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Atlas of Living Australia Annual Work Plan

Year 2 – 2021–2022

NCRIS
National Research
Infrastructure for Australia
An Australian Government Initiative

CSIRO

Executive summary

The ALA annual work plan details the projects, activities and major investments planned in a financial year to deliver on the strategic priorities articulated in the ALA Strategy 2020–2025 (https://www.ala.org.au/publications/). The work plan is reviewed and endorsed by the ALA Advisory Board and aligns with the Annual National Collaborative Research Infrastructure Strategy (NCRIS) Business Planning process. It is released publicly to provide our stakeholders greater visibility on ALA priorities, and to provide opportunities for collaboration. A primary focus for Year 2 (2020–2021) of the work plan will be our Trusted Data and Robust Services strategic priorities as both the Core Infrastructure Upgrade and Data Quality projects transition to a second stage. The year will also see the continued delivery of three important Australian Research Data Commons partnerships. These improve the ALA's ability to support decision-making. including with respect to national State of the Environment Reporting (in partnership with TERN and IMOS), manage native and introduced sensitive species data through the Sensitive Species Pathways Project, and support the national EcoCommons program with Griffith University and partners. Year 2 will also see the ALA commence scoping work around extending our capability to deal with more complex biodiversity data, and further engaging with industry. Priorities during 2021–2022 will also include some smaller projects, such as an upgrade of the ALA's biodiversity information explorer, continuing work to improve the ALA's approach to metrics and impact reporting, and an upgrade of the ALA4R product to support the research and higher education sectors more effectively.

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Further information

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

Introduction

The Atlas of Living Australia (ALA) is a National Collaborative Research Infrastructure Strategy (NCRIS) project responsible for mobilising biodiversity data to support national and international users demanding timely access to Australian biodiversity data. The ALA provides biodiversity data to over 82,000 users a year in research, industry and government. It delivers benefit and supports research excellence in fields such as biodiversity, genetics and ecosystem science; delivers to major natural resource management programs; and supports the international research community by providing Australian data to the Global Biodiversity Information Facility (GBIF). The ALA is founded on the principle of open data access realised through a Creative Commons (CC) licence model. This is important in the context of maximising re-use of data produced, collected, held and funded by government as well as contributing data. The ALA currently holds over 90 million records of more than 111,000 species from across Australia and elsewhere.

ALA Strategy 2020–2025

After almost a decade of operation, and in response to a shift in stakeholder expectations of what constitutes a fit-for-purpose national biodiversity infrastructure, the ALA has recognised the need to develop a new strategy. The ALA Strategy 2020–2025 (https://www.ala.org.au/publications/) was released in July 2020 and is framed around four strategic priorities, which are to:

- deliver trusted data

- provide robust services

- partner for impact

- support decision-making.

The development of the strategy was informed by a comprehensive ALA Future Directions National Consultation process, completed late in 2019. Key outcomes from the consultation included recognition that users will need to access, upload and integrate different data types from the typical biodiversity occurrence record; this can include genetic data, eDNA and sensor network data, including imagery and acoustics. Access to trusted biodiversity data, accompanied by metadata, will continue to be a fundamental requirement to support research and decision-making. Access to longitudinal, or time-series, biodiversity monitoring data and ecological plot data will be essential to understand changes and trajectories, and to predict future states of biodiversity. Finally, stakeholders identified that, for the ALA to deliver greater national benefit to research and decision-making, and to address the major national biodiversity management challenges, its data holdings will need to be more geographically and taxonomically representative and comprehensive.

The results of the ALA Future Directions National Consultation provide the reference data that have shaped the ALA Strategy 2020–2025. However, the strategy has also been developed in response to internal priorities that are often opaque to our external stakeholders. Foremost among these is the need to upgrade ALA infrastructure to address extant infrastructure challenges and anticipated needs around new data streams. In addition to guiding the ALA's future state, the strategy will also provide stakeholders with greater clarity

regarding the ALA's priorities, thus highlighting opportunities for partnering and aligning. These priorities will be communicated to stakeholders each year through the ALA Annual Work Plan.

