

Australian Museum
Research Institute

Science Strategy 2023 – 2027



Australian Museum Research Institute

Since 1827, the Australian Museum (AM) has supported research, collections, and public education, contributing to a better understanding of natural and cultural diversity. Today, the AM's natural science and cultural collections are accessed by researchers worldwide, leading to ever-expanding insights about the planet, including its history, biodiversity and the human cultures it supports. The AM respectfully acknowledges its relationship to First Nations peoples, Aboriginal, Torres Strait Islander, and Pacific Islander communities who care for their culture, land, waters, and all living things. The AM's science benefits from their experience and deep knowledge of the natural world and their continuous cultural practices.

In 2014, the AM named its science division the Australian Museum Research Institute (AMRI) to provide a stronger and more cohesive presence in the scientific community and facilitate wider public dissemination of the AM's science. Research undertaken by AMRI scientists, drawing on the AM's vast collections, informs the public spaces and activities of the Museum and addresses the critical issues of the present. This includes studies of biology and archaeology, past and present environments, the impacts of climate change, wildlife and zoonotic diseases, and the management of pest species and other biosecurity risks. In 2022/23 AMRI scientists, senior fellows and research associates discovered and named 210 new species and published 239 publications.

AMRI operates under the Australian Museum Trust Act 1975 (NSW), which has two specific objectives:

1. Propagate knowledge about the natural environment of Australia and to increase that knowledge.
2. Give particular emphasis to propagating, increasing, and applying knowledge in the natural sciences of biology, anthropology, and geology.

The objectives of AMRI are to:

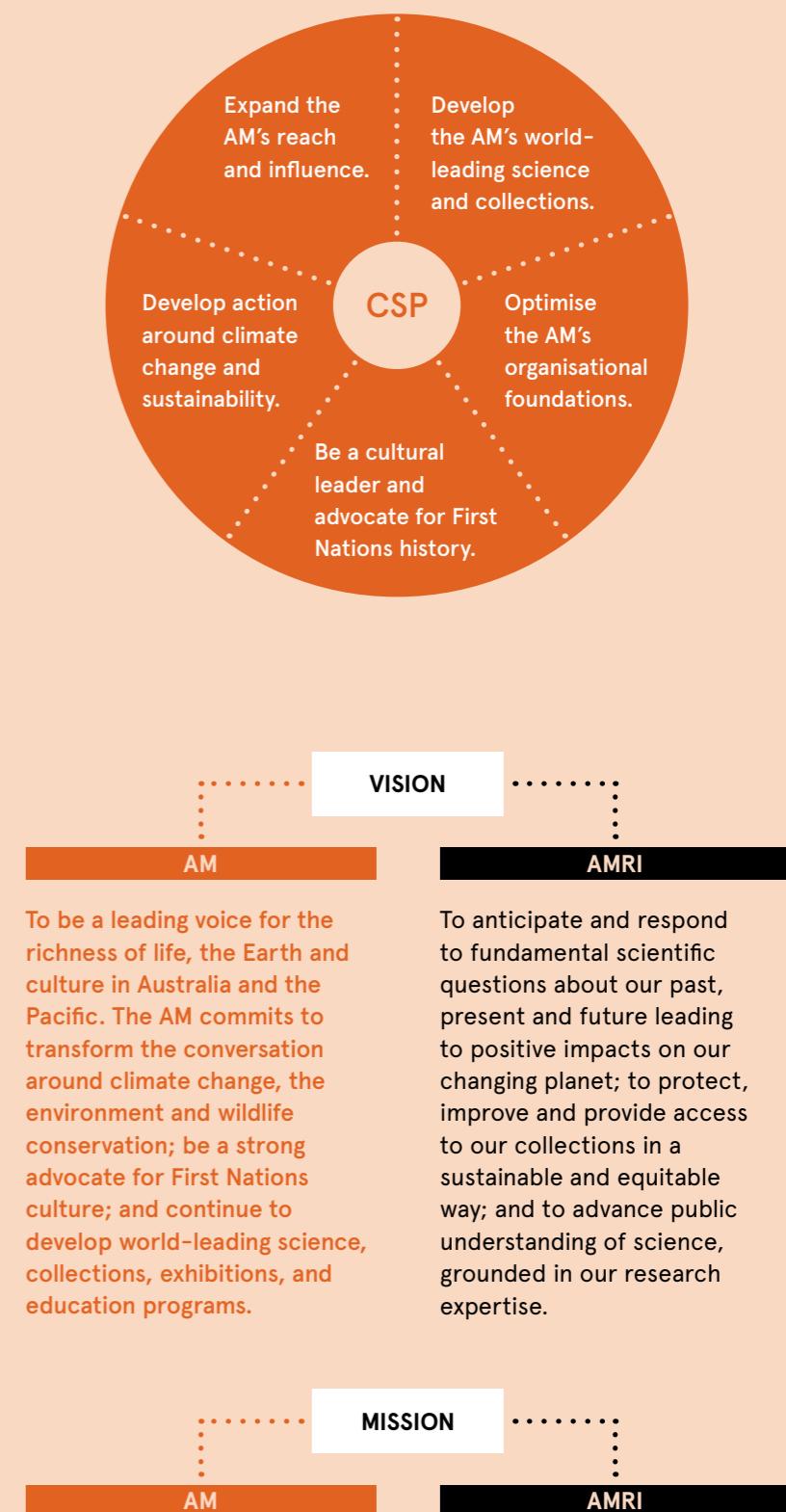
1. Create fundamental knowledge of the natural world through studying the natural sciences of biology, geology, and archaeology.
2. Apply and disseminate this knowledge to the scientific community and wider public through innovative and engaging means.



