Atlas of Living Australia
ala.org.au

# Decadal Vision:
# **Growth-for-Impact**

NCRIS National Research Infrastructure for Australia An Australian Government Initiative

CSIRO

The ALA is made possible by contributions from its partners, is supported by NCRIS and hosted by CSIRO.

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Dr Tahlia Perry (University of Adelaide) leads Echidna CSI, a research project that uses the ALA's BioCollect app to collect citizen science observations of Echidnas from all over Australia.

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**Further information**

Further information regarding the ALA workplan is available by contacting **ala@csiro.au**



Cover image: Flying Peacock Spider *(Maratus volans)*

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# Executive summary

## Vision

Delivering trusted biodiversity data for Australia supporting world-class transformational research and more effective decision-making.

## Background

The ALA's *Decadal Vision: Growth for impact* was developed to extend and grow ALA's impact beyond the life of the current strategy 2020-2025. It is framed around a set of principles and growth opportunities. The Decadal Vision aims to provide clarity and certainty to data providers, stakeholders and users on ALA's long-term ambitions and priorities. It will also inform National Research Infrastructure decadal planning and investment.

## Science and decision-making drivers

The criticality of maintaining healthy and resilient landscapes through the identification, description, conservation, and restoration of biodiversity has received increasing recognition in recent years owing to the unprecedented impacts of climate change, the devastation caused by a series of summer bushfires, and the increasing ecological and economic importance of biosecurity in Australia. Understanding the critical role of biodiversity to human health and provision of ecosystem services to industries (such as agriculture and tourism), have generated a suite of pressing research challenges.

Despite these drivers, it is estimated that only 30% of Australia's 420,000 species have been named and documented thus there also remains a major taxonomic science challenge ahead for Australia. A national biodiversity data infrastructure is fundamental to supporting such a mission.

In parallel, Australia's environmental policy landscape continues to invest significant resources into biodiversity conservation, restoration, and planning, in addition to building a world-class national biosecurity system to maintain the health of our natural, agricultural, and economic systems. Australia's investment in biodiversity management extends to many billions of dollars annually demanding trusted national biodiversity data to support planning, management, monitoring and evaluation.

Collectively these research, policy and management programs demand continued access to *Australia's most comprehensive biodiversity data infrastructure* provided by the Atlas of Living Australia. The priorities below respond to emerging science and policy drivers, user feedback over recent years, and were validated through stakeholder consultations.

## Principles for growth

The principles guiding the ALA's Decadal Vision are to:

- **continue to deliver ALA's core function** through the provision of national and open biodiversity data services for research, industry, government, education, and community
- **evolve functions to support transformational science** to generate new insights into the states (current and future) and sustainable beneficial use and management of Australia's biodiversity
- **prioritise functions and activities** that are user-driven and grow or accelerate impact
- **achieve operational efficiencies** to optimise available resources and deliver priority data streams
- **collaborate** with NCRIS facilities to maximise collective benefit
- **change the mix of ALA partnership models** to realise decadal growth-for-impact outcomes.

## Core +

The ALA will extend its core biodiversity data functions to support transformational research and more effective decision-making by:

- **Supporting new biodiversity data types**
  - Support (a) 'digital extended specimen' concept from the collections sector to make data globally discoverable, interoperable, and accessible, and (b) survey data acquired by major research programs, government, and industry.
  - Incorporate novel data streams from (a) transformational advances in genomics-based biodiversity identification and monitoring such as environmental DNA, and (b) sensor network data (e.g., camera traps, acoustics).

- **Accelerating the digitisation of Australia's biological collections** and provision of this data to the ALA
- **Delivering analytics-ready data** to support the biodiversity analysis, monitoring and modelling communities in a manner that is fit-for-purpose.

## Priority sectors

The ALA will underpin emerging science innovation and biodiversity outcomes by focusing on priority sectors:

- **Biosecurity sector data** to expand ALA capability given the common data and infrastructure needs, and lack of national capability for research and policy.
- **Industry partnerships** to improve access and awareness of the ALA, and to support the sector's commitment to corporate environmental responsibility and sustainability – initially at the interface of industry, business, and government.
- **Government collaborations** to further enhance Australia's national biodiversity data system, including through partnerships to build and maintain shared capabilities.
- **International partnerships** by working alongside GBIF to support improved mobilisation of biodiversity data in the Australasian region.

## Flexible partnership models

To realise the growth for impact vision, the ALA will adjust the balance and mix of partnership models including:

- **NCRIS core** program funding directed at essential business–as–usual functions and open biodiversity data products and services where no external market exists for co-investment. This model includes continued support for partner programs (e.g., GBIF, DigiVol, Biodiversity Heritage Library).
- **National Research Infrastructure (NRI) partnerships** resourced by a consortium of NCRIS projects where shared benefits support transformational science.
- **Co-investment** in partnerships with government, industry, research, and NGOs where missions align, and downstream benefits accrue for the ALA and its main users.
- **Professional services** – fee-based services providing ALA platforms and expertise to industry and government partners where scope exceeds what's already delivered under the ALA's core capability. This model could include a subscriber service for premium and/or bespoke services.

**Inchman Ant**
*(Myrmecia forficata)*



# 01 Introduction

The Atlas of Living Australia's vision is to deliver trusted biodiversity data for Australia supporting world-class transformational research and more effective decision-making. This Decadal Vision: Growth-for-Impact has been developed to socialise a vision for the ALA's impact beyond the life of the current strategy 2020-2025. The Decadal Vision aims to provide clarity and certainty to data providers, stakeholders and users on the ALA's long-term ambitions and priorities. It will also inform National Research Infrastructure decadal planning and investment.

