ACCELERATING DISCOVERY AND ACCESS TO AUSTRALIA'S BIOLOGICAL COLLECTIONS

In 2024, Australia's biological collections community, end users and research infrastructure partners came together to realise a future vision for a national biological collection. Accelerating discovery and access to Australia's biological collections provides a remarkable opportunity to transform science across a suite of disciplines including environmental monitoring, genomics, health, biosecurity, agriculture and artificial intelligence. The transformation will enable Australia's biological collections system to support novel science and partner with global programs.

Ram's Horn Squid (*Spirula spirula*) Photo Credit thebeachcomber CC BY NC
Christmas Jewel Spider (*Austracantha minax*) Photo Credit Simon Grove TMAG CC BY NC
Ruby Bonnet (*Cruentomycena viscidocruenta*) Photo Credit RogerP CC BY NC

A FUTURE STATE FOR BIODIVERSITY SCIENCES

CHANGING FACE OF BIOLOGICAL COLLECTIONS

- Australia is a mega biodiverse continent with many species found nowhere else. Only 30% of our biodiversity has been identified and described.
- Biological collections provide the fundamental infrastructure that underpin all we know and understand about species.
- Australia's biological collections are maintained by universities, museums and herbaria, state, territory and federal governments and research organisations including the CSIRO.
- New technologies including genomics, advanced imaging, and artificial intelligence and machine learning are massively expanding the potential of biological collections and the role they will play in supporting science and decision-making.
- Australia's biological collections are a remarkable national asset, however their full benefit is not being realised due to a lack of national coordination and access to skills, technology and infrastructure.

Industry and business users of Australia's biological collections by ABS categories (2016–23) derived from ALA metrics

Professional Consultants | Agriculture, Forestry & Horticulture | Infrastructure | Mining & Energy | Green Energy | Publications & Mapping | Fashion, Design, Art & Entertainment | Technology | Other

ENABLING WORLD-CLASS SCIENCE AND DECISION-MAKING

- Biological collections are fundamental to science in areas including taxonomy, biosystematics, evolutionary biology, biosecurity, and conservation biology and provide the fundamental biodiversity data that supports the ecological sciences.
- 18 of the Australian Bureau of Statistics National Research Areas were underpinned by biological collections data 2019-2023.
- More than 80% of environmental approvals under Australian environmental law rely on biological collections data.
- Biological collections are a fundamental component of Australia's biosecurity system supporting improved environmental, agricultural and trade outcomes.
- In 2019-2023 there were more than 6,000 users of collections data within government and industry.

BIOLOGICAL COLLECTIONS SUPPORT

Science and research

Biosecurity

Human health

Industry

Government decision making

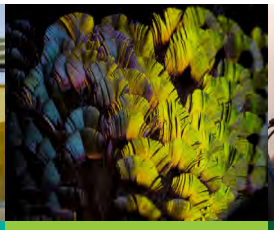
Education and Outreach

A VISION FOR REALISING A NATIONALLY DISTRIBUTED BIOLOGICAL COLLECTION

The National Research Infrastructure (NRI) Roadmap calls for a step change around a national approach to collections, as well as related national and international strategies regarding species conservation, Indigenous data sovereignty, biosecurity, biological diversity, and national research and science priorities. A national workshop hosted by Australia's biological collections community, end users, and research infrastructure partners in May 2023 identified the following five transformations required to deliver on this vision.

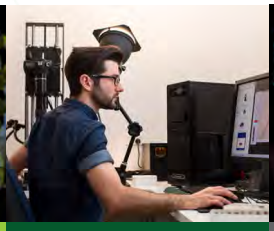
(1) Collection digitisation, storage, and management

Mobilising collections-based data and targeting investment in new technologies, developing national standards, and improving digital curation.



(2) Digital infrastructure, data access and integration

A common, standards-based 'digital extended specimen' approach to digital documentation, facilitating global access to Australian collections data.

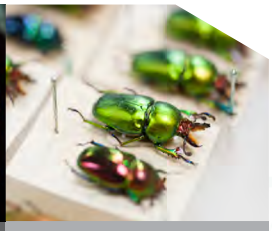


(3) Emerging transformational technologies

A national DNA sequence library, national advanced imaging store and using AI to extend physical collection specimen discovery, to align collections to emerging needs in research, policy and management.

