Mapping Biodiversity

The Atlas of Living Australia

Saw Banksia – *Banksia serrata*

ALA

Banksia serrata - names

Integrated Botanical Information System (IBIS)
Australian National Botanic Gardens
Australian National Herbarium

Australian Plant Name Index (APNI)

Proteaceae
Banksia serrata L.f.

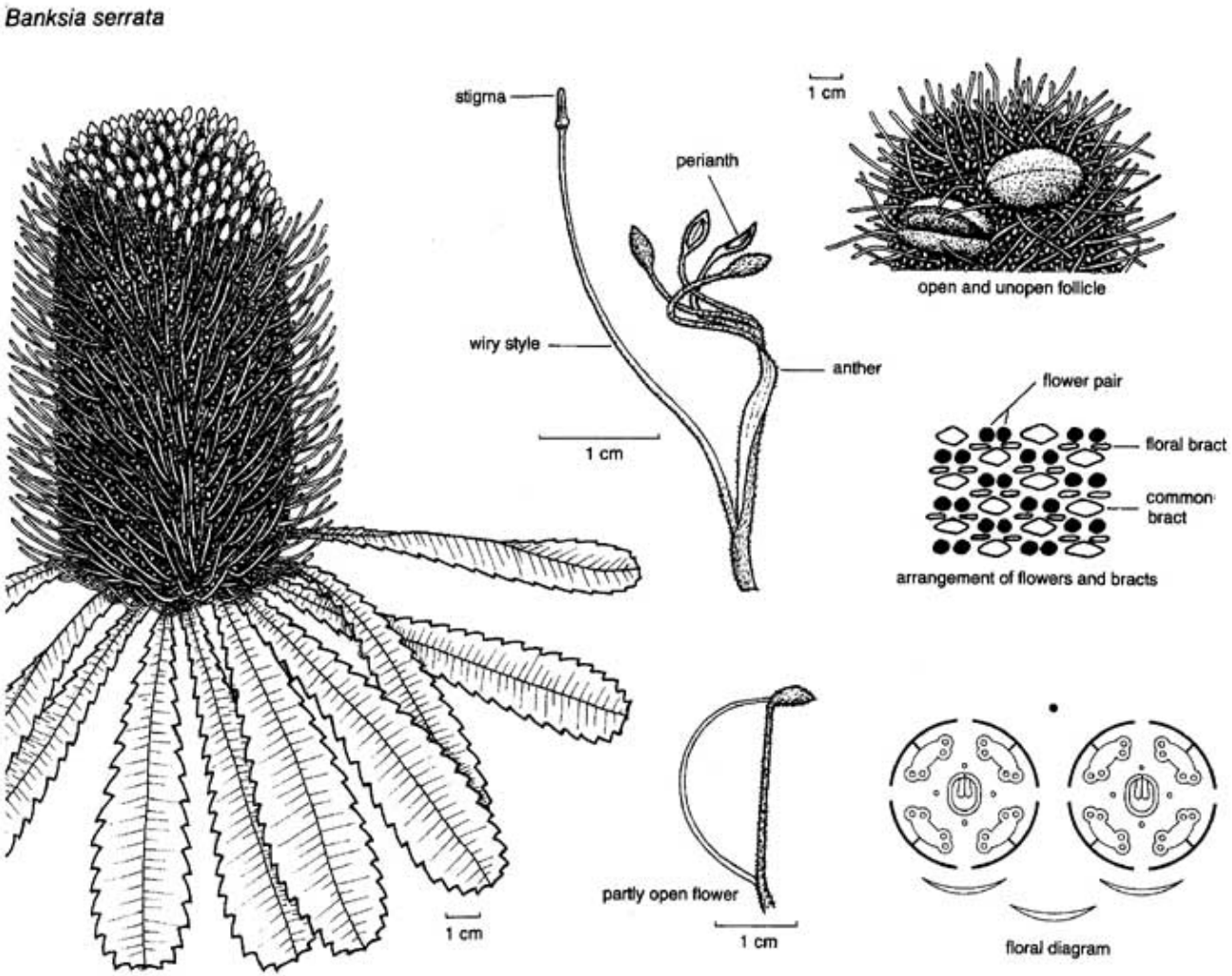
Linnaeus, C. filius (1782), *Supplementum Plantarum*: 126 [tax. nov.]
Type: "Habitat in Nova Hollandia. I. Banks, Armiger."
Comment: Given under BANKSIA L.f. (*nom. cons.*). Base name for *Isostylis serrata* (L.f.) Britten; *Sirmuellera serrata* (L.f.) Kuntze.
Kuntze, C.E.O. (1891), *Revisio Generum Plantarum* 2: 582
basionym of: **Sirmuellera serrata (L.f.) Kuntze**
Britten, J. in Banks, J. & Solander, D.C. (1905), *Illustrations of Australian plants collected in 1770 during Captain Cook's voyage round the world* 3: 83, t. 270
basionym of: **Isostylis serrata (L.f.) Britten**
Hill, A.W. (1942) *Botanical Magazine* 163: t. 9642
George, A.S. (1981) The genus Banksia L.f. (Proteaceae). *Nuytsia* 3(3): 320-322
Lectotype: "BM, a sheet labelled by Banks: "New South Wales Botany Bay. J.B." and by Robert Brown "Banksia serrata Linn suppl. Botany Bay". The sheet bears a single specimen in late bud. Iso: B, C, NSW."
nomenclatural synonym: *Banksia conchifera Gaertn.* nom. illeg.
nomenclatural synonym: *Isostylis serrata (L.f.) Britten*
synonym: *Banksia serrata var. hirsuta R.T.Baker*
Robson, Peter J.Checklist of Australian Trees. (1993) Database Record.
Common Name: Honeysuckle
Common Name: Old Man Banksia
Common Name: Red Honeysuckle
Common Name: Red Banksia
Common Name: Saw Leaf Banksia
Common Name: Saw toothed Banksia
Common Name: Saw Banksia
George, A.S. in Wilson, A.J.G. (Ed) (1999), *Flora of Australia* 17B: 197, Fig. 26, Map 193
nomenclatural synonym: *Sirmuellera serrata (L.f.) Kuntze*
nomenclatural synonym: *Banksia conchifera Gaertn.* nom. illeg.
nomenclatural synonym: *Isostylis serrata (L.f.) Britten*
synonym: *Banksia serrifolia Knight* nom. illeg.
synonym: *Banksia serratifolia Salisb.* nom. illeg.
synonym: *Banksia serrata var. hirsuta R.T.Baker*
synonym: *Banksia undulata Lindl.*
synonym: *Banksia mitis Knight* nom. illeg.
Common Name: Saw Banksia
CHAH (2005), *Australian Plant Census*
nomenclatural synonym: *Sirmuellera serrata (L.f.) Kuntze*
nomenclatural synonym: *Banksia mitis Knight* nom. illeg.
nomenclatural synonym: *Banksia conchifera Gaertn.* nom. illeg.
nomenclatural synonym: *Isostylis serrata (L.f.) Britten*
nomenclatural synonym: *Banksia serrata L.f. var. serrata*
synonym: *Banksia serrifolia Knight* nom. illeg.
synonym: *Banksia serratifolia Salisb.* nom. illeg.
synonym: *Sirmuellera serratifolia (Salisb.) Kuntze*
synonym: *Banksia serrata var. hirsuta R.T.Baker*
synonym: *Banksia undulata Lindl.*
APC Dist.: Qld, NSW, Vic, Tas