**Pacific Baza**
*(Aviceda subcristata)*
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# 02 Rationale

The ALA is a National Collaborative Research Infrastructure Strategy (NCRIS) research infrastructure responsible for mobilising biodiversity data to support national and international users demanding timely access to Australian biodiversity data. The ALA delivers biodiversity data to over 70,000 users in research, industry, and government annually. It delivers impact and supports research excellence in fields such as biodiversity, genetics, and ecosystem science, delivers to major natural resource management programs and supports the international community through the provision of Australian biodiversity data. The ALA's primary user communities include:

- Ecology and evolutionary biology, taxonomy and biodiversity researchers, in particular, those in academia and publicly funded research agencies.
- Museums, herbaria and other collections.
- Commonwealth and State/Territory government agencies, in particular, environmental protection, agriculture, and land management agencies.
- Non-government organisations that manage or have an interest in biodiversity, citizen scientists and community groups.
- International collaborators using ALA's data infrastructure (e.g., Global Biodiversity Information Facility [GBIF] and Living Atlases program).

The opportunities and challenges facing the sustainable use and management of Australia's biological resources are shared across research, government, industry, and community sectors. Government policy, in particular the *Commonwealth Environmental Protection and Biodiversity Conservation Act* and *2021 National Research Infrastructure Roadmap,* require all tiers of government, industry, and community to work together towards specified environmental outcomes. Research has an important role in providing insight and solutions across all these end-user sectors. Consequently, Australia's biodiversity information supply chain is highly interconnected and demands a comprehensive platform for biodiversity data such as that provided by the ALA.

In 2019, after ten years of operation, the ALA undertook a national consultation process to better understand its strengths, limitations and the future needs of our users resulting in the publication of the **ALA Future Directions National Consultation Report**. The **ALA Strategy 2020-25**, released in June 2020, is the formal response to the national consultation findings. The strategy is very much foundational, focusing on improving data quality, the robustness of our infrastructure, establishing partnerships to deliver impact and improving how we support decision making, as an extension to the world class services the ALA provides to the research sector.

The ALA Decadal Vision: Growth-for-Impact provides the roadmap for the ALA to achieve its ambition to be Australia's pre-eminent e-Research Infrastructure for biodiversity data services – an essential information service for the nation. The priorities below respond to emerging science and policy drivers, user feedback over recent years, and were validated through stakeholder consultations in 2019 (ALA Future Directions) and 2021 (ALA Decadal Vision).

# 03

# Science and decision-making drivers

The criticality of maintaining healthy and resilient landscapes through the identification, description, conservation, and restoration of biodiversity has received increasing recognition in recent years owing to the unprecedented impacts of climate change (Hoffman et al 2015), the devastation caused by a series of summer bushfires (Godfrey et al, 2021, Saunders et al. 2021), and the increasing ecological and economic importance of biosecurity in Australia (Dodd et al. 2020). Understanding the critical role of biodiversity to human health (Bratman et al. 2019) and provision of ecosystem services to industries (such as agriculture and tourism), have generated a suite of pressing research challenges.

Despite these drivers, it is estimated that only 30% of Australia's 420,000 species have been named and documented thus there also remains a major taxonomic science challenge ahead for Australia. A national biodiversity data infrastructure is fundamental to supporting such a mission. It will ensure our current state of biodiversity knowledge is understood and made accessible, and will also help prioritise future discovery and documentation campaigns.

Transformational science is needed to generate new insights and solutions for sustainable natural resources management in Australia. The grand research challenges facing biodiversity conservation and management can be encapsulated as follows:

- What are the current and future state(s) of Australia's biodiversity resources under the cumulative impact of anthropogenic and environmental stressors?
- What are the opportunities for sustainable beneficial use and management of Australia's biodiversity?

Australia's environmental policy landscape continues to invest significant resources into biodiversity conservation, restoration, and planning, in addition to building a world-class national biosecurity system to maintain the health of our natural, agricultural, and economic systems (Deloitte Access Economics 2021). The recently announced Agriculture Stewardship Package provides $32.1 million to promote biodiversity stewardship, wildlife and habitat funding totalling $200 million in response to 2019-20 bushfires, and the Regional Land Partnership that is investing $450 million in species recovery and protecting threatened ecological communities. Australia's investment in biodiversity management extends to many billions of dollars annually – when state and territory government programs and the activities of NGOs such as Bush Heritage Australia and Greening Australia are included.

Collectively these research, policy and management programs require continued access to *Australia's most comprehensive biodiversity data infrastructure* provided by the Atlas of Living Australia.

Volunteer Noreen Tasleem working on the Australian National Insect Collection
© CSIRO

# 04
# Responding to need

Trusted and harmonised national biodiversity data available under an open licence is fundamental to supporting applied and foundation science, and to support major biodiversity conservation programs. Data provides the evidence-base to understand, monitor, plan and predict.

The ALA has been at the cutting-edge of delivering such capability in Australia, and in partnership with the Global Biodiversity Information Facility (GBIF) internationally. However, significant challenges and opportunities remain to ensure Australia maintains a comprehensive, representative and adequate national biodiversity data infrastructure.

In order to meet the demand for infrastructure capable of supporting taxonomic, ecological, biosecurity and genomics research, the ALA's architecture will need to evolve. Additional opportunities exist to engage further with industry and government programs and extend ALA's analytical capability to support users beyond only the provision of biodiversity data.

The ALA will continue to work closely with the biodiversity science sector to refine research questions so that data, product and service offerings can be tailored to best meet the strategic and applied research needs.

# 05

# Principles for growth

The principles guiding the ALA Decadal Vision: Growth-for-impact are to:

- **Continue to deliver the ALA's core function** through the provision of national and open, quality-controlled biodiversity data services for research, industry, government, education, and community.
- **Evolve functions to support transformational science** to generate new insights into the states (current and future) and sustainable beneficial use and management of Australia's biodiversity.
- **Prioritise functions and activities** that are user-driven and grow or accelerate impact.
- **Achieve operational efficiencies** to optimise available resources and deliver priority data streams.
- **Collaborate** with NCRIS facilities to maximise collective benefit.
- **Change the mix of ALA partnership models** to realise decadal growth-for-impact outcomes.