About the ALA Annual Work Plan – 2021–2022

The annual work plan describes the new projects, activities and major investments planned for each financial year to deliver on the priorities articulated in the strategy. It provides an indication of resources committed (Table 1) and, where appropriate, identifies the ALA lead who can act as a point of reference for external stakeholders. The primary objective of the work plan is to provide the ALA Advisory Board, the NCRIS program and our partners with greater insight into the activities of the ALA and, potentially, to lead to partnership opportunities. The work plan is reviewed by the ALA Advisory Board at its March meeting in preparation for public release and/or consultation before the start of each financial year in July. This is the second work plan under the ALA's Strategy 2020–2025, for the second year of implementation. Figure 1 shows the relationship between the work plan, the ALA strategy and key timelines leading to public release before the start of each financial year.

Table 1. Indicative size of activities in the ALA work plan

Full time equivalent staff needed to scope, undertake and deliver activity	Size
< 1FTE	Small
1–2 FTE	Medium
>2 FTE	Large

Figure 1.0. Relationship between the ALA strategy, NCRIS business planning and the ALA's annual work plan

Operations (business as usual) framework

This work plan focuses on the new projects and activities planned for 2021–2022. In parallel, the ALA continues to provide extensive operational support for our systems and users framed around its five functions: data, applications, systems, projects, and science and decision support. These functions are described further in Table 2.

Table 2. Overview of ALA operational functions

Data	The Data Management Team works with data providers and supports the systems for ingestion. The team is working towards the following major goals: • streamlining data ingestion – sharing the workload of standardisation and automation with data providers wherever possible • rewarding data providers for sharing data with the ALA by helping them to manage their data loads, assess data quality and track how their data are being used • broadening the types of data that can be ingested by working with data providers, users and the local and international informatics communities.
Applications	The Applications Team manages and maintains several client-facing applications to ensure that they continue to be fit for purpose and deliver capabilities that are consistent with the ALA's strategic objectives and maximise fulfilment of the requirements and expectations of the largest possible communities of users. Applications include BioCollect, MERIT, DigiVol, Profiles platform, iNaturalist Australian Node, ZoaTrack and Phylolink. These applications support the collection of data for ingestion into the ALA as well as access to, and analysis of, data. They are one of the key ways in which new users engage with ALA services, and are often the capabilities around which vital external partnerships are built.
Systems	The Systems Team maintains and enhances ALA software for back-end systems, with a focus on code quality, security, improved automated testing, deployment and improved customer experience. The team ensures that core ALA back-end systems are secure and robust by monitoring server vitals, system logs, usage and security. One of its major functions is to administer server infrastructure in hosted environments (AWS, NCI, Nectar, IM&T), ensuring, among other things, that operating systems are up to date, security patches are applied, file systems and databases are regularly backed up (robust services and trusted data) and intrusion detection is appropriately configured (robust services).

Projects	The ALA Projects Team provides expert project management, analytical skills and sector knowledge to support the delivery of the ALA's strategic and operational priorities. This includes design, maintenance and delivery of the ALA Project Management Framework, including business processes and methodologies, documentation templates and approval mechanisms, through the Projects Oversight Board and Resourcing Forum. The team is also responsible for managing the ALA Change Advisory Board, which governs processes, documentation and approvals for software code changes and deployment across ALA systems. Finally, it provides project management and business analysis capability to ALA projects.
Science & Decision Support	The Science and Decision Support Team provides analysis products and services for internal and external stakeholders. The team focuses on the following priorities: • improving open, reproducible scientific workflows through improved support for ALA data and services in the R statistical environment • providing visualisations, dashboards, models and reports to provide insights into the collections held by the ALA and to highlight their potential ecological applications or interpretations • driving better links between the ALA and the research community through outreach via training and workshops, communications activities such as webinars and media appearances, and scientific publications.

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ALA work plan 2021–2022 at a glance

1 & 2. Delivering trusted data and providing robust services

We will be transitioning to Stage 2 for both of the following:

- Core Infrastructure Upgrade project

- Data Quality project.

In addition, ALA infrastructure will be further strengthened by implementing the recommendations from the ALA's security review and delivering the ALA's hybrid cloud hosting strategy.

Exploring different types of data

We will begin scoping studies for incorporating different data types into the ALA:

- **improving our approach to dealing with more complex data** – e.g. sampling events, ecological survey data, eDNA and more novel data streams such as acoustic monitoring and related sensor networks

- **engaging with industry as a provider of trusted data to the ALA** – scoping work to partner with the private sector, and through partnerships with the Department of Agriculture, Water and the Environment around its digital environmental assessment program.