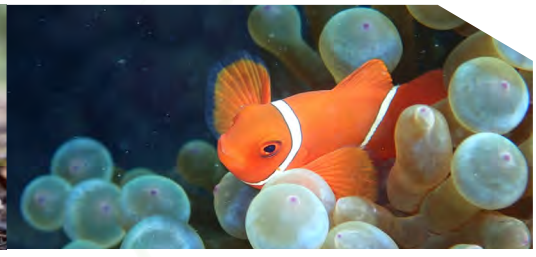
(4) Skills and workforce development

Fostering a highly trained workforce with diverse expertise in collections management, digitisation, genomics, taxonomy and biobanking.



(5) Sectoral leadership

A national coordinating body to ensure a national approach addresses priority research and collections development drivers. A national approach to Indigenous Cultural and Intellectual Property (ICIP) principles.



Orange-eyed Tree Frog *(Litoria chloris)* Photo Credit Frederik Leck Fischer CC BY NC
Emperor Cortinar *(Cortinarius archeri)* Photo Credit Hamish Beshara CC BY NC
Clownfish *(Amphiprion biaculeatus)* Photo Credit Maryanne Wirkkanen CC BY NC

Accelerating discovery and access to Australia's biological collections is required to fully realise the benefits of these remarkable science assets as national research infrastructure, supporting science, government, industry and community.

DRIVERS

- Australia's draft National Science and Research Priorities
- Convention on Biological Diversity
- Data and Digital Government Strategy
- Decadal Plan for Taxonomy and Biosystematics in Australia & New Zealand
- Equator Principles
- National Biosecurity Strategy
- National Digital Research Infrastructure Strategy
- National Plant Pest Reference Collections Strategy
- National Research Infrastructure Roadmap 2021
- Nature Positive Plan
- Research Translation and Commercialisation Agenda
- Taskforce for Nature-Based Financial Disclosures
- Threatened Species Action Plan

FURTHER INFORMATION

This initiative is being led by Australia's Biodiversity Information Partnership, a consortium including the Atlas of Living Australia, Australian Biological Resources Study, Council of Heads of Australasian Herbaria, Council of Heads of Australian Faunal Collections and CSIRO in partnership with several National Collaborative Research Infrastructure Strategy (NCRIS) partners including Australian Access Federation, Australian Research Data Commons, Bioplatforms Australia, Microscopy Australia, National Imaging Facility and Terrestrial Ecosystem Research Network. For further information please contact ala@csiro.au.

PROPOSED PARTNERS

Council of Heads Australasian Herbaria (CHAH)

Australian National Herbarium, Centre for Australian National Biodiversity Research (NRCA, CSIRO)

Australian Tropical Herbarium (James Cook University, NRCA CSIRO and Queensland Government)

Charles Sturt University Herbarium

Downing Herbarium, Macquarie University

Janet Cosh Herbarium, University of Wollongong

John Ray Herbarium, The University of Sydney

John T. Waterhouse Herbarium, University of New South Wales

La Trobe University Herbarium

NCW Beadle Herbarium, University of New England

Northern Territory Herbarium

Queensland Herbarium

Royal Botanic Gardens Victoria

State Herbarium of South Australia

Sydney Herbarium, Royal Botanic Gardens and Domain Trust, NSW

Tasmanian Herbarium, Tasmanian Museum and Art Gallery

The University of Melbourne Herbarium

Western Australian Herbarium, Department of Biodiversity, Conservation and Attractions

Council of Heads of Australian Faunal Collections (CHAFC)

Australian Museum

National Research Collections Australia (CSIRO)

Museums Victoria

Museum and Art Gallery of the Northern Territory

Queen Victoria Museum and Art Gallery

Queensland Museum

South Australian Museum

Tasmanian Museum and Art Gallery

Western Australian Museum

Australian Entomological Society Collections Committee (AESCC)

National Plant Pest Reference Collection

National Collaborative Research Infrastructure Strategy (NCRIS)

Atlas of Living Australia

AuScope

Australian Access Federation

Australian Research Data Commons

BioPlatforms Australia

National Imaging Facility

Terrestrial Ecosystem Research Network

Commonwealth

Australian Biological Resources Study

CSIRO

Geoscience Australia

Department of Agriculture, Fisheries & Forestry

Australian Bureau of Agricultural and Resource Economics and Sciences

Department of Climate Change, the Environment, Energy & Water

Office of Threatened Species Commissioner

Australian Antarctic Division

Higher Education Sector

The University of Melbourne (Godfrey Howitt Entomology Collections, Tiegs Museum Zoological Collection, Plant Systematics Research Group)

University of Adelaide (Evolutionary Biology)

University of New England (UNE Natural History Museum)

University of New South Wales (School of Biological, Earth & Environmental Sciences - systematics and taxonomy)

University of Sydney (Chau Chak Wing Museum - Macleay Collection)

Other

Taxonomy Australia