population extinction in the rare endemic *Banksia brownii* (Proteaceae)

David J. Coates *, Shelley L. McArthur, Margaret Byrne

Heredity **83** (1999) 418–427

Genetic divergence and the mating system in the endangered and geographically restricted species, *Lambertia orbifolia* Gardner (Proteaceae)

DAVID J. COATES* & VICKI L. HAMLEY

Seed storage

Two main factors that affect how long a seed will survive are:

- Seed moisture content
- Storage temperature

We reduce both to extend the life of the seed

- Seed are dried at 15% relative humidity and 15°C.
- Seed moisture content will be ca. 3-7%.
- Seed is then sealed into a heat sealed foil.
- Seed is then stored at -20°C

Theoretical longevity of grass tree (*Xanthorrhoea preissii*)

Assumptions:

- Perth mean relative humidity is ca. 50%
- If seeds are dried at 50% RH in an air-conditioned room (assume 21°C) the moisture content will be ca. 10%
- If seeds are dried at 15% RH and 15°C the moisture content will be ca. 5.3%

Estimated time (years) for grass tree seed viability to fall to 50% (p_{50})

Seed Moisture Content (%)	Storage temperature (°C)		
	21	5	-20
10	4		
5.3			

Estimated time (years) for grass tree seed viability to fall to 50% (p_{50})

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Estimated time (years) for grass tree seed viability to fall to 50% (p_{50})

Seed Moisture Content (%)	Storage temperature (°C)		
	21	5	-20
10	4	16	133
5.3			

Estimated time (years) for grass tree seed viability to fall to 50% (p_{50})

Seed Moisture Content (%)	Storage temperature (°C)		
	21	5	-20
10	4	16	133
5.3	108		

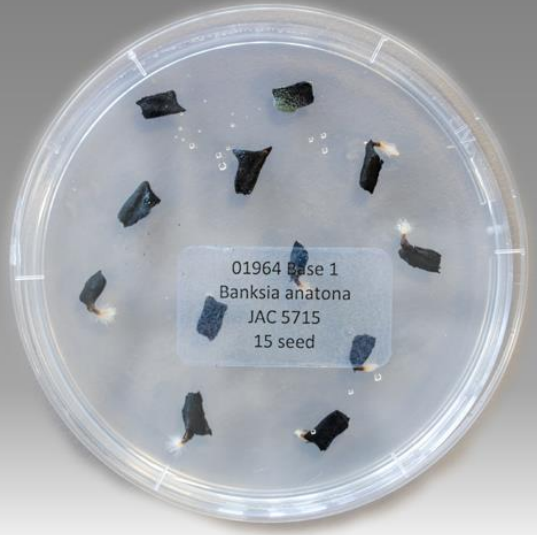
Estimated time (years) for grass tree seed viability to fall to 50% (p_{50})

Seed Moisture Content (%)	Storage temperature (°C)		
	21	5	-20
10	4	16	133
5.3	108	454	

Estimated time (years) for grass tree seed viability to fall to 50% (p_{50})

Seed Moisture Content (%)	Storage temperature (°C)		
	21	5	-20
10	4	16	133
5.3	108	454	3830

Checking if seeds are alive



How successful have we been?

- 80% of Threatened species collected
- 22% of Priority species collected

Challenges – small plant size

Stylidium tinkeri

Trithuria occidentalis

Lack of pollination

Small, declining populations

- *Daviesia cunderdin*
- 1 population down to 2 plants

Timing

Extracting seed for germination

Eremophila virens

Eremophila rostrata ssp. *trifida*

Successes and highlights

Collections of extinct populations

Banksia brownii (at least 3 pops)

Banksia anatona (1 pop)

Collections of rediscovered species

Acacia prismifolia – rediscovered after not being seen for over 80 years

Significant collections

Many-flowered Commersonia - *Commersonia apella*

Woodlupine seed production area

Assisting with taxonomy

Nuytsia
The journal of the Western Australian Herbarium
31: 89–93
Published online 28 April 2020

Worthy of love: *Geleznowia amabilis* (Rutaceae), a stunning new species of 'Yellow Bells' from Kalbarri in Western Australia

Kelly A. Shepherd[1] and Andrew D. Crawford[2]

We're not in this alone!

AUSTRALIAN SEEDBANK PARTNERSHIP

MILLENNIUM SEED BANK PROJECT Kew

Have you considered Volunteering?

Thank you