3 & 4. Partnering for impact and supporting decision-making

We will continue to deliver three important Australian Research Data Commons partnerships:

- improving access to biodiversity data for national State of the Environment Reporting (in partnership with TERN and IMOS)

- managing native and introduced sensitive species data through the Sensitive Species Pathways Project

- supporting the national EcoCommons program alongside Griffith University and partners.

Additional smaller project priorities

- Upgrading the ALA's biodiversity information explorer

- Improving the ALA's approach to metrics and impact reporting

- Upgrading the ALA4R product to better support the research and higher education sectors.

Strategic priority 1: Deliver trusted data

Trusted, high-quality data are fundamental to supporting world-leading biodiversity research and delivering value to decision-making. The ongoing challenge of working with our community to improve and better communicate the quality of biodiversity data in the ALA emerged as a dominant theme from the ALA's Future Directions National Consultation process, conducted in 2019. Data quality is a general term referring to the taxonomic and spatial accuracy of data, but also the temporal and geographic coverage of biodiversity data in the context of its ability to support research and decision-making.

Title	Description	Lead	Size	Strategic action
Data Quality project Stage 2	Phase 2 of the Data Quality Project will examine and implement new approaches for dealing with data quality in the context of what was achieved in Phase 1 (Data Profiles Project). The ALA user community will be consulted to gather and prioritise further data quality problems to be addressed. Previous consultation indicated the following potential areas of work: • Data improvement – facilitating a record annotation life cycle • Data content – are key datasets available? • Data usage – who are the ALA's target audiences and are they using the ALA? • Data quality assertions – what additional information would help users to better select fit-for-their-purpose data? • Names and taxonomy – does the national names and taxonomy system solve the issues it is intended for? • Communications, metadata and systems documentation, engagement activities – is the ALA user community aware of the data quality approach and available tools?	Miles Nicholls	Medium	1.1 1.2

Development can then begin to resolve the highest priority issue.

Metrics & Impact Reporting project	The Metrics and Impact Reporting project is a long-term project that started in 2020. Already delivered is a comprehensive methodology to capture information about how the ALA is referenced in the academic literature on several dimensions (used, cited, attributed etc). Work continues on refining and developing standardised methodologies for reporting on how the ALA website is used and by whom. The ALA is required to create regular reports on progress, both to external organisations and internally to CSIRO, and this project aims to streamline these. The third part of this project is to develop new ways of reporting on the impact of the ALA, in addition to metrics about ALA use. Impact stories are best expressed as narratives rather than numbers, and the Communications Team will be closely involved in this part of the project. Ultimately the project will also explore how ALA metrics can better support our data providers and stakeholders groups.	Ely Wallis	Medium	1.1 4.1
Industry environmental assessment data – Scoping	The 2019 ALA Future Directions National Consultation process identified the emerging importance of industry environmental assessment data acquired by consultants as a potential source of data to the ALA. In some states and territories, it is estimated that greater than 75% of current biodiversity data acquisition occurs to support the activities of the private sector, or to meet statutory environmental assessment and monitoring requirements. This project will commence with a scoping study to better understand the key stakeholders, data availability and	Andre Zerger	Small	1.6 3.5 4.5

common licensing frameworks, and it will ultimately evaluate the feasibility of engaging with this sector to complement the ALA's existing relationships with data providers. The work also includes partnering with national initiatives operating in this space, for example those led by the Commonwealth Department of Agriculture, Water and the Environment, and internationally with activities led by the Global Biodiversity Information Facility and initiatives such as Data4Nature.