**Leafy Sea Dragon**
*(Phycodurus eques)*

# 06 Core

The ALA delivers biodiversity data and related services to over 85,000 users per year across research, industry, government, and the public. It supports programs in taxonomy, biodiversity, ecosystem science, and biosecurity. It also contributes to major natural resource management programs and supports the international community as the Australian node of the Global Biodiversity Information Facility (GBIF) and the code base for the successful international Living Atlases community. The ALA was established on open-access principles, with data publishers by default using Creative Commons licences and with an open-source code base. This approach has encouraged re-use and maximised the value of data, especially for data that have been funded, produced or collected by public institutions in Australia.

The ALA holds more than 100 million biodiversity occurrence records associated with more than 111,000 species, predominantly from the Australian region. As a complement to its species data, the ALA also manages a wide range of other categories of data, including information on natural historical collections, spatial layers, Indigenous ecological knowledge, taxonomic profiles, biodiversity literature, data on biodiversity projects and animal tracking data. Investment in the ALA and in its partner capabilities (including GBIF and the Living Atlases) has radically enhanced ease of access to biodiversity data globally.

Fundamental to the ALA's core functions (Figure 1) has been the development of tools and platforms to enable our national and international stakeholders to collect, manage and deliver open biodiversity data. Examples include the ALA's support for the DigiVol platform in partnership with the Australian Museum to engage volunteers in the digitisation of biodiversity data; the Biodiversity Heritage Library (BHL) partnering with Museums Victoria to ensure Australia's historical biodiversity literature are digitised; and the ALA's Spatial Portal and Species Lists tools. More recently the ALA has partnered with the global iNaturalist platform to support citizen scientists in the acquisition and identification of biodiversity observations. Collectively this and related capabilities built and supported by the ALA have been fundamental in improving how the ALA acquires and delivers biodiversity data for Australia.

The ALA plays an important national and international outreach and engagement role with a number of communities supporting their contribution to, and participation in biodiversity science. The ALA is at the forefront of developing and providing infrastructure for the Australian citizen science sector maximising the research value of community contributed data. The ALA's Indigenous ecological knowledge program is working with Indigenous communities and language groups to integrate and preserve Indigenous biodiversity knowledge with western science. The ALA is a leader in international initiatives to develop and promote data and metadata standards, it also fosters continuous improvement in the adoption of FAIR (findable, accessible, interoperable, reusable) data principles. The ALA team plays an active role in the leadership of international biodiversity data standards bodies such as the Taxonomic Data Working Group (TDWG), and related international working groups.

# ADDITIONS TO THE ALA CORE FUNCTIONS
## *2025 AND BEYOND*

## DATA MOBILISATION 01

- Species occurrence records
- National species lists & taxonomies
- Species information
- 2-D images and sound
- Spatial and environmental layers

+

- Digital extended specimen
- Biodiversity survey data
- Sensor networks
- Genomic data

## DATA ENHANCEMENT & ANALYSIS 02

- Indexation of species data
- Data quality checks
- Sensitive species data service
- Lead and contribute to international data standards
- Spatial Portal
- Galah R package
- Explore Your Area

+

- Analytics-ready data

## PLATFORM & APP DEVELOPMENT

03

- DigiVol
- iNaturalist
- International Living Atlases
- BioCollect
- BioCollect hubs
  e.g. MERIT, NESP, WABSI
- Biodiversity Heritage Library
- ALA Hubs
  e.g. AVH, eFlora

+

- Australian Reference Genome Atlas

## ENGAGEMENT & LEADERSHIP

04

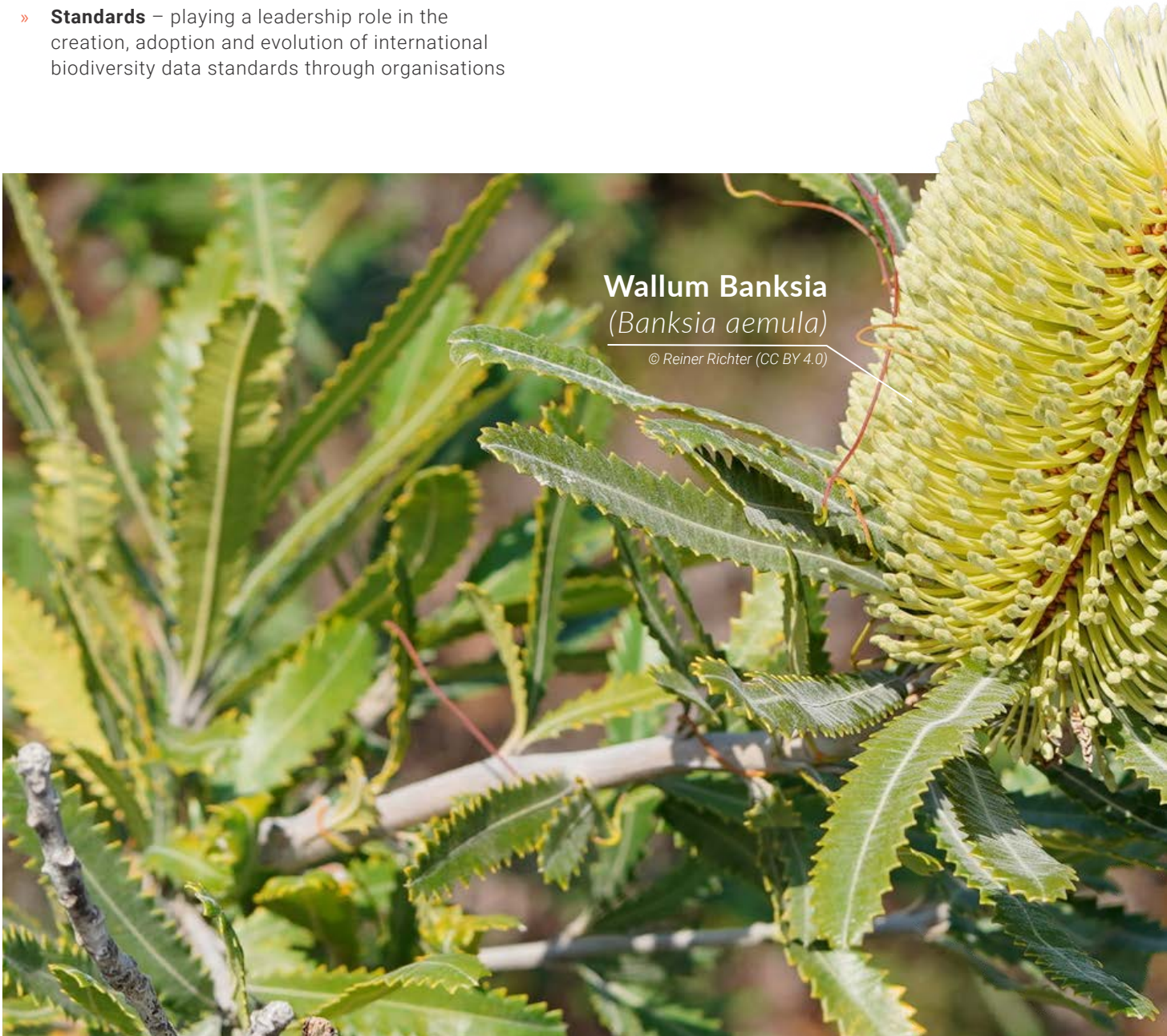
- Biological collections
- Biodiversity & ecological sciences
- Indigenous ecological knowledge
- Citizen science
- Government