55344 , Map CANB collections. ,

IBIS data generated Thu Jul 24 09:39:25 2008 feed-back to cpbr-info@anbg.gov.au

ALA

Banksia serrata – biology



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Interactions - Banksia Jewel Beetle

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Interactions – New Holland Honeyeater

ALA

Interactions — *Phytophthora cinnamomi*

ALA

Banksia serrata – literature

Aust. J. Bot., 1988, **36**, 415–31

The Survival and Population Response to Frequent Fires of Two Woody Resprouters *Banksia serrata* and *Isopogon anemonifolius*

R. A. Bradstock[AB] *and P. J. Myerscough*[A]

[A]School of Biological Sciences, Macleay Building A12, University of Sydney, N.S.W. 2006.
[B]Present address: N.S.W. National Parks and Wildlife Service, Box N189, Grosvenor St, Sydney, N.S.W. 2000.

Abstract

Plants of *B. serrata* and *I. anemonifolius* resprout after fire, although the species diff (single-stemmed small tree, multistemmed low shrub respectively). If fires occur be lished plants are fire-tolerant, populations will decline. The age of first fire tolerance lower in *B. serrata* (6 years) than in *I. anemonifolius* (about 13 years). Rates of surv during fires were measured in the field along with rates of stem regrowth in fire-t juveniles. These results were used to predict rates of population decline under repeate closely spaced to prevent the survival of newly established genets.

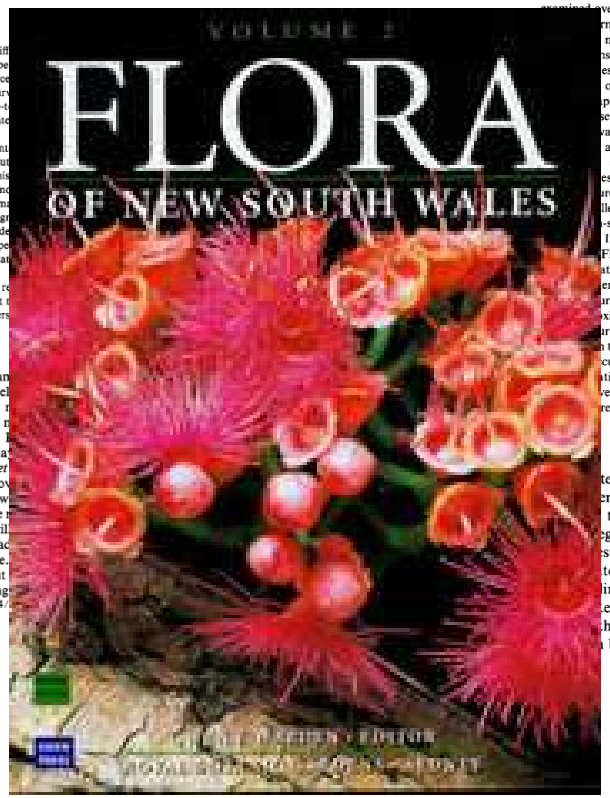
In both species, juveniles were more prone to death than adults in fires and high-int most deaths. In *B. serrata*, adult stems (>2·0 cm d.b.h.) are mostly fire-tolerant, but years apart can prevent many juveniles which survive from reaching adulthood. This likely in *I. anemonifolius*. As a result stands of *B. serrata* may decline m *I. anemonifolius* under 5-year fire cycles. *I. anemonifolius* populations, however, m to decline when the interval between fires is slightly longer (e.g. 10 years) because lig juveniles develop at a slower rate than in *B. serrata*. Extinction or substantial de numbers may be approached in stands of either species after 50 years under some repe fire cycles. The rate of such declines will depend directly on the structure of populat of adults and juveniles).