Data management pre-ingestion framework	The ALA's core infrastructure upgrade project brings an opportunity to refine the data ingestion pipeline from our data providers into our internal systems. We seek to improve the velocity of data uploads and refreshes by encouraging data providers towards using standard formats (Darwin Core Archives) and self-service tools where possible. Internally, we aim to provide the right technology mix to be able to automate processes and reduce hands-on intervention in data preparation while maintaining quality assurance workflows. These changes will require outreach in the form of seminars, workshops and changes to our knowledge base articles on data submission.	Peggy Newman	Medium	1.3 1.5
Complex data – Scoping	The Darwin Core data standard currently employed by the ALA is well suited to storing records of individual occurrences but has some limitations for storing data with a temporal structure – for example, from repeat visits to a given location for repeated surveys or biodiversity monitoring programs. Several potential alternative standards have been suggested to address this deficiency, particularly Event Core and Humboldt Core.	Martin Westgate /Peggy Newman	Medium	1.1 1.3 1.5 4.2 4.5

This project will scope the strengths and weaknesses of proposed extensions to the Darwin Core standard and identify the steps needed to extend the data model currently employed by the ALA. The capacity to accurately store complex data structures is critical to some areas of biodiversity modelling, such as time series analysis, that are themselves fundamental to accurate state of the environment reporting.

Sensitive species data pathways	Threatened and sensitive species information and data are central to significant research and policy effort. They are the focus of research effort in areas of biodiversity, ecological systems and anthropogenic and climate change, and are central to key Commonwealth and state jurisdictional policies, programs and regulation, including the *Environment Protection and Biodiversity Conservation Act 1999*. Sensitive species form a central component of biosecurity legislation (*Biosecurity Act 2015*) aimed at managing risk to human health, trade, agriculture and the environment from the introduction of exotic species, viruses and pathogens. Data required includes the full-resolution spatial location and temporal aspects of target species that often reside in jurisdictional data repositories. Data is often managed locally without nationally consistent licensing and access.	Hamish Holewa	Large	1.3 3.1 3.2 4.1

This project aims to address these barriers through the development and implementation of a national framework to enable the sharing of full-resolution threatened and sensitive species data. The framework will address issues such as

licensing, access and authority, governance and programmatic standards.

Strategic priority 2: Provide robust services

Thousands of users across research, government, industry and community sectors use ALA data and services to contribute, mobilise, access and analyse data. Beyond only data provision to the central ALA database, ALA infrastructure also supports our stakeholders to mobilise and manage their data through, for example, BioCollect, DigiVol and Atlas hubs. The ALA's evolution into one of the world's foremost biodiversity infrastructures, supporting a growth of 10 million biodiversity occurrence records annually, also requires a rethink, and potentially a system redesign, to deliver robust data services into the future. This includes both the 'soft' enablers, such as how we interact with and respond to user requests, and system upgrades to support the increasing volume, variety and velocity of data expected from new biodiversity data streams. New data streams challenging the ALA will include plot data, genetic information, acoustic, sound and video, and increasingly higher quality images. This strategy makes a commitment to improving the user experience and uplifting the robustness of our infrastructure to ensure it remains at the forefront of biodiversity data delivery.

Title	Description	Lead	Size	Strategic action
Core Infrastructure Upgrade project stages 2 & 3	The Core Infrastructure Upgrade project is replacing the various components of the ALA occurrence record system with software developed by the Global Biodiversity Information Facility (GBIF) with adaptations for the ALA's specific requirements. After 11 years of active development, the ALA's core data processing infrastructure is approaching 'end of life'. The overall goal is to remove a significant amount of legacy-IT capability by co-developing and maintaining systems with GBIF. Stage 2 and Stage 3 will commence in financial year 2021–2022. Stage 2 seeks to replace the collections and institutions metadata management system. Stage 3 will introduce new systems for the search, download and use of occurrence records.	Javier Molina	Large	2.1 2.4 2.5 2.6 3.1 4.4

API gateway development	The ALA's public-facing APIs are currently fully open for public consumption, but the granularity at which these are accessible varies. This makes it difficult to contact consumers when services change, and near impossible for the ALA to gauge its impact through these services. This project aims to develop a common API gateway facility for all ALA API services, including the existing public-facing services as well as new services planned for development and currently under construction for the Profiles and Ecodata applications. This gateway facility will enable external clients/users of the API to access the services, thereby enabling usage logging for improved management and client communications as well as tracking of metrics for impact reporting.	Peter Brenton	Small	2.4 2.5 2.6
Cybersecurity uplift	The ALA recognises the need to ensure appropriate security and privacy mechanisms are in operation to ensure data integrity and system availability and resilience. This project will implement agreed recommendations from the cybersecurity review undertaken in late 2020. Recommendations include training staff, implementing cybersecurity processes and procedures, developing security documentation, and performing regular threat assessment and vulnerability testing.	Nick dos Remedios	Medi um	2.1 4.4
Hybrid cloud hosting strategy (server hosting modernisation)	The ALA's websites, applications and services comprise over 50 separate systems that are hosted on over 150 server instances. A combination of commercial and research cloud infrastructures is currently used, based on each component's individual capacity, performance and reliability requirements. Software components have been designed to be run in both commercial and research hosting	Nick dos Remedios	Small	2.1

environments, which allows flexibility in assigning and moving components between different cloud hosting environments. This project aims to reduce costs by making better use of research cloud hosting where possible. It also aims to review hosting technologies to allow more efficient hosting utilisation and provide better capacity management.