Photo Tom Bannigan

AMRI's Science Strategy 2023-2027 sits within the Museum's current Corporate Strategic Plan (CSP), which provides a framework against which the targets to be met by AMRI's Science Strategy have been developed.

The AM's CSP identifies five strategic priorities that are reflected within the Science Strategy's objectives:



To be a leading voice for the richness of life, the Earth and culture in Australia and the Pacific. The AM commits to transform the conversation around climate change, the environment and wildlife conservation; be a strong advocate for First Nations culture; and continue to develop world-leading science, collections, exhibitions, and education programs.

To anticipate and respond to fundamental scientific questions about our past, present and future leading to positive impacts on our changing planet; to protect, improve and provide access to our collections in a sustainable and equitable way; and to advance public understanding of science, grounded in our research expertise.

To ignite wonder, inspire debate, and drive change.

To be a trusted global leader in scientific research, collections care and public engagement.

About AMRI



Institutional Value

AMRI is the scientific foundation of the AM, providing research and scientific excellence that underpins the public experience at the Museum. AMRI strives to understand and respond to challenges facing Australia and the region through scientific research, communication, and education. The AM's deep knowledge of biodiversity and geodiversity, combined with integrative, collections-based approaches, provides the AM with a unique perspective on understanding the evolution of the environment and its trajectory into the future. AMRI scientists discover and document biodiversity within the AM's backyard and beyond, identifying potential environmentally and economically devastating pests, and use molecular techniques (DNA) to solve wildlife forensic mysteries and to understand the origins of Australia's unique fauna.

AMRI's research focuses on some of today's major challenges including:

- Understanding changing biodiversity including impacts of climate change via taxonomic research and contributing to threatened species and conservation management; and
- Researching major changes in earth sciences, particularly in mineralogy, petrology, and palaeontology; and
- Exploring and communicating under-represented histories and cultures

The AM holds a remarkable 22 million specimens and objects in its collections – approximately 19 million are in the natural science collection. The AM's natural science collections and AMRI research is underpinned by significant scientific infrastructure including the Australian Centre for Wildlife Genomics, Collection Care and Conservation Lab and the Lizard Island Research Station, situated on Australia's Great Barrier Reef. Combined with digital citizen science projects, high impact expeditions, and extensive networks and partners, AMRI is at the forefront of scientific discovery.