Declines in populations of these resprouters may be likely under current fire r Sydney region of New South Wales, although these species are more likely to persist t of frequent fire (<10 year interval) than some cohabiting species of obligate seeders

Introduction

Species of woody plants that recover from fire by resprouting are comm prone regions of the world (Kruger 1983; Mooney and Hobbs 1986). Rel species that rely solely on seeds for regeneration (obligate seeders), r thought to be able to persist when fires are frequent because the time r new shoots, flower and set seeds is often short (Keeley and Zedler 1978). I plants normally capable of resprouting die when burnt and mortality ma the interval between fires is very short (J. C. Noble 1982, 1984; Zedler *et* season and intensity of any fire may also affect survival (Gill and Grov Noble 1984). Ultimately, the number of plants within populations w enough new individuals survive to take the place of those that die. If fire r new plants have reached survival size and can resprout, replacement wil Quick regrowth and sexual reproduction will not help to replace dead ad plants are slow to develop and thus unlikely to survive any imminent fire. possible that populations will decline if repeated fires are frequent, but about the rate of decline and critical interval between fires for resprouting

0067-1924/



Journal of Ecology (1989), **77**, 509–523

SEASONAL VARIATION IN FLOWERING INTENSITY AND POLLINATION LIMITATION OF FRUIT SET IN FOUR CO-OCCURRING *BANKSIA* SPECIES

B. J. COPLAND AND R. J. WHELAN

Biology Department, University of Wollongong, Wollongong, NSW, 2500 Australia

SUMMARY

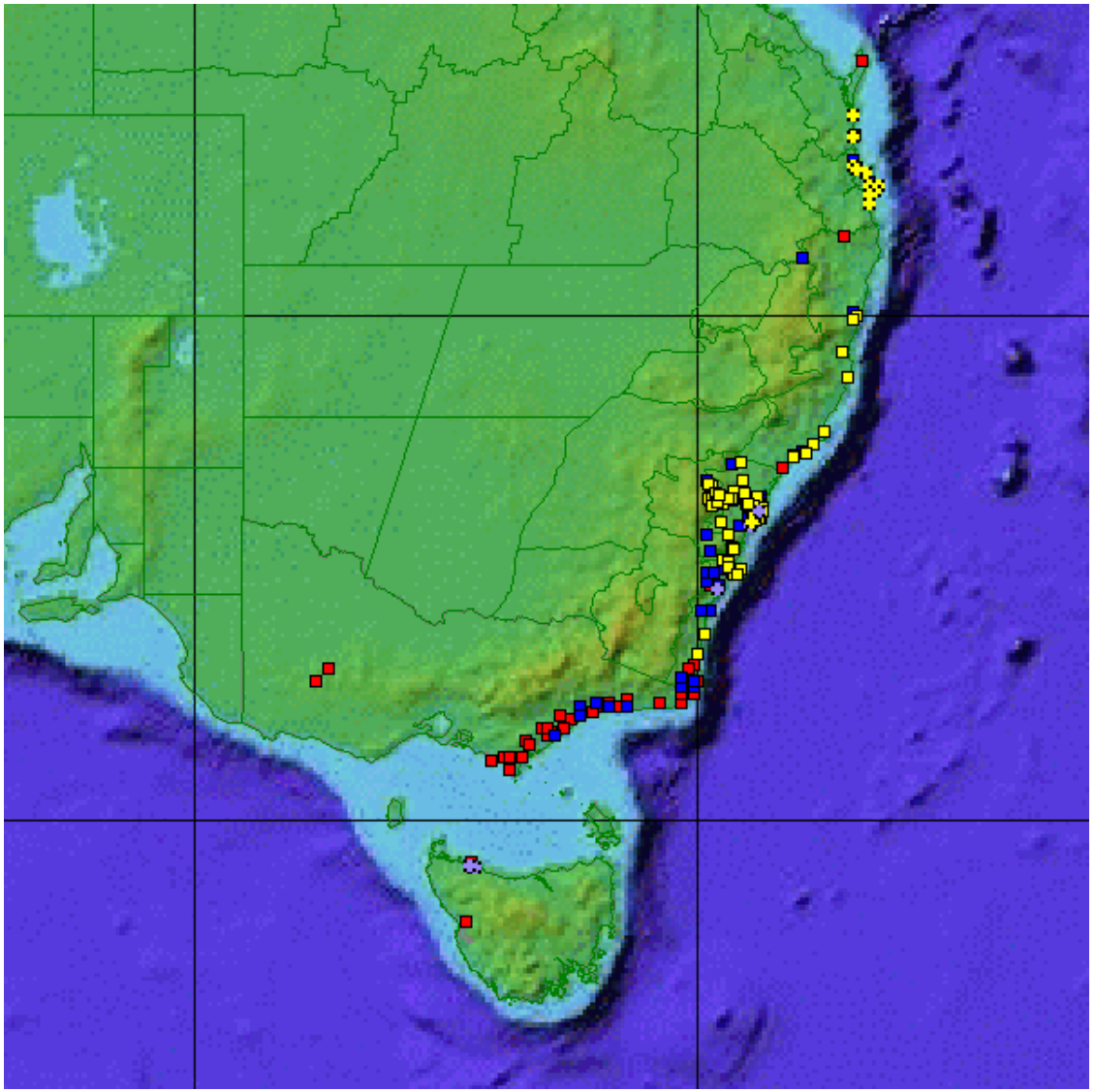
(1) Patterns of flowering, levels of fruit set and pollination limitation of fruit set were ver four years in a group of four co-occurring *Banksia* species (Proteaceae) in rn Australia.
numbers of inflorescences per plant varied markedly between years, but the set, peak and completion of flowering was relatively consistent among years es.
of the four species studied flowered in winter, and flowering times for these pped substantially.
set in the three winter-flowering species varied both within and between years. as caused by differences in the proportions of inflorescences successfully and not by differences in numbers of fruits produced per inflorescence.
set in *Banksia ericifolia* was examined in detail. The proportion of es setting fruit was generally lower in late-season samples than earlier each rce limitation probably explained this because experimental additions of len failed to increase fruit set in late-season inflorescences in any year.
-supplementation did increase fruit set in *B. ericifolia* on one occasion: peak 1985. This was the time of highest flowering intensity during the four years of Fruit set in *B. spinulosa* and *B. paludosa* was also increased by pollen ation in this year. These results indicate that pollination was limiting fruit set in er, they suggest that interspecific competition among plants for pollination rring and should be examined directly.
ximately half of the inflorescences produced by the *B. ericifolia* plants studied r years of the study appeared during peak flowering in 1985. The greatest to the seed bank, which is stored in the canopy until released by a future fire, curred at this time.
tion of fruit set by ineffective pollination, although it may occur only rarely, e a disproportionately large impact on reproductive success over a relatively re period.