+

- Biosecurity
- Industry
- International

The ALA's core functions can be summarised as follows:

- **Data mobilisation** – partnering with data custodians to harmonise Australia's biodiversity species occurrence data into a single information model and publishing this publicly as open data. Principle data types currently supported by the ALA include (a) species occurrence records, (b) national checklists and taxonomies, (c) species information, and (d) images and sounds.
- **Data enhancement** – enhancing data by applying quality checks, and indexing species occurrence data against contextual spatial layers (e.g., climate data, geographic boundaries, topographic data), and authoritative lists (e.g., species conservation status, threatened species listings) to improve the richness of species occurrence data available through the ALA.
- **Platforms & applications** – designing, building and supporting platforms that harmonise Australia's biodiversity data including DigiVol, BioCollect (including MERIT, NESP and WABSI Hubs), Biodiversity Heritage Library, iNaturalist, international Living Atlases program, and ALA hubs (e.g., Australasian Virtual Herbarium).
- **Standards** – playing a leadership role in the creation, adoption and evolution of international biodiversity data standards through organisations such as TDWG, and national bodies such as the Australian Biodiversity Information Governance Group.
- **Analytics** – supporting the discovery and analysis of biodiversity data through a suite of tools (e.g., Galah R software), applications (e.g. Spatial Portal, Explore Your Area), and training programs.
- **Sectors** – the ALA's primary points of engagement include (a) collections, museums and herbaria, (b) biodiversity and ecological sciences (c) commonwealth, state and territory governments, (d) non-government organisations, (e) citizen science, and (f) Indigenous communities and organisations.
- **Engagement and leadership** – the ALA plays a national leadership role in enhancing Australia's biodiversity data capability working in partnership with our key stakeholders and NCRIS partners. Examples include EcoAssets to improve how we report on biodiversity change, Restricted Access Data project to develop a framework for managing Australia's sensitive species data, and the multi-regional citizen science partnership with DAWE to support bushfire recovery needs.



**Wallum Banksia**
*(Banksia aemula)*
*© Reiner Richter (CC BY 4.0)*

# 07 Core +

The ALA will extend its core biodiversity functions (Figure 1) to support transformational research and more effective decision-making by:

## 7.1 Supporting new biodiversity data types

**Supporting new biodiversity data types** including digital extended specimens, survey data and novel data streams (genomics, sensor network data).

**ALA will support:**

a) 'Digital extended specimen' concept from the collections sector to make data globally discoverable, interoperable, and accessible, which will allow users to generate new insights into the status, evolution and function of biodiversity.

b) Biodiversity survey data acquired by major research programs, biological collections, community programs and government to underpin biodiversity monitoring, species distribution modelling, and related analyses.

c) Accelerating the digitisation of Australia's biological collections

and **incorporate** novel data streams from:

d) Transformational advances in genomics-based biodiversity identification and monitoring such as environmental DNA (eDNA) which allow users to identify, describe and monitor species and population genetic distributions.

e) Sensor network data (e.g., camera traps) which will provide the capability to monitor species in near real-time.

Since the inception of the ALA and its partner biodiversity research infrastructures such as the Global Biodiversity Information Facility (GBIF), the complexity, richness and variety of methods used to acquire biodiversity data, has transformed what research demands of infrastructure. This includes (a) richer biodiversity information models that support biodiversity survey data (i.e. events concept) and the emerging 'digital extended specimen' concept from the museums, collections and herbaria to make specimen data globally discoverable and accessible, and (b) novel data streams resulting from new sensor networks (e.g. camera traps) and transformational advances in genomics-based methods such as environmental DNA (eDNA) for detecting and monitoring species. Collectively these advances demand the ALA to evolve data holdings and architecture, grow storage and upskill to support these new data streams.

### 7.1.1 New biodiversity data types – digital extended specimen

Collections held in museums and herbaria have, for centuries, provided the basis for classical (morphological) taxonomy, been used to catalogue biodiversity, and been a valuable resource for studying changes in ecology and evolution such as biodiversity loss and invasive species (Miller et al, 2020). Continuously improving and novel techniques in genomics, advanced imaging, and sampling means that more information than ever before can be obtained from research on biological collections. This also means that the characterisation of a museum 'specimen' as a single pinned insect, bird mount, or fish in alcohol, or an herbarium 'specimen' as simply that which is attached to an herbarium sheet is also changing.