AMRI communicates its scientific research widely through a variety of methods including publication in scientific journals, books, blogs, public forums, AM webpages, exhibitions, education programs, and the provision of technical advice to government and industry. In doing this we inspire interest in the natural world and inform decision-makers.

FOCUS

In order to deliver the greatest impact, the research and initiatives of the AM's scientists and collaborators are guided by core principles. The AM strives to innovate by sharing resources and ideas, being multidisciplinary, and working with others to drive scientific and cultural discoveries.

PRINCIPLE 1

Undertake fundamental natural sciences and archaeological research

This principle includes understanding the diversity and evolutionary history of animals and the development and function of ecosystems through time, as well the cultural elements that inform how people value, understand, and engage with biodiversity. This principle underpins the AM's ability to understand and conserve species diversity, by championing biodiversity discovery. This includes the spatial distributions of animals and the interactions of animals in different ecosystems. An important part of contemporary discovery is engagement and collaboration with First Nations communities to learn from their knowledge.



PRINCIPLE 3

Identify and implement solutions to address environmental challenges

AMRI research objectives, projects and outputs translate into real-world impacts and applications. AMRI supports government and industry in addressing important challenges, such as setting plans and priorities for biodiversity conservation, using forensic techniques to combat wildlife crime, managing Australia's marine fisheries, or responding to threats to aviation from airplane collisions with wild birds. Research in AMRI also provides a better understanding of the environmental challenges of our time, including the increasing impacts of large-scale bushfires on Australian species and landscapes, implications of rising temperatures for the distribution of native and invasive species, and disruptions to marine ecosystems, including Australia's coral reefs, from warming oceans and rising sea levels. A key AMRI contribution is national and international biosecurity capacity building, particularly via reference specimens held within our collections and our scientists' expertise, which help to protect against impacts of invasive species on agriculture, forestry, fisheries, and of course on our unique terrestrial and marine ecosystems. Engaging the public broadly in AMRI research, especially via our citizen science projects like FrogID, increases the scope and impact of our research contributions, as does the increasing widespread use of our digital collections resources in applied research, government decision-making, and education.

PRINCIPLE 4

Reveal the history of the environment and culture through time

This principle relates to the diverse ways that societies have actively created and interrelated with their natural and cultural environments over time. It focuses on human perceptions, impacts and ways of living within these environments, particularly within the Australian and Pacific regions. As part of this the AM respectfully values the contribution and knowledge of First Nations peoples of Australia and the Pacific region who have managed and cared for the environment over many millennia. Activities centre around archaeological research including partnering with communities to deepen cultural understandings. Research focus areas include tangible and intangible cultural heritage and the role and responsibilities of museums in contemporary society and helping people to engage with (and respond to) the challenges of our changing world in a manner that explores ways to support respectful engagement.



Core Assets

World-class natural science collections

The AM is a cornerstone of Australia's distributed network of natural history collections. The AM's collection has more than 22 million objects and specimens and is the largest in the Southern Hemisphere, with most of the collections based in the city of Sydney. Some 19 million specimens and objects make-up the natural history collection. The AM is Australia's first museum and has collections from across Australia, the Pacific and Southeast Asia, with a particular focus on New South Wales.

The Australian Museum collections have been carefully acquired for over 190 years for their scientific and cultural value. The value of the collections lies in their contribution to scientific understanding, cultural identity, environmental management and conservation, education, interpretation, public engagement, and inspiration. As such, they are largely irreplaceable – and valued at around \$1 billion. The AM's collections contain unique snapshots of evolutionary history that unlock a wealth of understanding of human impacts on the changing planet.