INTRODUCTION

terns displayed by plants have significance in many areas of ecology. en used in studies of the organization of communities (Stiles 1978), theory (Pyke, Pulliam & Charnov 1977), and the evolution of gies (Schaffer & Gadgil 1975). Two areas of particular interest recently stions of (i) whether or not sympatric plant species compete for the tors (Waser 1983; Campbell 1985) and (ii) whether or not resource ination sets the proximate limit to fruit set in the field (Bierzychudek ebelo 1987; Horvitz & Schemske 1988). These questions are clearly he potential for competition for pollinators will depend upon being in short supply.

ALA

Banksia serrata - distribution



ALA

Banksia serrata — molecular data

ALA

Biodiversity information

Root rot
Phytophthora cinnamomi

Pathogen of

Banksia jewel beetle
Cyrioides imperialis

Larvae mine stems

New Holland Honeyeater
(Phylidonyris novaehollandiae)

Feeds upon nectar

Pollinates

Banksia serrata L.f.

= *Isostylis serrata* (L.f.) Britten

= *Sirmuellera serrata* (L.f.) Kuntze

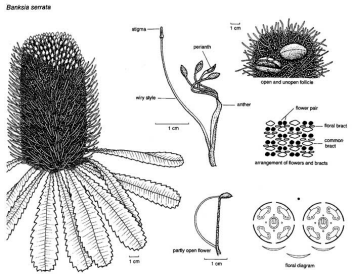
Old Man Banksia

Saw Banksia

Kingdom: Plantae
Division: Magnoliophyta
Family: Proteaceae
Subfamily: Grevilleoideae
Tribe: Banksieae
Subtribe: Banksiinae
Genus: *Banksia* L.f.

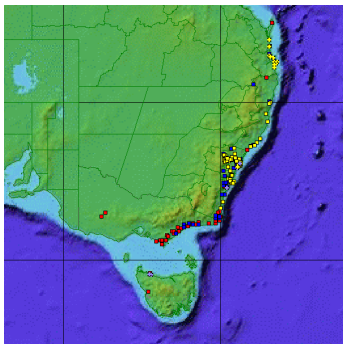
Identified as

Biology and ecology

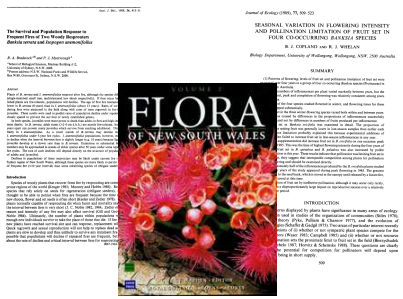


Molecular biology

Distribution



Literature



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Biodiversity information

Braconidae - ? *Chaoilta sp.*

Parasitises

Huntsman spider
Holconia montana

Preys upon

Feeds upon

Tagasaste (tree lucerne)
Chamaecytisus palmensis

Uresiphita ornithopteralis (Guenée, 1854)

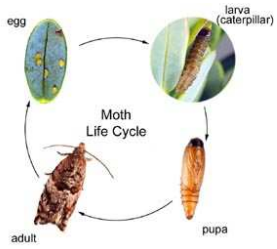
= *Mecyna ornithopteralis* Guenée, 1854

English: tree lucerne moth

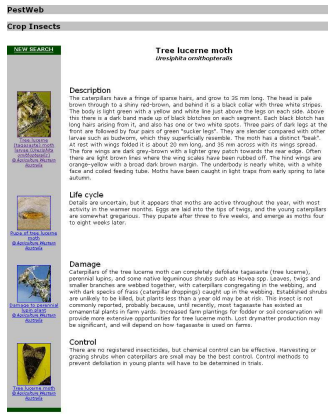
Identified as

Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Lepidoptera
Family: Crambidae
Subfamily: Pyraustinae
Tribe: Pyraustini
Genus: *Uresiphita* Hübner, 1825

