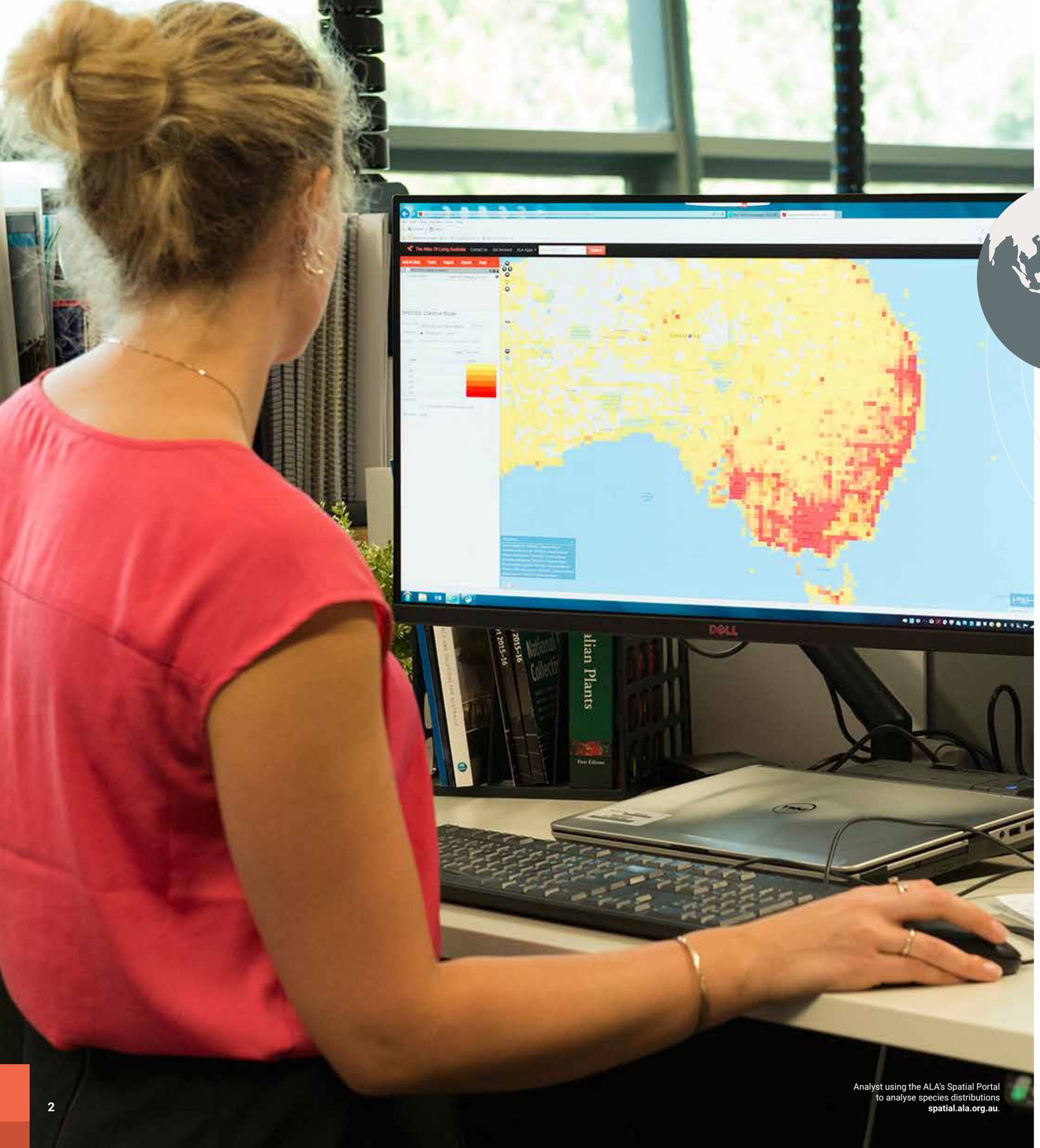
Atlas of Living Australia
ala.org.au

Strategy 2020-2025

NCRIS National Research Infrastructure for Australia
An Australian Government initiative

CSIRO



Analyst using the ALA's Spatial Portal to analyse species distributions **spatial.ala.org.au**.

