AUSTRALIAN MUSEUM

NATURAL SCIENCE COLLECTION DEVELOPMENT STRATEGY, 2015-2018

NATURAL SCIENCE

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AUSTRALIAN MUSEUM
1 William Street Sydney
NSW 2010 Australia
T 61 2 9320 6000
australianmuseum.net.au

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1 INTRODUCTION

The Australian Museum's mission is inspiring exploration, understanding and care for our world. We do this by researching, exhibiting, educating and communicating the relationship between people, culture and the natural environment.

Under the *Australian Museum Trust Act, 1975* [7] we are mandated to:

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

In September 2013 the Museum established the Australian Museum Research Institute (AMRI) to provide a stronger cohesive presence in the research world and a vehicle for wider promotion of our scientific work.

AMRI comprises scientific infrastructure, research and collections staff, Senior Fellows, Research Associates and their postgraduate students. Its scope covers the full range of our geoscience, biological and archaeological research with a strong emphasis on the Museum's 6 strategic research focus areas.

The *Australian Museum Science Strategy 2014-2017*[6] includes the specific areas of research focus:

1. Understand and ameliorate impacts of climate change on biodiversity
2. Contribute to the understanding and management of biosecurity threats
3. Discover and understand biodiversity to inform effective animal conservation
4. Apply wildlife genomics to solve key problems.
5. Generate knowledge to maximise benefits from Australia's geological and biological resources
6. Through our anthropological and archaeological research foster understanding and appreciation of cultural differences for a more socially inclusive society.

The purpose of this *Natural Science Collection Development Strategy, 2015 - 2018* is to set out the priorities for collection development for the next three years in the natural science collections in terms of acquisitions. These collection development priorities will align with the research and engagement goals identified in the *Australian Museum Science Strategy 2014-2017*[6], the *Audience Engagement Strategy 2015-2019*[4], and the *Australian Museum 5 Year Strategic Plan 2014-2019*[1].

The Museum natural science collections are a significant intangible asset for the State of NSW, with a total value estimated to be in excess of $232 million (based on estimated recollection cost for databased collection specimens, April 2015). This value is included as an appreciating capital asset in the Museum budgets, and is recalculated each year.

There are also a number of external drivers. An active Collection Development Strategy is also an essential requirement for accepting donations of collections under the federal Cultural Gifts Program[10]. Having a defined Collection Development Strategy provides documentation to support applications for scientific and educational specimen collection, and for export/import permits of specimens.

An Appendix is available that highlights the strengths and history of each collection area, and how each area intends to address the Collection Development Strategy.

2 HISTORY

The Australian Museum was established in 1827, and by the mid-1800s was actively acquiring many specimens. Under The *Australian Museum Trust Act, 1975*[7] the Museum may acquire and hold specimens and scientific data relating to the natural sciences and anthropology.

The Australian Museum *Collection Management Policy, 2008* defines the purpose of the collections, and broad principles and criteria for acquisition, and the subsequent *Natural Science Collection Development Strategy 2007–2012* outlined collection acquisition plans for each collection from 2007 to 2012 aligned with the *Research and Collections Review, 2005*, and this has been in continuous use until 2015 and will be superseded by this current strategy document.

Acquisition of specimens and objects in cultural institutions such as the Australian Museum is also guided by legislation at the international and regional level. These are outlined in *Australian Best Practice Guide to Collecting Cultural Material, 2014*[3]. Collection of vertebrate specimens by the Museum is guided by the *Australian code for the care and use of animals for scientific purposes, 2013*[2], and by an internal procedural document *Code of Practice for Collecting Fishes and Marine Invertebrates, 2008*[8].

3 COLLECTION DEVELOPMENT

Collection development in the Museum can be summarised in the following way:

- *collections derived from Australian Museum staff;*
- *donations from external sources*

3.1 Collections from Australian Museum staff

Research conducted by staff of the Australian Museum Research Institute (AMRI) has made a huge contribution to the development of the biological and geological collections, particularly in the last forty years. Collections made by AM research staff tend to focus on particular study taxa and may represent a wide range of collecting sites and preservation methods. Collections made by geological staff have added to our knowledge of past Australian fauna, clarified the formation of volcanic rocks, minerals and gems, and revealed special biological/chemical processes forming cave minerals. Specimens from these collections are often designated as primary and secondary types as a result of taxonomic research and revisions carried out by AM scientists, and are also a valuable source of molecular data supporting systematic research. Type specimens are the biological, palaeontological or mineralogical specimens designated by taxonomists to represent examples of the new species they are describing. Type specimens, especially holotype specimens are of critical importance for fixing the identity of species.

Other AMRI staff such as collection managers conduct field trips with the aim of collecting to complement acquisitions received from donations and research. These collections target geographic areas or habitats that have been poorly collected, taxon groups that are poorly represented in the collections, and taxa that are required for current research, education and public engagement projects at the AM and other institutions. Geological field collecting has targeted Australian localities yielding specimens of display and research interest, to fill species or locality gaps in the collections, or to document the suite of species from a particular fossil or mineral deposit, mine or quarry. Collection management also arrange exchanges with other institutions to develop collections, particularly for vertebrate and geological collections. Collection specimens may also be purchased from private and commercial sources, particularly in conjunction with public engagement projects providing their provenance is established and is deemed suitable for AMRI collections.