Biology and ecology



Fact sheets



Molecular biology

All Leps Barcode of Life

Locality: Reid, ACT
GPS: 35.280S 149.138E
Date: 1 January 2008

Distribution

ALA

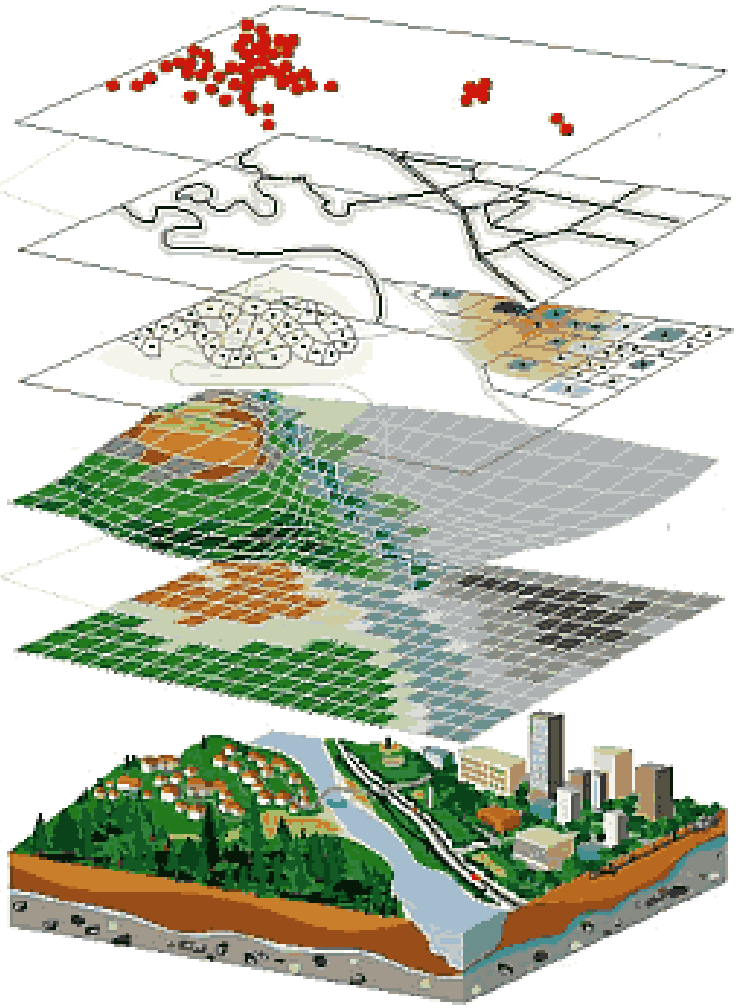
Uses: Biosecurity

- Questions
  - What is this organism?
  - What does it eat?
  - Does it carry disease?
  - Could it spread in Australia?
  - How can it be controlled?
- Information needed
  - Names and classification
  - Identification keys
  - Images
  - Distribution data
  - Food webs
  - Literature (biology and control)

ALA

Uses: Land-use planning

- Questions
  - What species are found here?
  - Are they threatened?
  - What are their needs?
  - How can impacts be minimised?
  - How can habitats be restored?
- Information needed
  - Names and classification
  - Distribution data
  - Food webs
  - Literature (biology and control)



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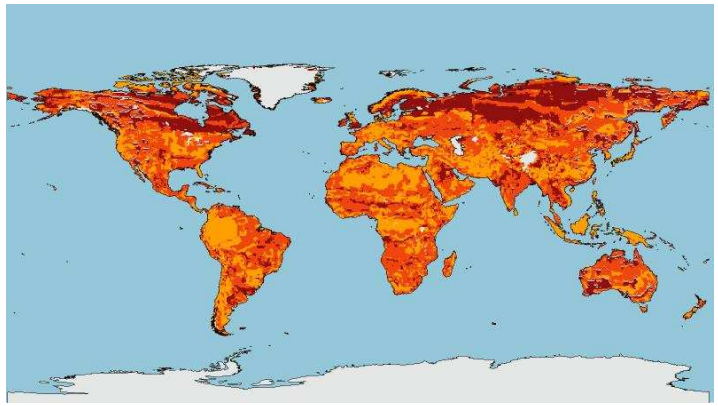
Uses: Conservation and climate change

- Questions
  - Which species will be affected?
  - How will their ranges be affected?
  - Can they colonise more favourable regions?
  - Will pest species benefit?
- Information needed
  - Names and classification
  - Climate change models
  - Distribution data
  - Environmental niche models
  - Food webs
  - Literature (conservation and biology)



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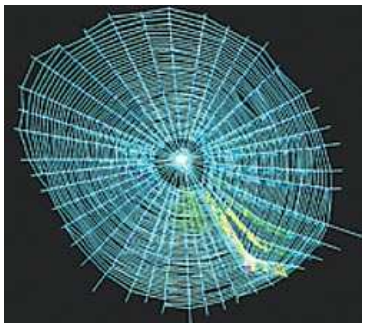
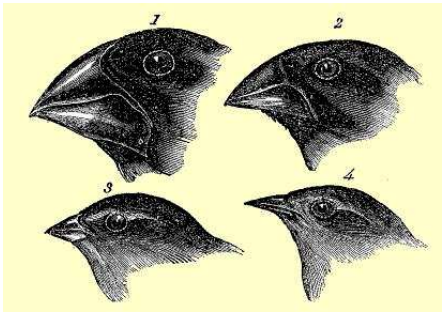
Other uses

- Crop improvement
- Sustainable use
- Health and medicine
- Biomaterials
- Forensics
- Taxonomy
- Leisure





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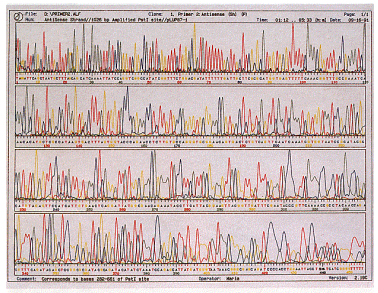
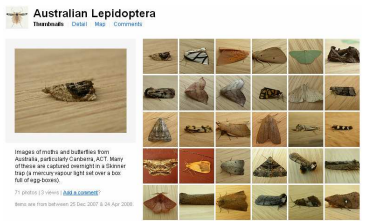
Sources of biodiversity information

- Natural history collections and herbaria
- Living collections
- Field studies
- Literature
- Molecular research
- Images and multimedia
- Experts