Expertise and dedication of staff, volunteers, and collaborators

Many of the AMRI staff and associates are world experts. AMRI's strength lies in its ability to apply their expertise across a range of disciplines to manage the collection and explore and resolve scientific questions in novel and exploratory ways. AMRI staff and honorary appointees also bring science and cultural understanding to the community, inspire curiosity and passion for the planet, and spark conversations about the future through exhibitions, learning programs, and a range of media channels. The AM's volunteer and citizen science network increases its capacity to undertake science, building its advocacy base and contributing significant outcomes. The Museum's education programs help provide a pipeline of young researchers and citizen scientists.



Collaboration adds the crucial dimension required to address the challenges and opportunities of the future. Deepening and expanding existing partnerships and driving new partnerships will be key to the AM's success in helping to address these challenges. The Museum's internationally recognised collections and expertise provide us with opportunities to collaborate widely – with universities, research institutes and governments, natural resource and biosecurity managers, industry groups, non-government organisations, First Nations Peoples, strategic communicators, and the wider community.

Research infrastructure for studying large collections and 'big data'

The collections are a reference tool for understanding the biodiversity of Australia and neighbouring regions. Representing a cornerstone of natural history science infrastructure, it provides information, and material for educational and exhibition and display purposes. The AM expands, develops and cares for the collections to provide a resource in perpetuity for high impact research. Digital technology provides opportunities for engaging more stakeholders in the research on, and exploration of, the collections. The AM's collections are housed in several locations including the Australian Museum in Sydney, the Museum's Discovery Centre at Castle Hill, the Australian Fossil and Mineral Museum in Bathurst, and the Age of Fishes Museum in Canowindra. The other facilities host state-of-the-art infrastructure that support priority science areas. They include:

- The Australian Centre for Wildlife Genomics (ACWG) and frozen tissue collection, which facilitates molecular based research of the highest calibre and provides essential genetic services in species identification and sex determination of wildlife. ACWG has attained National Association of Testing Authorities accreditation and is the only wildlife forensic laboratory accredited in the Southern Hemisphere.
- The Collection Enhancement Project team, who work to expand and share the vast collections data to national and global data initiatives, such as the Atlas of Living Australia.

Citizen science as a prominent digital platform for science communication

The AM has been a pioneer in citizen science, long providing opportunities for anyone who wants to make a difference through science. Today, the Australian Museum Centre for Citizen Science oversees and coordinates these efforts. The AM's citizen science programs highlight the AM's scientific investigations, examine contemporary issues for which science can provide solutions, and inspire the public to contribute. The AM uses a range of communication and learning approaches and supports face-to-face interactions and digital initiatives to inform and create an environment that stimulates curiosity and motivates learning.

Lizard Island Research Station: Australia's premier marine field station

Lizard Island Research Station (LIRS) is a world-leading coral reef research facility, established more than 50 years ago. LIRS collaboratively engages with its partners to enable excellence in scientific research and education. LIRS contributes to AM scientific research, education and outreach programs, and environmental advocacy. LIRS provides high quality research infrastructure that facilitates coral reef scientific research; provides education opportunities to encourage future marine science students and researchers; and disseminates research findings about the threats facing the Great Barrier Reef, including climate change, to the public and policymakers.

Solutions for the future: tackling climate change

The AM established a Climate Solutions Centre (CSC) in June 2022, bringing diverse voices together to inform and inspire more Australians to support climate solutions. The CSC brings together cutting-edge research and insights from people on the ground to create ways of engaging broad audiences with climate solutions. The CSC upscales the AM's existing climate initiatives and the CSC team is reaching more people than ever with exhibitions, touring exhibitions, events, workshops, digital resources and school programs.