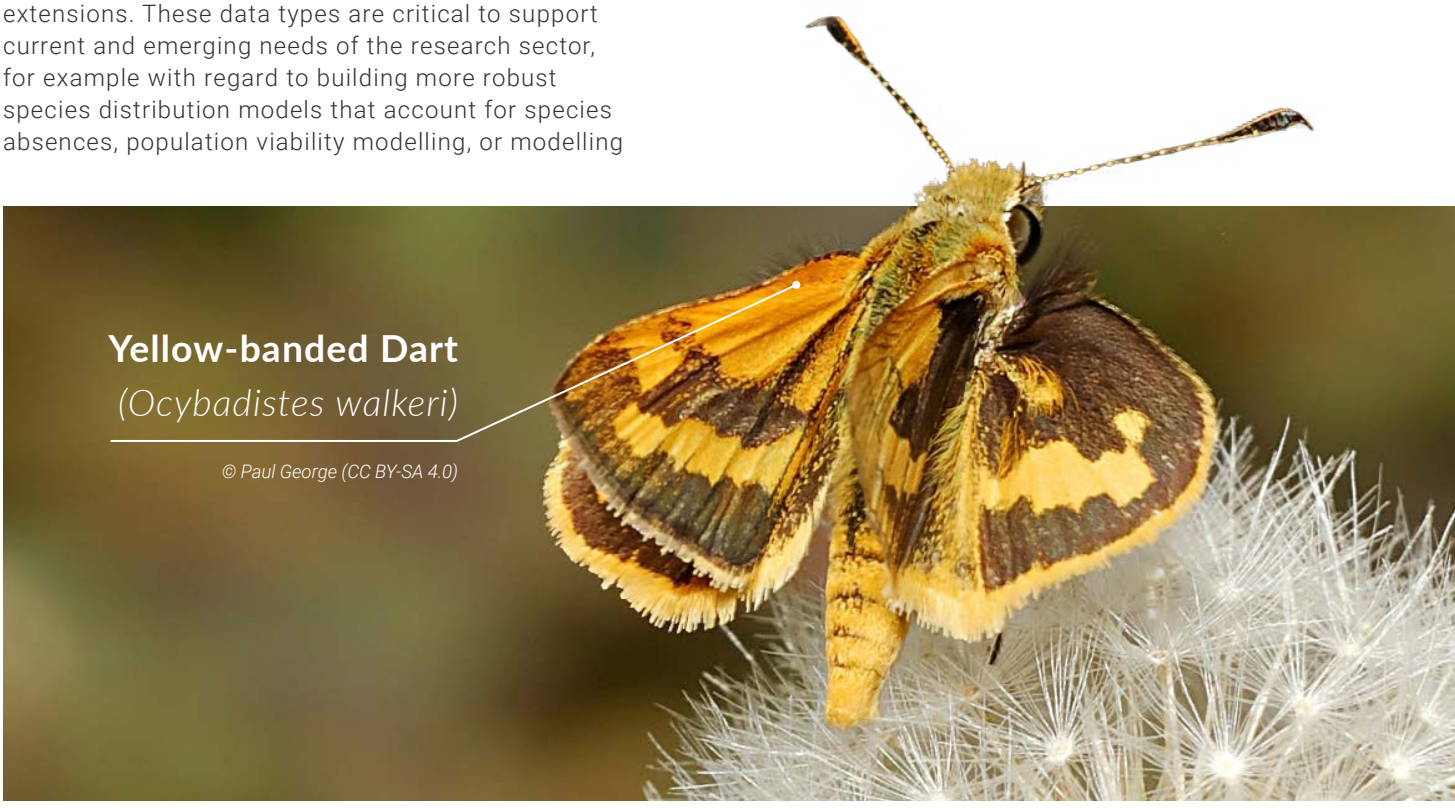
The concept of the digital extended specimen, or the digital extensible specimen, has emerged. This concept describes the collective representation of all digital and physical assets that comprise a primary biodiversity record (Schindel and Cook, 2018). A next generation challenge for biodiversity infrastructures is to broaden the current concept of standalone occurrence records into an interlinked network of knowledge, that can be traversed and interrogated by the user to generate new insights based on cross walking between morphology, genomics, biological interactions and ecology. Taxonomists regard trait data as an important extension to the digital description of collection specimens though this is still in a developmental phase, consequently the addition of trait characteristics into the ALA's digital extended specimen data is a longer-term ambition.

### 7.1.2 New biodiversity data types – survey data

The Darwin Core data standard adopted by the ALA and GBIF is an internationally accepted standard developed and ratified by the Biodiversity Information Standards (TDWG) group. It was originally created to exchange species occurrence data between collecting institutions (museums and herbaria) and is built on frameworks such as the Australian-designed Herbarium Information Standards and Protocols for Interchange of Data (HISPID) standard. Darwin Core is fundamental to ALA and GBIF architecture. It has also been widely adopted by the Citizen Science community as the basis for recording observations. Although Darwin Core can also be used to document information about survey methodology and data in a time series, the ALA has not yet undertaken to implement these extensions. These data types are critical to support current and emerging needs of the research sector, for example with regard to building more robust species distribution models that account for species absences, population viability modelling, or modelling the incursion of invasive species. The ALA will be improved by extending the data model to support time series data, and information about survey protocols and methods. This in turn would allow researchers to enhance their understanding of biodiversity change, improve how Australia reports on the state of our environment, and allow decision makers to more effectively evaluate the efficacy of conservation investments such as re-vegetation and related habitat restoration activities.