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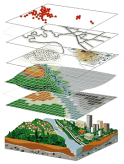
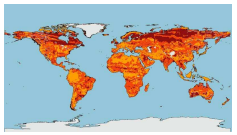
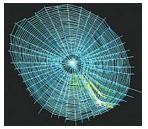
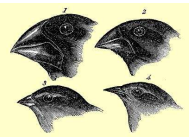
Making information available to users







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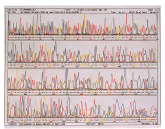
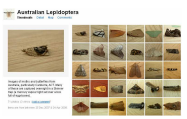
ATLAS OF LIVING AUSTRALIA





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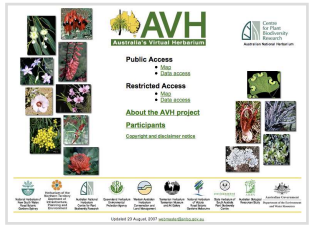
Atlas of Living Australia

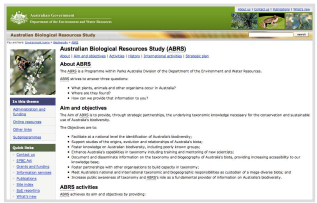
- Government-funded (NCRIS) project to June 2011
- Mission:
  - To develop an authoritative, freely accessible, distributed and federated biodiversity data management system that links Australia's biological knowledge with its scientific reference collections and other custodians of biological information
  - To share biodiversity knowledge to shape our future
- Participants
  - CSIRO
  - The Australian Museum
  - Museum Victoria
  - Queensland Museum
  - The Tasmanian Museum and Art Gallery
  - Southern Cross University
  - The University of Adelaide
  - DAFF
  - DEWHA
  - CHAH
  - CHAFC
  - CHAEC
  - AMRRN

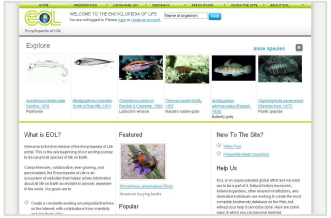
ALA

Timing of Atlas

- Builds on other national and global projects
  - Australian Virtual Herbarium
  - Online Zoological Collections of Australian Museums
  - Australian Biological Resources Study
  - Global Biodiversity Information Facility
  - Oceanographic Biogeographic Information System
  - Encyclopedia of Life
  - Many more



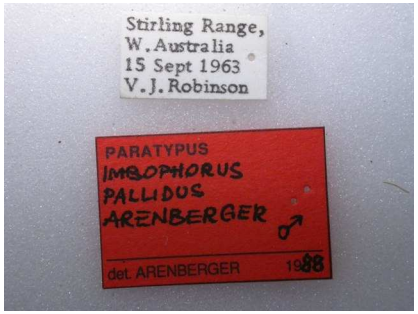




ALA

Challenges: Digitising information

- Important information in non-digital forms:
  - History of printed descriptions and other literature
  - Specimen labels (estimated 1.5 billion globally)
  - Field notebooks
- Many millions of dollars required to make all of this information fully accessible
- Work shared with GBIF and other projects



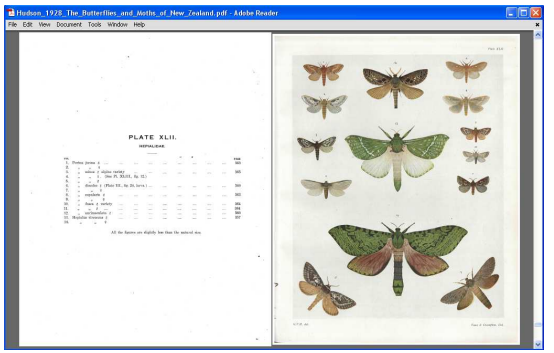
ScientificName:	*Imbophorus pallidus*
Family:	Pterophoridae
Locality:	Stirling Range
State:	WA
DateCollected:	1963-09-15
Latitude:	-34.3
Longitude:	118.0
CoordinatePrecision:	10000
CoordinateMethod:	Google Earth
TypeStatus:	Paratypus

ALA

Challenges: Digitising literature

- An example:
  - BUGS - Bibliography of New Zealand terrestrial invertebrates 1775-1985
  - BUGZ online

    http://entdocs.landcareresearch.co.nz
  - Scanned entomological literature
  - Searchable text
  - Downloadable PDFs
- Result:
  - A significant body of literature more accessible and better managed than ever before



Challenges: Standardising data

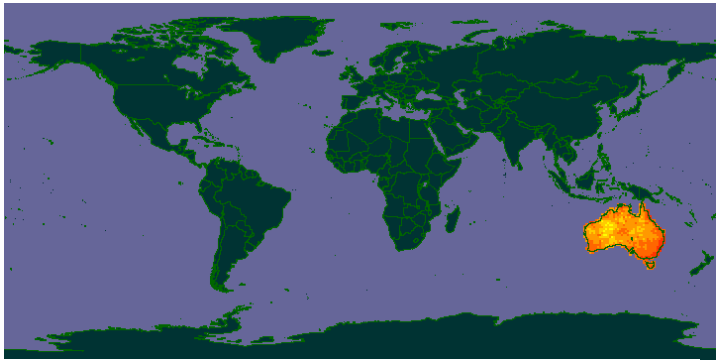
- Need structured data for machine use
- Need agreed standard data elements
  - ScientificName
  - DecimalLatitude, Decimal Longitude
  - CoordinatePrecision
- Need standard formats for data values
  - New South Wales vs. NSW vs. N.S.W.
  - Australia vs. Australien vs. AU
  - 2008-05-15 vs. 05/15/2008 vs. 15 May 2008
  - Specimen vs. S vs. Voucher
- Standards allow data to be combined and reused
- Biodiversity Information Standards (TDWG)