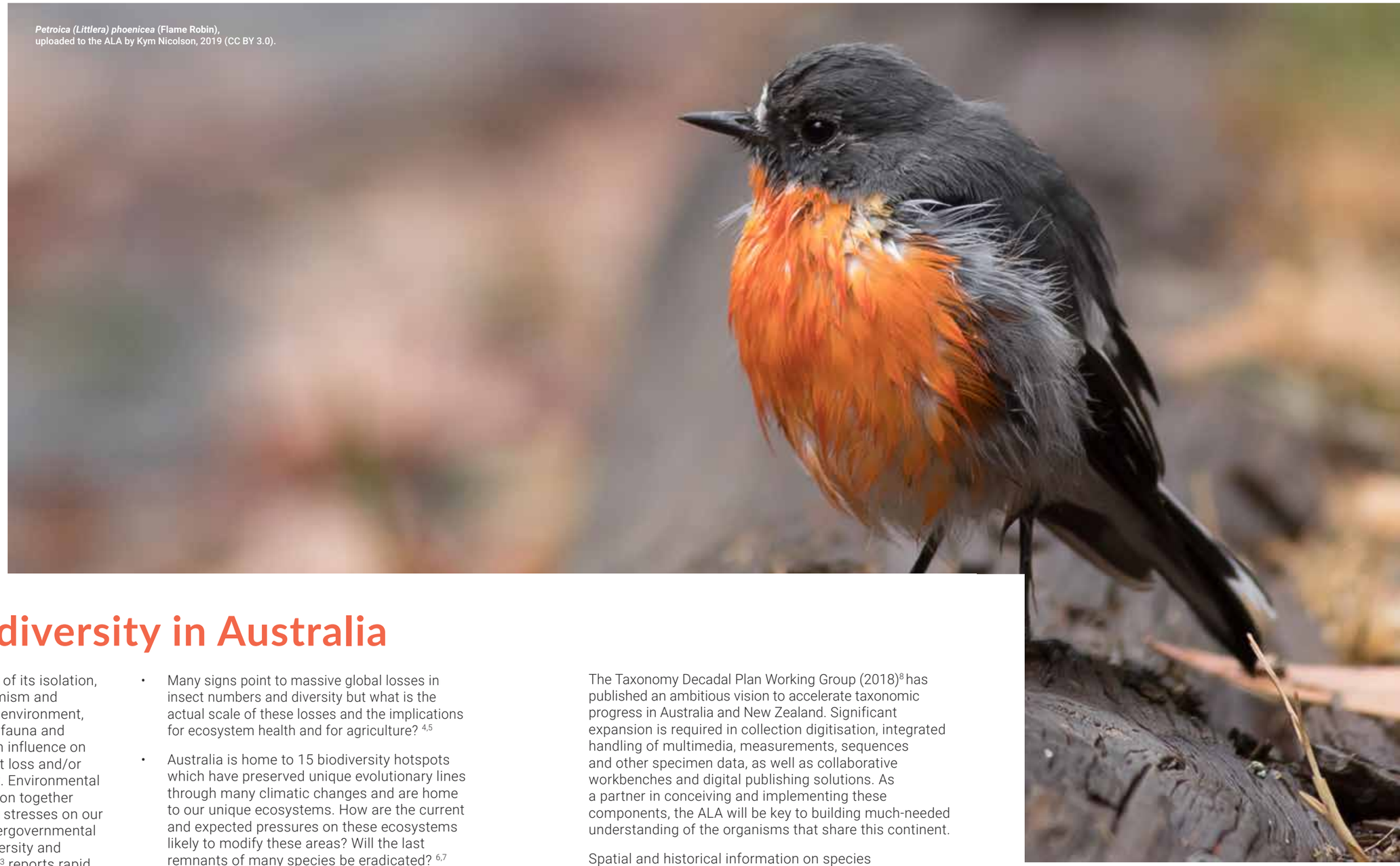
01 Introduction

The Atlas of Living Australia (ALA) is a National Collaborative Research Infrastructure Strategy (NCRIS) facility hosted by CSIRO, responsible for mobilising biodiversity data to support users demanding timely access to Australian biodiversity data.

The ALA provides biodiversity data to over 50,000 users in research, industry and government annually. It delivers impact 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 was founded on the principle of open data access, realised through a Creative Commons licence model. This is important in the context of maximising the re-use of data produced, collected, stored and fundedby government.

The ALA currently holds over 85 million records of more than 111,000 species from across Australia.