Our Strategic Priorities

Expand initiatives, public engagement, and partnerships

Over the next five years the AM will work toward a range of large-scale initiatives underpinned by strong collaborations and partnerships. The AM's strategic priority areas will include:

- Completing existing major initiatives (for example, the AM's partnerships in Centres of Excellence funded by the Australian Research Council, and the National Herpetology Genomics Project).
- Fostering existing partnerships with universities, research institutes, museums and State and Federal government institutions, and create new opportunities (including joint positions and co-designing core research projects using museum collections) and sharing of research facilities for collaborative projects.
- Investigating student training opportunities for the next generation of data-minded scientists to extract valuable information from the AM's natural history collections.
- Developing regional partnerships in NSW, including the development of a new regional research project including a First Nations partnership in biodiversity and environmental research.
- Developing flagship collaborations to deliver consultative collection care to the Asia-Pacific region through new skill sharing and training initiatives as well as commercial activities where AMRI collection care expertise can be engaged for a variety of projects.
- In consultation with NSW First Nations and Pasifika staff, addressing future safe keeping and best practice in cultural collections conservation.
- Promoting the work and value of AMRI as not only a reference to the past but also a guide for the future.
- Continuing our impactful science communication work whilst seeking out new media opportunities, to produce engaging content for the wider public and dissemination of valuable scientific research.
- Fostering innovation in citizen science projects and supporting technology, including the incorporation of AI technology where applicable.

Increase resourcing and expertise

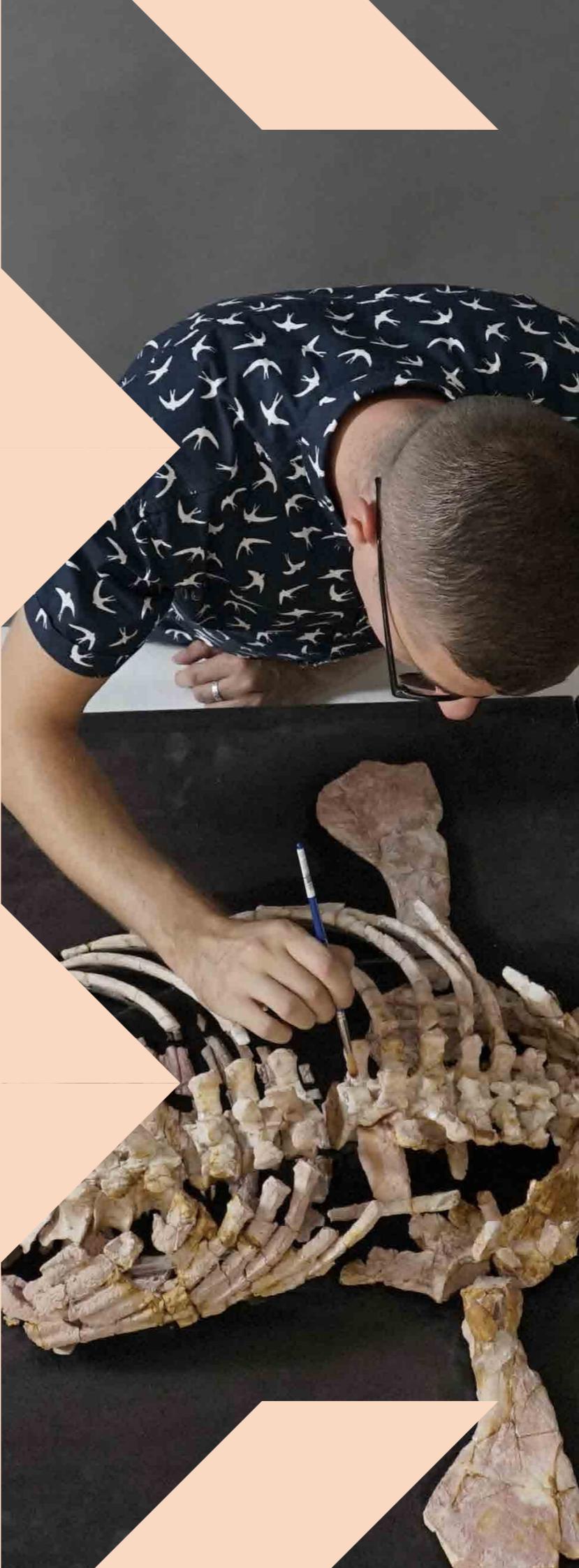
In 2022/23, AMRI had a recurrent operating budget of approximately \$1.2 million and a team of more than 100 staff including research scientists, collection staff, and conservators, and more than 130 associates, fellows, and students. As a museum that is grounded in excellent science, it is important to maintain and increase research across priority areas. AMRI will do this through:

- Seeking additional opportunities to increase funding and staff, through grants, partnerships, and commercial revenue to support collections and research.
- Identifying opportunities to protect institutional knowledge as staff retire, including bolstering the Honorary Program.