Biodiversity Information Standards TDWG

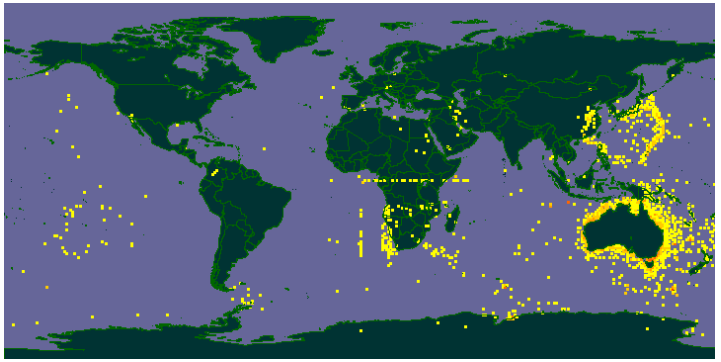
ALA

Challenges: Detecting errors

- Misspellings:
  - *Ornithorynchus* / *Ornithorhynchus*?
  - Mt. Tambourine / Mt. Tamborine?
- Coordinate problems:
  - Positive values for South or West
  - Latitude / Longitude transposed
  - Coordinates not near Locality
  - Unknown precision
- Other issues:
  - Same record shared through different routes
  - Unknown collecting strategy



GBIF data for “Australia” intersecting Australian continent



GBIF data for “Australia” not intersecting Australian continent

ALA

Challenges: Handling taxonomy

- 250-year history of seeking to interpret biodiversity
- Many names for the same species
  - *Ornithorhynchus anatinus* vs. *Ornithorhynchus paradoxus*
  - Species described more than once
  - Species moved to new genus
  - Split into multiple species concepts
  - Merge into one species concepts
- Common names
- Alternative opinions on higher classification
- Result:
  - Related information found under different names

ALA

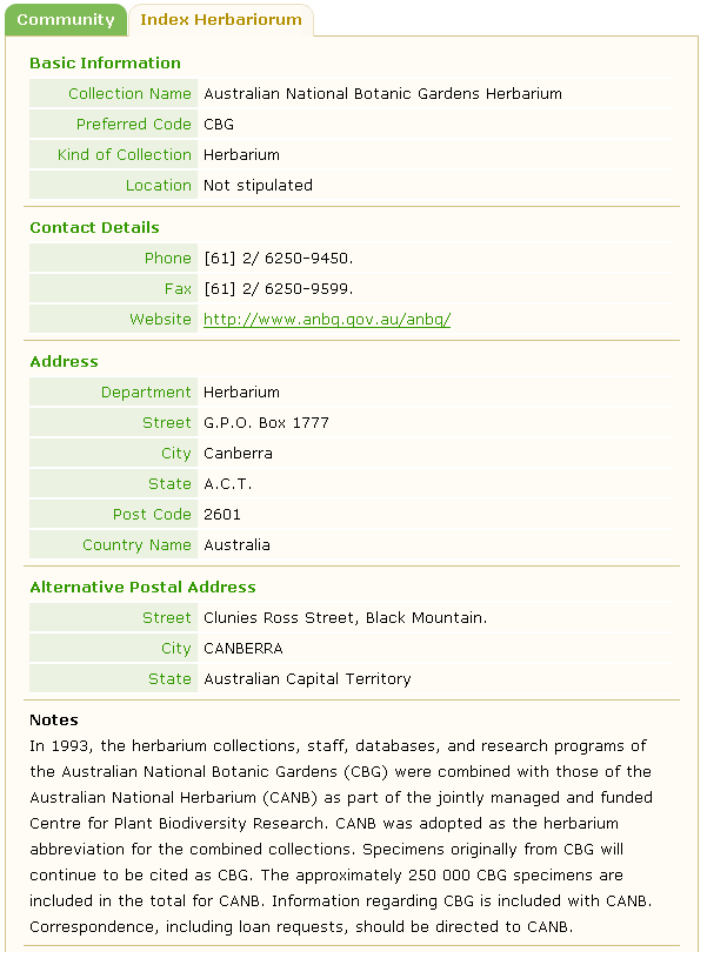
Developing the ALA

- User needs analysis
  - Document how users find biodiversity information today
- Collaborative software development
  - Reuse code from GBIF data portal
  - Develop solutions supporting other Australian data networks (AVH, OZCAM, APPD, AMRIN)
  - Share components with Encyclopedia of Life, OBIS, etc.
  - Develop taxonomic tools with ABRS and ANBG
- Work with other Australian infrastructure projects
  - NCRIS Platforms for Collaboration
  - NCRIS Integrated Biological Systems
  - NCRIS Terrestrial Ecological Research Network
  - NCRIS Australian Biosecurity Information Network
- Start with general purpose tools
  - In future develop portals for specific user groups

ALA

ALA: Metadata Repository

- Metadata: information about data resources
- Describe all resources, including:
  - Collection databases
  - Ecological/observational databases
  - Images and image libraries
  - Online bibliographies and literature
  - Sequence data
  - International networks
- Metadata includes:
  - Description
  - Ownership and access details
  - Terms from vocabularies, gazetteers, ontologies…



Community | Index Herbariorum

Basic Information

Collection Name	Australian National Botanic Gardens Herbarium
Preferred Code	CBG
Kind of Collection	Herbarium
Location	Not stipulated

Contact Details

Phone	[61] 2/ 6250-9450.
Fax	[61] 2/ 6250-9599.
Website	http://www.anbg.gov.au/anbg/

Address

Department	Herbarium
Street	G.P.O. Box 1777
City	Canberra
State	A.C.T.
Post Code	2601
Country Name	Australia