### 7.1.3 Novel data streams – genomics

Significant demand exists in the research sector to improve how we integrate, store and provide access to biodiversity data acquired through genomics-based techniques. The advent of these techniques in biodiversity science, for example environmental DNA (eDNA) for biodiversity monitoring of aquatic systems or for biosecurity threat detection, has the potential to transform how we identify, describe and monitor species and their distributions (Thomson and Willerslev, 2015). Currently there is no national capability to effectively manage biodiversity-related genomic data emerging from such programs, or the storage and linking of reference data to support science. Further, much of the data generated by these techniques is stored offshore in disconnected systems such as with the US National Centre for Biotechnology Information. With its extensive data holdings of biodiversity occurrence records across Australia, combined with strong informatics expertise, the ALA is ideally placed to play a leadership role in improving the management of this data and delivering it to the research sector.



**Yellow-banded Dart**
*(Ocybadistes walkeri)*

### 7.1.4 Novel data streams – biodiversity sensor networks

Environmental sensor networks are common in domains such as hydrology, meteorology and air quality (Mao et al 2020) and are increasingly being applied in biodiversity science (Collins and Brown, 2018), for example through the use of acoustic sensors for monitoring frog calls, and camera traps for monitoring the distribution and behaviour of animals. The ALA has developed platforms to support the inclusion of camera trap data through its enhancements to the DigiVol (**https://volunteer.ala.org.au**) platform which allows volunteers to transcribe species observations from camera trap data. However, the data flows from monitoring programs remains manual and new technologies such as AI/ML for the identification of species will demand real-time infrastructure support. Collectively this suite of biodiversity sensors will generate large volumes of data of significant benefit to the biodiversity research sector.

## 7.2 Accelerating digitisation of Australia's biological collections

Australia's biological collections provide physical specimen-based research infrastructure that underpin taxonomy and biodiversity science, as well as supporting a diverse range of other disciplines including human health studies, biobanking, genomics, biosecurity, and natural resource management. Australia's nationally distributed biological collections provide a geolocated, physical specimen-based genomic resource crucial to:

- Understanding the impacts of and responding to climate change
- Responding to national disasters such as natural hazard impacts on biodiversity
- Preparing for biosecurity threats
- Supporting emerging research focal areas such as biodiversity-related genomics and characterisation.

Central to the realisation of this infrastructure is making these biological collections discoverable by digitising physical biological specimens, ensuring these assets can be preserved indefinitely and are available globally to support biodiversity science. The task is substantial. For example, in museums and CSIRO, 77.8% of the estimated 33 million digitisable objects (many objects comprise multiple specimens) remain undiscoverable to science as specimens via the ALA. The ALA will partner with Australia's biological collections community through peak bodies including for example the Council of Heads of Australasian Herbaria (CHAH) and the Council of Heads of Australasian Faunal Collections (CHAFC), to support a collaborative approach to digitising Australia's biological collections, and making these available through the ALA.

## 7.3 Delivering analytics-ready data

The ALA will provide analytics-ready data streams by working in partnership with the environmental analytics and modelling communities to ensure a consumable and fit-for-purpose suite of data streams and services. The ALA has primarily provided harmonised biodiversity occurrence records to users via download from the ALA website, through ALA software applications or programmatically via application programming interfaces (API). Therefore, the ALA's role has focused on only a few elements of the data 'value chain' around collection, harmonisation and publication and opportunities exist to provide an analytics function to support users. The ALA has commenced delivering elements of this function through its partnership and commitment to the EcoCommons program, leadership of the EcoAssets project to provide data products to support State of the Environment reporting, development of a suite of R-Package tools to support users, and establishment of a science and decision team to provide basic analytics capability to our stakeholders.

This function has significant potential to be expanded to deliver richer analytic services, including analytics-ready data streams for modelling where a more detailed understanding of ALA data holdings and architecture is required. Opportunities also exist to provide such services to industry, in addition to government to support their compliance reporting, with respect to Sustainable Development Goal targets and other sustainability indicators.

# 08
# Priority sectors

The ALA will adopt a sectoral approach to engaging with new partners. Preliminary analysis of ALA users and existing stakeholder needs has identified four high-level sectors (biosecurity, industry, government and international) as the most pressing and fertile areas for the ALA to focus and make a significant contribution.

The ALA will underpin emerging science innovation and biodiversity outcomes by focusing on partnerships with priority sectors including the following:

- **Biosecurity sector** data to expand ALA capability given the common data and infrastructure needs, and lack of national capability for research and policy.
- **Industry partnerships** to improve access and awareness of the ALA, and to support the sector's commitment to corporate environmental responsibility and sustainability – initially at the interface of industry, business, and government.
- **Government** collaborations to further enhance Australia's national biodiversity data system, including through partnerships to build and maintain shared capabilities.
- **International partnerships** by working alongside GBIF to support improved mobilisation of biodiversity data in the Australasian region.

## 8.1 Biosecurity sector

The ALA will focus on biosecurity, a targeted nationally significant application, to inform invasive and threatened species management in near real-time. Historically, ALA data partnerships have focused on native species, though noting Australian faunal collections and herbaria also include non-native species records. This focus has been cemented through the growing contribution of citizen science–acquired data to the ALA from platforms such as iNaturalist, which also focuses on native species. The ALA's strength has therefore been in addressing research questions related to natural systems, such as restoration ecology, evolutionary ecology and native species distribution modelling. The biosecurity sector provides the ALA with new opportunities for delivering services and impact since the core infrastructure required to manage biosecurity data are the same. Dodd et al (2021) noted that Australia operates one of the world's most comprehensive biosecurity systems globally estimated to be worth $314 billion highlighting the criticality of biosecurity to Australia's landscapes, agricultural systems, people and ultimately economy. Biosecurity is a key theme of the Australian Government's Ag2030 policy agenda which seeks to grow agriculture to $100 billion by 2030.