Conduct high-impact and high-quality research

AMRI is uniquely placed to foster a culture of high-quality and high-impact research across a variety of subject areas. The breadth of the collections encourages and supports many lines of inquiry and as such provides a hub for ongoing research efforts, with over 200 publications in the 2021/22 financial year. AMRI will continue to place emphasis on natural science research by:

- Monitoring the research landscape for knowledge gaps and supporting projects (both internally and externally driven) that aim to fill these gaps.
- Promoting a culture of collaboration with other institutions and researchers to support high-impact projects.
- Seeking opportunities to increase research staff in underrepresented areas of taxonomic study.
- Collaborating with, and attracting, experts in relevant fields of study.



Maintain and grow reference collections

AMRI holds the largest collection of specimens in the Southern Hemisphere and is a focal point for collections-based research and support. The AM's collections are also an exceptional resource for driving the public experience at the Museum and AMRI's research provides the foundation for exhibitions and permanent galleries. AMRI's strategic priorities include:

- Maintaining current collections using best-practice guidelines and investigating improvements to long-term housing facilities.
- Continuing to grow the collections as a reference for the study of wildlife and zoonotic diseases, pest species, and for the identification and management of biosecurity concerns.
- Assessing current and changing community and industry needs, through AMRI scientists, to determine priorities and direction for collection growth.
- Promoting the collections for educational research, consultation with zoos and wildlife managers, and to support public exhibitions.
- Leading major expeditions in the Asia-Pacific region and building expertise and the collections.

Build new infrastructure for research and collections

To conserve, maintain, and improve our collections, the AM will continue to be a world-leader in all areas of conservation, while improving and expanding research and collections infrastructure. This includes being a leader in modern collections housing, sustainability principles related to the collections, integrated pest management (IPM) systems, complex collection care, and collection logistics. To do this, the AM will:

- Upgrade onsite facilities to house collections.
- Plan for long-term offsite housing for and collections, including allowing for their growth.
- Upgrade genomic facilities to include an Ancient DNA Lab.
- Develop national and international training programs, including internship programs.
- Value its expertise and services including collection risk assessment and management, IPM, and specialist treatments, species identifications and specialist advice.
- Upgrade ICT infrastructure and integrate Artificial Intelligence technologies to support growth of collections, increasing digital collection data, and expanding citizen science opportunities.
- Develop new commercial opportunities for AMRI to leverage its science infrastructure.



Unlock the full value of the collections with the Collection Enhancement Project

The Collection Enhancement Project (CEP) is a ten-year mass digitisation program running from 2020 to 2030. The CEP involves the digitisation of the AM's Natural Science Collections, Cultural Collections, Archives and Research Library Rare Book Collections. Each collection has its own challenges, which makes the CEP the most ambitious digitisation project ever undertaken by the Museum. The program aims to digitise the collections of the AM so that it is a leader in collection management will allow the data to be accessible to the public and researchers around the world.

The program will enhance the Museum's ability to audit, secure, value, manage, research, and provide public access to the collections.

Major opportunities of the CEP include:

- Leveraging existing infrastructure such as the AM's DigiVol citizen science project and new microCT scanner.
- Exploring new cutting edge techniques to expand information from natural history collection items (such as genomic, stable isotope, or environmental contaminant data).
- Developing new initiatives for dealing with big and complex datasets which can be shared across other educational and scientific organisations.
- Providing open, fair, and accessible natural history and suitable cultural collection content to the scientific community and wider public, acknowledging the shared stewardship of the collections maintained by the AM.