Alternative Postal Address

Street	Clunies Ross Street, Black Mountain.
City	CANBERRA
State	Australian Capital Territory

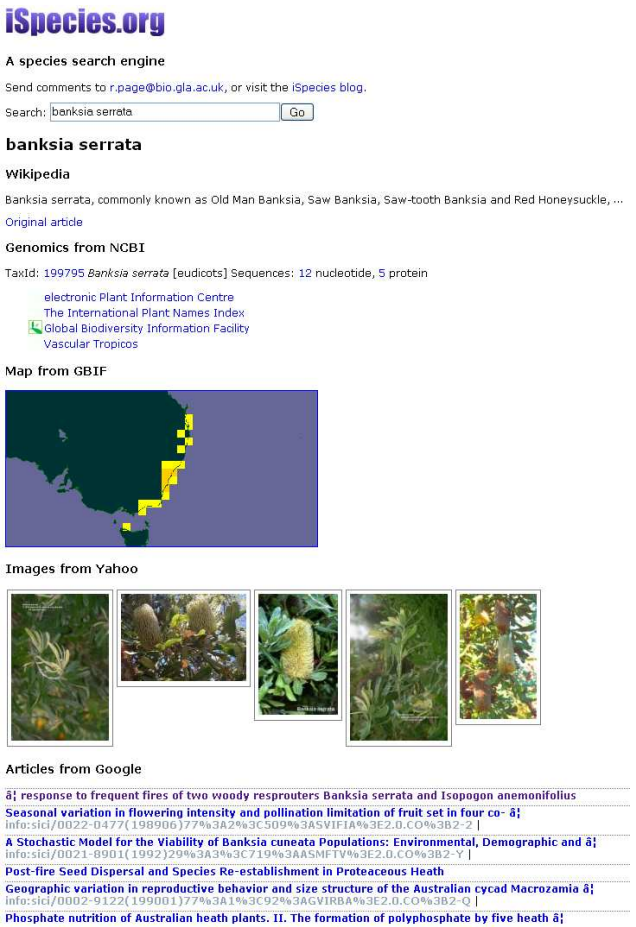
Notes

In 1993, the herbarium collections, staff, databases, and research programs of the Australian National Botanic Gardens (CBG) were combined with those of the Australian National Herbarium (CANB) as part of the jointly managed and funded Centre for Plant Biodiversity Research. CANB was adopted as the herbarium abbreviation for the combined collections. Specimens originally from CBG will continue to be cited as CBG. The approximately 250 000 CBG specimens are included in the total for CANB. Information regarding CBG is included with CANB. Correspondence, including loan requests, should be directed to CANB.

ALA

ALA: "Yellow Pages" for species

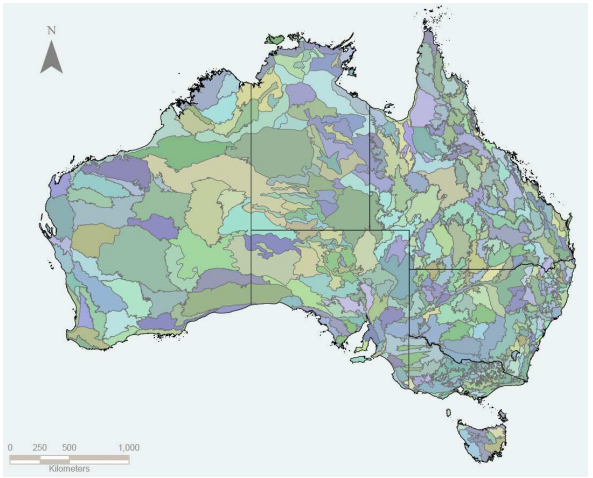
- Pages for every species (and higher taxon)
  - Links to all information resources
  - Organised by major category
  - Image thumbnails
  - Literature links
  - Links to GIS mapping
- Dynamically generated
- Direct users to original resources
- Web services
  - Enable other sites and tools directly to link content



ALA

ALA: Regional biodiversity atlas

- All georeferenced data for Australian biota
  - Specimen records
  - Observations
  - Ecological data sets
- Integrated GIS layers
  - Climate, geology, soil, vegetation, etc.
- Indexed by regions
  - Local government areas
  - Water catchment areas
  - IBRA regions
  - National parks
- Fact sheets/species lists for each region



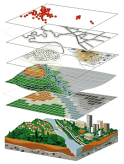
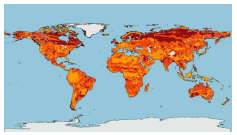
ALA

ALA: Annotating data

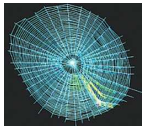
- Need tools to store comments on any record
  - User-suggested errors or corrections
  - Corrections from automated validation tools
  - Comments or structured corrections
  - Links to further information
  - Responses from data providers (conversation threads)
- Services to retrieve comments via record identifier
- Allow any tool or web site to see comments
- Allow data providers to import comments

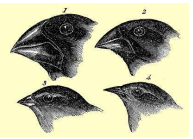
ALA

ALA: Putting it all together







GLOBAL BIODIVERSITY INFORMATION FACILITY
data.gbif.org

Encyclopedia of Life

Regional Atlas

Yellow Pages

Biosecurity Portal

Occurrence Index

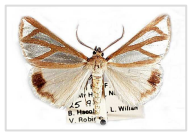
Metadata repository

Name Index

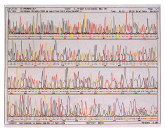
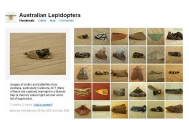
Annotation Tools

Metadata

Data




ALA

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Thank you

ALA