However, there is no national mechanism to provide trusted biosecurity data. This offers an important opportunity to leverage ALA expertise to directly support the biosecurity sector. This is relevant to the 2016 NCRIS roadmap which identified biosecurity as future capability. The ALA maintains formal partnerships with organisations such as Plant Health Australia, Centre for Invasive Species Solutions and the Department of Agriculture, Water and the Environment. The ongoing and increasing importance of biosecurity risk in Australia to native plants and animals, agriculture and human health and wellbeing demands a more structured and purposeful approach to engaging with the sector for the purpose of supporting alien and invasive species data. Roles the ALA can play to deliver impact in this science and decision-making sector include:

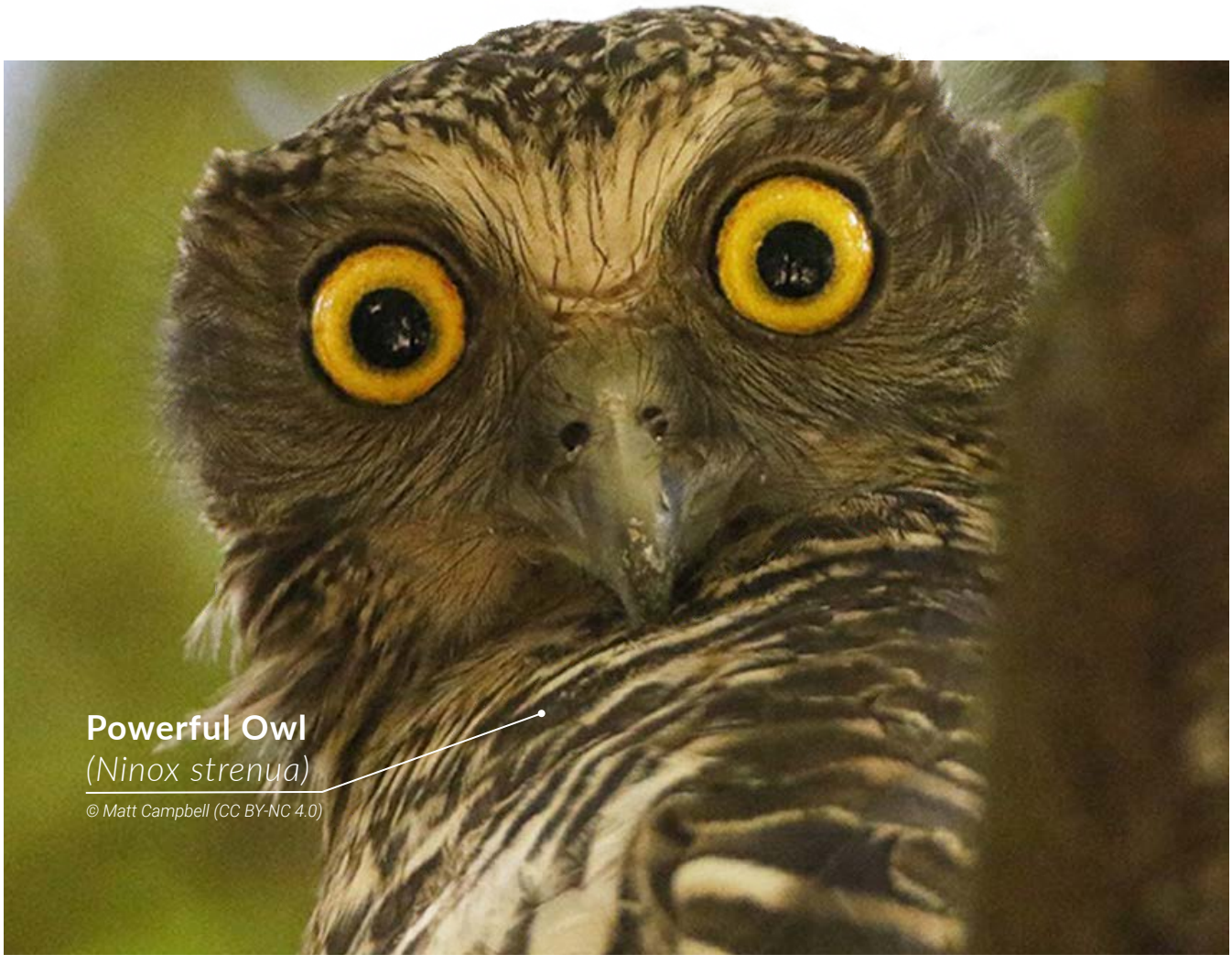
- Engaging with state government agriculture departments and related citizen science programs to build a national database of exotic pests and diseases.
- Customising ALA biodiversity informatics capability to provide national and state biosecurity surveillance and alert system for decision-makers.
- Leveraging ALA analytics capability to provide biosecurity-focussed reporting at national scales.

## 8.2 Industry partnerships

Improving the value of national research infrastructure investment to industry is an important component of the 2021 National Research Infrastructure roadmap (**https://www.dese.gov.au/national-research-infrastructure/resources/2021-national-research-infrastructure-roadmap** Last Accessed May 1st, 2022). Early in 2022 the ALA completed an industry consultation process to better understand existing awareness of ALA capability, and the needs of the sector that could be better addressed by the ALA. The study noted widespread use of the ALA by industry, primarily by the environmental consultants associated with the natural resources, energy and infrastructure sectors. Indeed, most organisations that were aware of the ALA noted it was essential to their business, principally to inform preliminary environmental assessment. The study also highlighted actions that would deliver greater impact to industry including the following:

- Extending the current focus on data quality to taxonomic and threatened species list matching and locational validation
- Storage and use of new data forms including eDNA, bioacoustics and camera trap data, which mirrors the needs of the research and biological collections sector.
- Building more effective mechanisms for feeding industry-created data streams into the ALA, for example through bulk data upload capability.