Petroica (Littlera) phoenicea (Flame Robin),
uploaded to the ALA by Kym Nicolson, 2019 (CC BY 3.0).

02 Biodiversity in Australia

As a result of its isolation, high endemism and distinctive environment, Australia's fauna and flora are rich and unique.[1,2] Human influence on the continent has led to significant loss and/or transformation of this biodiversity. Environmental challenges and human consumption together place unprecedented and growing stresses on our environment and species. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES 2019)[3] reports rapid losses in biodiversity and ecosystem health, and also states that insufficient information exists to monitor and respond to these trends.

Biodiversity researchers face the challenge of delivering and interpreting disparate information to answer the greatest environmental questions facing society. For example:

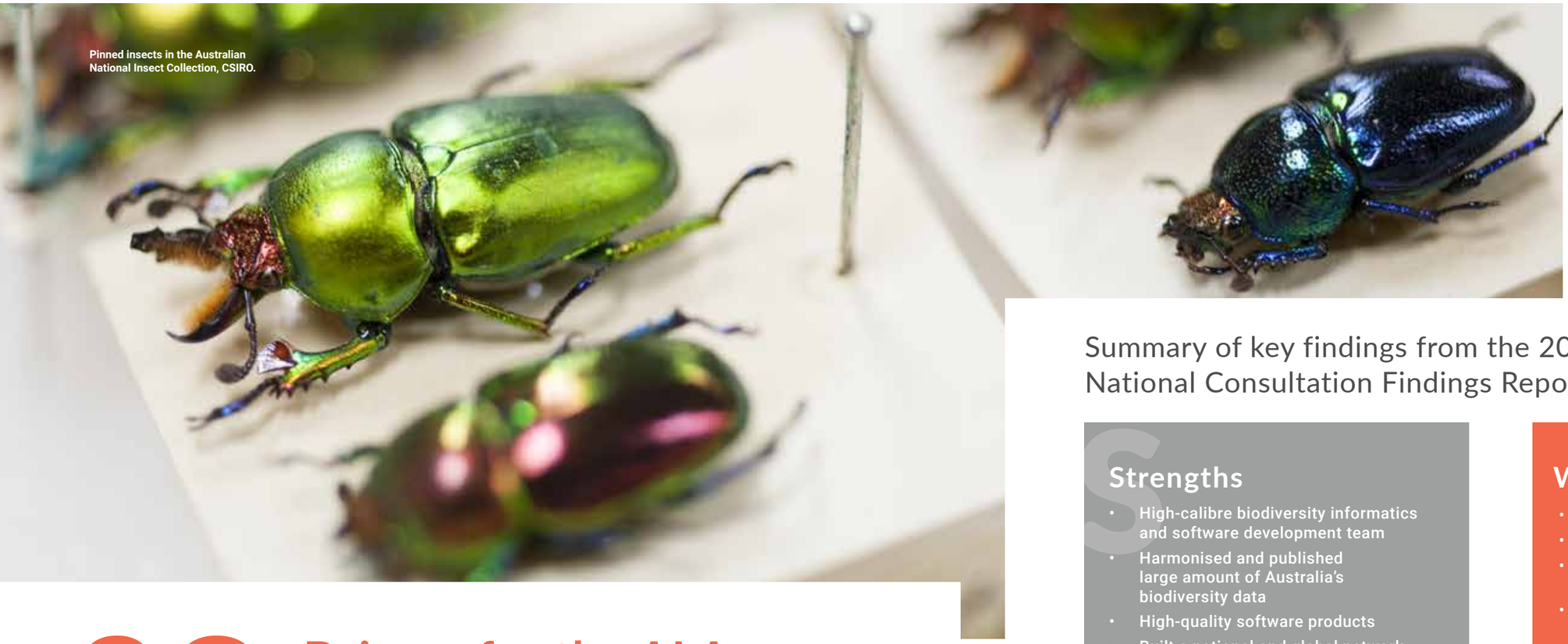
- Many signs point to massive global losses in insect numbers and diversity but what is the actual scale of these losses and the implications for ecosystem health and for agriculture? [4,5]
- Australia is home to 15 biodiversity hotspots which have preserved unique evolutionary lines through many climatic changes and are home to our unique ecosystems. How are the current and expected pressures on these ecosystems likely to modify these areas? Will the last remnants of many species be eradicated? [6,7]
- Designing effective ecology restoration programs and understanding ecological change in response to major disturbances such as the 2020 bushfire season.