| Biodiversity Information Explorer upgrade | The pages of the Biodiversity Information Explorer, which contain descriptive content about species as well as higher taxa, are the most accessed pages in the ALA. They are long overdue for an overhaul, as the information is often outdated and may be incorrect or inaccurate. We regularly receive feedback about these pages from users. In this project, we will consider what can be done to improve the content of the pages in the BIE, without necessarily addressing the user interface design or usability of the pages. The goal of the project will be to investigate how new data sources can be incorporated into existing pages; where new content might be developed; and what other improvements could be made – such as more intuitive linking to external data. | Ely Wallis | Med. | 1.1

2.2 |

Strategic priority 3: Partner for impact

The ALA plays a national and international leadership role in the area of biodiversity informatics and IT system development to support the biodiversity sector. Its success has also leveraged the expertise and networks provided by our partners in museums, collections, government biodiversity data programs and partner NCRIS facilities, and, increasingly, through our relationships with the citizen science sector.

This strategy makes a commitment to further provide a national and international leadership role in the area of biodiversity informatics and to partner with those communities that provide complementary skills through domains such as taxonomy and ecological modelling, and with national e-research partners. Globally, our key partnership will continue to be with the Global Biodiversity Information Facility, where we will partner to achieve efficiencies and deliver improved data services. We will also partner with other international initiatives (e.g. iNaturalist) to ensure the Australian biodiversity community has access to the best research infrastructure, technology and methods.

Finally, this strategy will guide the ALA in partnering with new sectors. These include industry and the environmental consulting sector, which in many parts of Australia is the dominant sector acquiring new biodiversity data. Engaging more deeply with the biosecurity sector will also provide an opportunity to improve ALA record holdings while supporting national biosecurity surveillance and risk assessment needs.

Title	Description	Lead	Size	Strategic action
Indigenous Ecological Knowledge project **July 2021 – June 2022**	Collaboration with First Nations partners lies at the heart of the Indigenous Ecological Knowledge project. Working with traditional owners, language and culture informants and Indigenous language centres, this project seeks to document names for plants and animals along with descriptions of them that are written in a way that makes sense to communities. For example, how does it touch, feel, taste? Several projects are run simultaneously with different Indigenous communities and language groups. During 2021–2022, work will focus on the Garragal project for the Kamilaroi languages in northern NSW and with the Noongar Boodjar Language Centre in WA.	Ely Wallis (Nat Raisbeck-Brown)	Small	3.4

Higher education engagement	Until mid-2020 the ALA maintained a K–12 education outreach function. In 2020 the management team agreed that a focus on university (tertiary) education would better align with the ALA's strategic priorities and the intent of the National Collaborative Research Infrastructure Strategy program. To inform how best to engage with this sector, a stakeholder review was conducted in late 2020 to better understand the education and training needs of university educators and students. This work was complemented by a landscape analysis of the existing education and training programs available for those in university education with a focus on natural and data sciences. In 2021 the ALA will commence delivery of a targeted and considered higher education outreach role.	Martin Westgate	Small	3.2 4.5
NCRIS road map engagement **Jan–Dec 2021**	2021 will be an important year for the ALA and its partners in the National Collaborative Research Infrastructure Strategy program, as this year is a 'roadmapping' year. The 2021 National Research Infrastructure Roadmap will set out Australia's research infrastructure capability and future areas of need for the coming five to ten years. The ALA will engage directly with the roadmapping process and will also act as a conduit to ensure the views of our key sectors help inform the roadmap expert committee.	Andre Zerger	Small	2.3
Biosecurity sector engagement **July 2021 – June 2022**	Historically, ALA data partnerships have focused on native species. 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 native systems, such as restoration ecology, evolutionary ecology and native species	Hamish Holewa	Small	4.5

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. The ALA maintains formal partnerships in this sector 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 species data.