Appendix

AMRI BRANCHES

Life and Geosciences

AMRI specialises in taxonomic and systematic research utilising the Museum's natural science collections. The Life and Geosciences branch includes the AM's natural science collections: Arachnology, Entomology, Herpetology, Ichthyology, Malacology, Mammalogy, Marine Invertebrates, Mineralogy, Ornithology, and Palaeontology and Archaeology research. Natural science collections are similar to libraries but are made up of specimens and objects rather than books. Specimens and objects are regularly borrowed, studied, and returned. As this occurs, the information from each new study is added to the records, enriching the AM's knowledge and understanding of the objects and specimens in the collections. Natural science collections are an important resource for scientists, particularly those conducting taxonomic, systematic, ecosystem, and biodiversity research; this is especially important when research involves extinct or endangered species. The collections are of increasing importance in a changing world where our natural environments are being rapidly degraded.

Climate Solutions Centre

The Climate Solutions Centre is the first climate communications centre in Australia's museum sector. The CSC works to increase positive public engagement in climate change. The AM has established the CSC to bring together cutting-edge research and insights from people on the ground to create ways of engaging broad audiences with climate solutions. The CSC has commenced work (June 2022), upscaling the AM's existing climate initiatives. The CSC team is reaching more people than ever with exhibitions, touring exhibitions, events, workshops, digital resources and school programs.

Collection Care and Conservation

The Collection Care and Conservation (CC&C) branch is responsible for preservation and collection risk management across the AM. It delivers wide ranging expertise in high level conservation and prevention practices for the collections. CC&C is highly engaged in the materials conservation community and is a trusted voice in the care of natural science and cultural collections throughout Australia. The conservators are solution-based problem solvers who demonstrate a dedication to preserving the AM collections and facilitating high levels of access.

Digital Collections and Citizen Science

The Digital Collections and Citizen Science (DCCS) team coordinates a broad range of activities across AMRI and the Museum, from digitisation and citizen science through to the Museum's major expedition program. Recognised nationally and internationally as a leader in digitisation and citizen science the DCCS team is trusted with coordinating the delivery of major Museum initiatives that make the AM's collections accessible, engage the public in supporting research and collections programs through citizen science and bring the excitement of exploring for undiscovered biodiversity to audiences and members. DCCS is home to the Australian Centre for Citizen Science which manages a suite of highly successful citizen science projects including FrogID, DigiVol, Wildlife Spotter, and Australasian Fishes.

Australian Centre for Wildlife Genomics

The Australian Centre for Wildlife Genomics (ACWG) was founded in 2012 by Dr Rebecca Johnson, who was the Chief Investigator of projects focused on wildlife forensics, aviation wildlife strike and a range of conservation genomics projects including the publication of the world's first koala genome. This Centre is comprised of NATA accredited (ISO/IEC 17025) DNA laboratories and the AM's biological frozen tissue collection. The ACWG supports all molecular based research carried out by AMRI and offers DNA-based molecular diagnostic services to a wide variety of external partners. Its primary focus is on ecological applications such as species identification, individualization, conservation, and population management of wildlife species.

Lizard Island Research Station

Lizard Island Research Station (LIRS) is a world-leading and sustainable coral reef research facility, collaboratively engaging with its partners to enable excellence in scientific research and education. The AM owns and operates LIRS to facilitate coral reef research and education on the Great Barrier Reef. The Lizard Island Reef Research Foundation (LIRR) supports scientific research and education at the AM's LIRS on the northern Great Barrier Reef. All funds donated to the Foundation contribute to programs that support coral reef research and education. LIRS hosts hundreds of visiting researchers from around the world annually and often hosts media film crews interested in tracking climate change impacts on the Great Barrier Reef.

Key AMRI Team

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Lizard Island Research Station

Acknowledgement of Country

The Australian Museum acknowledges and pays respect to the Gadigal people as the First Peoples and Custodians of the land and waterways on which the Australian Museum stands.