The ALA can support the data-driven science to address questions such as these.

The Taxonomy Decadal Plan Working Group (2018)[8] has published an ambitious vision to accelerate taxonomic progress in Australia and New Zealand. Significant expansion is required in collection digitisation, integrated handling of multimedia, measurements, sequences and other specimen data, as well as collaborative workbenches and digital publishing solutions. As a partner in conceiving and implementing these components, the ALA will be key to building much-needed understanding of the organisms that share this continent.

Spatial and historical information on species distributions and population abundances is central not only to ecology and conservation but to all areas of environmental planning and sustainability.

The ALA is highly regarded for the progress it has made over the last 10 years in improving data access and harmonising species distribution information from previously disconnected sources. This impact has been felt by both the national and global research community.



Pinned insects in the Australian National Insect Collection, CSIRO.

03 Drivers for the ALA strategy 2020-2025

It is timely to develop a new ALA strategy for a number of reasons. First, the ALA is approaching its 10th year of operation and has transitioned from a design, prototyping and early system build phase to now delivering a robust suite of core products and services. With over 85 million occurrence records and 50,000 registered users the ALA value proposition has been proved and our users now have new expectations of the infrastructure. For instance, new technologies in advanced imaging and genetics produce valuable data of interest to our community, yet the types of data being generated challenge our current architecture.

This strategy was informed by the *Atlas of Living Australia Future Directions National Consultation Findings Report*, commissioned by the ALA and led by Dr Joanne Daly. During 2019, over 90 individuals and 35 organisations in Australia and internationally were consulted to explore strengths, weaknesses, opportunities and threats confronting the ALA.

Key outcomes from the consultation included:

- Recognition that in the near future users will need to access, upload and integrate data types different from the typical biodiversity occurrence records, these might include genetic, eDNA, sensor network, imagery and/or acoustic data.
- 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.
- The ALA will need to be more geographically and taxonomically representative and comprehensive to address the major national biodiversity management challenges.

ALA strengths, weaknesses, opportunities and threats as established by the 2019 national consultation process (shown opposite page) informed this strategy.

Summary of key findings from the 2019 ALA Future Directions National Consultation Findings Report

Strengths

- High-calibre biodiversity informatics and software development team
- Harmonised and published large amount of Australia's biodiversity data
- High-quality software products
- Built a national and global network around biodiversity informatics
- Strong institutional support

Weaknesses

- Lack of clear, forward-focused strategy
- Disconnected products and services
- Data quality and assessing fitness for purpose can be difficult
- Data not comprehensive nationally (geographic, taxonomic, temporal)
- Data not well targeted to address national challenges

Opportunities

- National leadership in informatics, data and systems
- Integrated data services across partner capabilities (e.g. NCRIS)
- Engage with government and industry/consulting sector to improve data holdings
- Delivery of curated quality assured data to users informed by research needs
- Data services and analytics for new sectors (e.g. biosecurity)

Threats

- Lack of ongoing resources
- Reputational risk from poor data quality
- Unclear mandate undermined by competitors who can deliver competing data services
- Failure to deal with new data types
- Reluctance of providers to provide data to the ALA

Atlas of Living Australia
Strategy 2020-2025

Atlas of Living Australia
ala.org.au

ALA's Vision

To deliver trusted biodiversity data services for Australia supporting world-class research and decision-making.