Strategic priority 4: Support decision-making

In addition to mobilising, harmonising and delivering biodiversity data, the ALA provides users with sophisticated decision-support tools, such as the Spatial Portal and ALA4R, through its website; and partnerships to deliver advanced analytics – for example, through virtual laboratories such as the Biodiversity and Climate Change Virtual Laboratory and EcoCloud. An outcome from such capability is a user community with access, not only to data, but also to decision-making tools to support their business needs.

The ALA will continue to develop the decision-support tools to enable its users to derive the best value from Australia's biodiversity data. In parallel, we will establish closer relationships with users to better understand their decision-making needs and their expectations of biodiversity data, as well as to include longitudinal data, survey plot data and data that are 'analysis-ready'.

Within five years, the ALA's data and services will be on a critical path for a number of national and state biodiversity monitoring, assessment and reporting programs, and will be delivering data services to support decision-making. Use cases could include state biodiversity assessments and monitoring programs, and Commonwealth State of the Environment Reporting.

Using the ALA's position of strength as an integrator across government and research sectors will ensure that Australia's best biodiversity data supports key decision-making needs.

Title	Description	Lead	Size	Strategic action
Cross-NCRIS State of the Environment Reporting project **July 2020 – Dec 2022**	Australia's National State of the Environment (SoE) Report is produced every five years by the Department of Agriculture, Water and Environment (DAWE) to meet the Commonwealth's statutory reporting obligations. It spans multiple chapters – which include biodiversity, climate change and inland water, to name only a few – and the chapter authors, and the report as a whole, rely extensively on high-quality national environmental data. Given the increasing richness of data available through NCRIS facilities since the last report was published in 2016, SoE provides the perfect use-case to develop new cross-facility data assets in support of national environmental reporting.	Andre Zerger	Large	3.2 4.2

Such integrated data products would also have significant value beyond the SoE program, including for the research sector and to support related government programs. This partnership will develop SoE-focused, report-ready data assets by integrating biodiversity data from across TERN, IMOS and the ALA. The opportunities include both enrichment of the main biodiversity data assets accessible through the ALA, and development of new datasets that enable researchers to work with community-level biodiversity data.

EcoCommons Australia Program	EcoCommons is a $6 million ARDC collaborative program developed by a consortium of university, government and NCRIS partners. The program serves over 6000 unique users and acts as an important gateway for researchers and decision-makers to use ALA data and integrate it with additional environmental data from other research and government facilities.	Hamish Holewa	Large	3.2 4.1 4.2

The EcoCommons Program provides analytical models and workflows that increase the value of ALA data. These include:

- advanced informatics workflows that are developed to allow researchers and decision-makers to better understand biodiversity and the environment – including key indicators such as abundance, absence and population dynamic models

- provision of commonly used analytics software in the cloud, including R and Python.

Biodiversity data application support to government programs and NGOs **Ongoing**	The ALA provides contracted software hosting and support services to DAWE for the MERIT application, which is the principal tool for compliance and implementation recording and reporting on federal government investments in environmental protection and rehabilitation interventions. This tool provides important data to government, which inform policies and programs to improve biodiversity and other environmental outcomes. The BioCollect platform is also being increasingly used for business-critical business processes. It is used by government agencies at all tiers, industry and the natural resource management (NRM) sector, including by major environmental NGOs. For example, it is a core component of industry environmental assessment processes involving the state government and industry in WA; and Brisbane City Council and numerous other LGAs use BioCollect as a critical part of their environmental data collection and community engagement activities, with data contributing to policy and management decision-making of councils.	Peter Brenton	Large	4.2 4.4 4.5
ALA4R upgrade	The most used programming language for statistical analysis in ecological science is R, but the infrastructure for interfacing with ALA products and services from R is out of date. We will continue to maintain the legacy package ALA4R, but will also launch a rewritten package, known as Galah, in 2021. We will capitalise on these advances by providing training materials to support uptake of Galah by researchers and programmers. We will also draw on Galah in our internal workflows to provide enhanced ALA products and services as well as improved impact reporting.	Martin Westgate	Small	4.1 4.2 4.5