Improving ALA's engagement with industry has the potential to enrich the data available for research, while also supporting a national drive towards more effective and efficient environmental assessment. This aligns with the ALA's commitment to support the Commonwealth Digital Environmental Assessment (DEAP) program led by the Department of Agriculture, Water and the Environment. The provision of more effective search interfaces, better systems for accessing all sensitive species data centrally, and online training modules are clear opportunities. The ALA has already commenced pilot projects in this space, for example with the Western Australian Biodiversity Sciences Institute through a partnership to establish the ALA-hosted Index of Biodiversity Surveys for Assessments (**https://wabsi.org.au/our-work/projects/index-of-biodiversity-surveys-for-assessments/** Last Accessed July 16, 2021), and stakeholders in the minerals sectors to onboard their biodiversity data to the ALA.



**Powerful Owl**
*(Ninox strenua)*

**Grasses**
*(Family Poaceae)*


## 8.3 Government

The ALA will partner with all tiers of government to co-develop and collaboratively resource new biodiversity data streams and platforms that directly contribute to Australia's biodiversity data system. The ALA has a successful history of developing and maintaining biodiversity data platforms to support national programs. This includes the partnership with the Department of Agriculture, Water and the Environment to support the MERIT tool (**https://fieldcapture.ala.org.au**, last accessed July 18, 2021) which underpins major environmental management programs such as Landcare, Regional Land Partnership and the Environmental Restoration fund and currently maintains data for over 3800 projects. Innovative biodiversity data platforms have also been built collaboratively with the Western Australian Biodiversity Sciences Institute, Plant Health Australia, Murray-Darling Basin Authority, the Australian Museum, and several local governments. A priority will be to establish partnerships with the Commonwealth's Digital Environmental Assessment Program, and underpinning Biodiversity Data Repository project given the fundamental role it will play in mobilising industry-generated biodiversity data through regulatory frameworks such as the *Environmental Protection and Biodiversity Conservation Act*.

## 8.4 International partnerships

Opportunities exist to provide biodiversity data services to support the global finance, extractive minerals and agriculture industries with respect to their ethical investment and social responsibility aspirations. Global partnerships such as Cross Sector Biodiversity Initiative, the Global Oil and Gas Industry Association for Environmental and Social Issues (IPIECA), and the Equator Principles **(https://equator-principles.com)** provide a risk management framework for financial institutions to determine, assess and manage environmental and social risk in development projects globally. All have a biodiversity data element in their framework. For example, Equator Principle 10 details expectations with regard to standardised biodiversity data and the expectation that data are made available through known biodiversity data repositories. Signatories to these various frameworks include financial institutions such as ANZ, Westpac and Commonwealth Banks, Fortescue, BHP and Chevron Australia. With its work in Western Australia these frameworks provide the ALA an opportunity to grow its scope and impact through a professional services business model, while supporting GBIF's mission to broaden its network in regions not currently well represented

# 09

# Flexible partnership models

To realise the growth for impact vision, the ALA will adjust the balance and mix of partnership models:

- **NCRIS core** program funding directed at essential business-as-usual functions and open biodiversity data products and services where no external market exists for co-investment. This model includes continued support for partner programs in Australia (e.g. DigiVol, Biodiversity Heritage Library), our ongoing role as the Australian node of the Global Biodiversity Information Facility, and support for a suite of engagement and leadership activities such as with Australia's citizen science sector and expanding its Indigenous ecological knowledge program.
- **National Research Infrastructure (NRI) partnerships** resourced by a consortium of NCRIS projects where shared benefits support transformational science. Collaborative projects have already been established with the Australian Urban Research Infrastructure Network (AURIN), Australian Research Data Commons (ARDC), Integrated Marine Observing System (IMOS), BioPlatforms Australia, and the Terrestrial Ecosystems Research Network (TERN). The ALA will prioritise expanding these partnerships in areas detailed in the Decadal Vision, and transition existing joint projects into an ongoing operational delivery model where appropriate.
- **Co-investment** in partnerships with government, industry, research and NGOs where missions align, and downstream benefits accrue for the ALA and its main users. Benefits will primarily centre around the provision of trusted biodiversity data to the ALA, and development of platforms and applications to support the acquisition and harmonisation of Australian biodiversity data.
- **Professional services** – fee-based services providing ALA platforms and expertise to industry and government partners where scope exceeds what's already delivered under ALA's core capability. This model could include a subscriber service for premium and/or bespoke services.

Figure 2 details growth areas and their likely partnership model for delivery, with the depth of orange shading indicating relative emphasis.

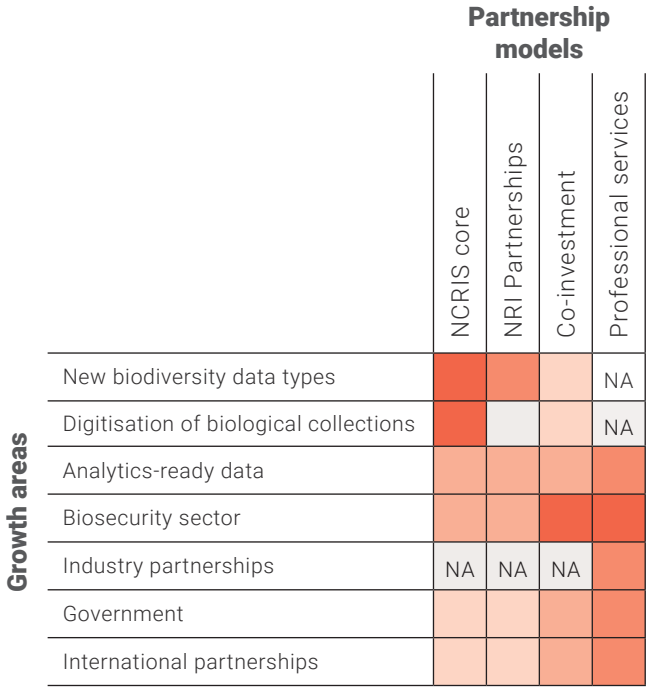



*Figure 2. Relationship between growth areas and delivery models*

# 10
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**Dainty Green Tree Frog**
*(Ranoidea gracilenta)*

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