Strategic priorities	1 DELIVER TRUSTED DATA	2 PROVIDE ROBUST SERVICES	3 PARTNER FOR IMPACT	4 SUPPORT DECISION-MAKING
Objectives	**Deliver trusted open biodiversity data for Australia to support research & decision-making**	**Provide high-reliability products & services to our users**	**Play a leadership role to support our community and enhance Australia's biodiversity data assets**	**Support our users to best leverage data and services**
Actions	**1.1** Review and improve the quality of data to better support user requirements **1.2** Improve how the ALA communicates the fitness-for-purpose of data to users **1.3** Develop tools and promote standards to help our partners provide high-quality data to the ALA & GBIF **1.4** Establish data priorities to ensure Australia has a nationally comprehensive, representative and adequate biodiversity data infrastructure **1.5** Develop mechanisms to support the ingest, accessibility and utility of more complex data (e.g. survey plot data, environmental assessment data) **1.6** Improve the capacity of related sectors (e.g. citizen science and NRM groups) to contribute data	**2.1** Ensure systems are stable, secure and resilient **2.2** Provide a user-centred digital experience **2.3** Implement ALA business processes to enhance delivery **2.4** Ensure ALA systems meet FAIR[10] principles and can be leveraged by our partners **2.5** Enhance the technical architecture to meet emerging user needs (e.g. machine learning, ecological survey data) **2.6** Ensure data and systems can be integrated into partner software applications	**3.1** Play a national and international leadership role in biodiversity data and informatics **3.2** Partner with NCRIS and other national initiatives to deliver greater collective value to data users **3.3** Partner with internationally recognised services such as GBIF, Catalogue of Life Plus and iNaturalist to enhance service delivery **3.4** Support communities that have subject matter expertise in areas of importance to biodiversity research (e.g. collection facilities, peak research bodies, Aboriginal and Torres Strait Islander peoples) **3.5** Engage with new sectors to prioritise data collection in areas of greatest research and decision-making need	**4.1** Deliver intuitive tools and capabilities to support decision makers to better use data in the ALA **4.2** Support major national biodiversity assessment, reporting and monitoring programs with data in the ALA **4.3** Facilitate knowledge transfer and coordinate programs that support best practice data analysis and utilisation **4.4** Provide solutions that meet security, privacy, sensitivity and other related needs of decision-makers **4.5** Work with new sectors to extend the reach & relevance of the ALA (e.g. biosecurity)

Aboriginal ranger using The Tracks App, a bi-lingual app to help record animal tracking data in the field. The Tracks App was developed by the Atlas of Living Australia for the Central Land Council.

04

The ALA has defined four strategic priorities to underpin its vision.

Deliver trusted data

Trusted, high-quality data are fundamental to supporting world-leading biodiversity research and delivering value to decision-making. The need to work 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 2019 consultation process. Data quality is a general term referring to taxonomic and spatial accuracy of data. It also refers to the temporal and geographic coverage of biodiversity data and its ability to support research and decision-making. Trusted data becomes increasingly critical if the ALA is to also support monitoring and regulatory or statutory compliance processes. These more rigid processes will demand a more mature and considered approach to capturing, managing and communicating the strength and weakness of biodiversity data.

The delivery of trusted data requires a national response. Currently, the ALA plays both the role of a data aggregator for major data contributors (e.g. government departments), as well as data custodian for much of the citizen science data and data provided by smaller programs not able to maintain their own data management systems. The ALA will utilise its national and global position to provide guidance and solutions to enhance the quality of data from all data provider communities.

Provide robust services

Thousands of users across research, government, industry and community sectors use the ALA to contribute, mobilise, access and analyse data. Beyond data provision to the central ALA database, ALA infrastructure also supports our stakeholders to mobilise and manage their data through tools such as BioCollect (a data collection and management tool), DigiVol (a data transcription tool) and ALA hubs (such as the Australasian Virtual Herbarium, Murray-Darling Basin Authority hub).

The ALA started as a modest partnership between institutions with biodiversity collections to share data using an open digital platform. It has evolved into one of the world's foremost biodiversity infrastructures supporting a growth of 10 million biodiversity occurrence records annually. However, to continue to deliver robust data services into the future the ALA needs to keep abreast of research developments and government needs. This includes continual improvement to both the 'soft' enablers such as how we interact with and respond to user requests, as well as system upgrades that support the increasing data volume, variety and velocity of data expected from new biodiversity data streams. New data streams currently challenging the ALA system include plot data, genetic information, acoustic, video and increasingly higher quality images.

This five-year strategy makes a commitment to improve the ALA user experience and uplift the infrastructure to ensure it remains robust and at the forefront of biodiversity data delivery.

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, partner NCRIS facilities and increasingly through our relationships with the citizen science sector.

This five-year 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, ecological modelling and national e-research partners.

We will continue to grow our partnerships with Aboriginal and Torres Strait Islander people, supporting their aspirations by recognising, respecting and enabling two-way biodiversity knowledge and its interface with research data infrastructure.

Globally, our key partnership will continue to remain with the Global Biodiversity Information Facility (GBIF) with which 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, high quality data and methods.

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

Support decision-making

In addition to mobilising, harmonising and delivering biodiversity data, the ALA provides users sophisticated decision-support tools through its website, such as the Spatial Portal and ALA4R. It also fosters 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 to not only data, but also to the decision-making tools to support their business needs.

The ALA will continue to develop the decision-support tools to enable our 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 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 will deliver data to support decision-making and be on a critical path for a number of national and state biodiversity monitoring, assessment and reporting programs. Use cases could include state biodiversity assessments and monitoring programs, and Australia's State of the Environment reporting.

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

A volunteer sorting a seed collection for National Research Collections Australia, CSIRO.

05 Performance and reporting

The ALA Strategy 2020-2025 will form the basis of the ALA's annual business planning process which is reviewed by the ALA Advisory Board in March each year. Major activities and projects for that year will be communicated to our key stakeholders and made available on the ALA website to provide greater awareness of the ALA's work program.

The ALA will measure annual performance to assess progress against the aspirations of the strategy through the ALA impact framework. This will be reported to the ALA Advisory Board and the NCRIS program. Key performance indicators will also be a core component of the annual performance monitoring in addition to supporting information including satisfaction surveys, user feedback, analytics from ALA systems and data citation metrics.

06 References

1. Chapman (2009). Numbers of Living Species in Australia and the World. 2nd edition. Australian Government, Department of the Environment, Water, Heritage and the Arts. Canberra, Australia. http://www.environment.gov.au/science/abrs/publications/other/numbers-living-species/contents
2. Cassis, Laffan & Ebach (2016), Biodiversity and Bioregionalisation Perspectives on the Historical Biogeography of Australia, in Ebach, M (2016), ed., Handbook of Australasian Biogeography (Taylor & Francis: Melbourne)
3. IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Díaz, J. Settele, E. S. Brondízio E.S., H. T. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera, K. A. Brauman, S. H. M. Butchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razzaque, B. Reyers, R. Roy Chowdhury, Y. J. Shin, I. J. Visseren-Hamakers, K. J. Willis, and C. N. Zayas (eds.). IPBES secretariat, Bonn, Germany. 56 pages. https://ipbes.net/global-assessment-report-biodiversity-ecosystem-services
4. Wagner (2020), Insect Declines in the Anthropocene. Annual Review of Entomology 65:457–80. https://doi.org/10.1146/annurev-ento-011019-025151
5. Cardoso, P et al (2020). Scientists' warning to humanity on insect extinctions, Biological Conservation (in press) https://doi.org/10.1016/j.biocon.2020.108426
6. Laurance, W. F et al. (2011). The 10 Australian ecosystems most vulnerable to tipping points. Biological Conservation, 144(5), 1472-1480.
7. Harris R. M. B, et al., Beaumont, L. J., Vance, T. R., Tozer, C. R., Remenyi, T. A., Perkins-Kirkpatrick, S. E., ... Bowman, D. M. J. S. (2018). Biological responses to the press and pulse of climate trends and extreme events Nature Climate Change, (2018), 8, 7, (579-587), 10.1038/s41558-018-0187-9
8. Taxonomy Decadal Plan Working Group (2018). Discovering Biodiversity: A decadal plan for taxonomy and biosystematics in Australia and New Zealand 2018–2028 (Australian Academy of Science and Royal Society Te Apārangi: Canberra and Wellington)
9. NESP Earth Systems and Climate Change Hub. 2019. Climate change impacts on the Gondwana Rainforests of Australia (workshop report), Earth Systems and Climate Change Hub Report No. 8, NESP Earth Systems and Climate Change Hub, Australia.
10. The FAIR data principles: findable, accessible, interoperable and reusable.

Ecologist in the field.
Fenner School of Environment and Society,
Australian National University.

Image credits

Front cover: Frontal view of the native Australian Cuckoo wasp *Chrysis lincea* (Chrysididae: Hymenoptera). © Pia Scanlon, Western Australian Agricultural Authority (Department of Primary Industries and Regional Development) 2020.

Back cover: Variegated Fairywren *(Malurus lamberti)* uploaded to iNaturalist by rebelrebel55 (CC BY-NC).

Citing this publication

Atlas of Living Australia Strategy 2020-2025, Atlas of Living Australia, Publication Series No 2, Canberra, Australia, pp. 14.

Atlas of Living Australia | support@ala.org.au

Atlas of Living Australia
ala.org.au

Contact us support@ala.org.au