Ecological studies often make bulk and repeated collections of organisms over space and time to better understand the temporal and spatial distribution of species. This provides a data set that is often broader than that provided by taxonomic studies. They provide scope for the Museum to provide analysis of and input to issues such as conservation planning, pest incursions and responses to climate change. Such collections often use techniques which are not suitable for providing good quality specimens and may provide large numbers of unsorted samples which are not readily accessible.

Collection acquisition by staff and others may focus on acquiring parts or extracts of original specimens, especially tissues or DNA extracts. This is particularly relevant to acquisition where the original specimen is not available (e.g. bird strike samples from aviation sources, hair samples) or where it is not possible to retain/collect the entire voucher specimen due to conservation, ethics or storage considerations (e.g. many vertebrates, especially large species).

3.2 Donations from external sources

Donations to the Museum have greatly contributed to the composition and diversity of our holdings.

Collections donated by private collectors tend towards popular collectables such as crystalline minerals, gems, butterflies, large beetles, large and attractive gastropods, or bird eggs. They often contain specimens collected over many years, and from areas which are no longer accessible or represent natural environments, and they may provide useful historical records and contain specimens which are now rare. Such collections may also contain specimens that do not meet criteria for acquisition but it is often necessary to accept a complete collection and subsequently deaccession some specimens.

There is a requirement that type specimens be deposited in recognised scientific collections so that other scientists can access them for research purposes. Deposition of types by external researchers is encouraged, particularly from type localities in NSW, Australia, and for taxonomic groups that are well represented at the AM.

External researchers in ecology, genetics and other fields of natural sciences are often required or encouraged to deposit voucher specimens in gazetted collections so that future researchers can validate their published research. The AM serves a vital role by acting as a depository for these vouchers, but donations from university students and other government agencies are often poorly curated and preserved (e.g. in plastic vials of alcohol with substandard labels) and may be rejected due to poor data and condition of specimens. The recognition of the importance of voucher specimens validates the role of taxonomic and systematic research that occurs in the AM, and can also enhance and develop the Museum collections. A balanced approach needs to be taken to obtain significant collections while rejecting collections of dubious value.

3.3 Collection data

The development of computer databases for storing collection records and associated metadata has placed new expectations on museums. Collection data is now made available to a wide range of users and is being applied to a suite of environmental problems and issues. Collection data is used to map species distributions, develop models to test change in distributions in response to environmental change, assist with planning decisions for protected areas and reserves, trace impacts of introduced species, and many more applications. There is substantial legacy backlog of uncaptured specimen data from collections made prior to the establishment of the collections database. This is being addressed by a number of digitising strategies including the volunteer digitisation program DigiVol. Collection development by AM staff is carried out with the understanding that new acquisitions will not increase this backlog.

3.4 Collaborations

The AM has an active role participating in collaborative collecting expeditions to locations such as Timor Leste and the Simpson Desert, which have benefited the AM in building collections that would not be possible alone. This is particularly the case for sampling in the deep sea where the cost of mounting a solo expedition is prohibitive. AM staff have participated in collaborative biodiversity surveys such as the 2003 NORFANZ expedition, and the 2005 'Voyage of Discovery' which have yielded important collections. The majority of overseas field work by AM staff is conducted in collaboration with external partners. Geological collecting benefited from extended collaborative field work, for example with the Geological Survey of Qld (volcanic rocks and gemstones, central Qld 1982), American Museum of Natural History (Lord Howe Island turtle fossils 1980), and Royal Tyrrell Museum, Alberta, Canada (collecting Centrosaurus bones in Dinosaur Provincial Park, Alberta, Canada 2002.

Some AM collection areas, in particular the invertebrate collections (Entomology, Marine Invertebrates, Arachnology, Malacology and Palaeontology) contain taxonomic groups which have been little studied, and in some cases poorly curated because of this. This is a result of a number of factors, such as available staff and storage resources, and available expertise (internal and external). Strategic curation of these areas and actively loaning material to relevant external researchers can be a very effective way of collaboratively developing these parts of the AM collections. Additionally, the Museum offers collection fellowships to encourage external researchers to visit the Museum to work on particular taxonomic groups.

4 GUIDELINES FOR COLLECTION DEVELOPMENT 2015-2018

4.1 Acquisition Process

Responsibility for the decision over whether or not to make an acquisition typically rests with the relevant Collection Manager, and all acquisition of natural history specimens must be approved by the Collection Manager or delegate in advance.

Decisions in regards to major acquisitions and acquisitions which include specimens from multiple collection areas should be made in consultation with the Branch Head (See also the internal procedural document "Natural Science Collections: Procedures and Guidelines for Collection Acquisitions, Version 2013:1"[11]) Major acquisitions can be defined as those acquisitions which would require additional resourcing above and beyond what is currently available with routine operating and capital budgets.

Donations require careful assessment under the guidelines. Unlike acquisitions from field and research work carried out by Museum staff, the contents of donations may not directly meet the priorities for collection development in relation to the *Australian Museum Science Strategy 2015-2018*[6]. In many cases donations may be offered at short notice, such as in the case of a deceased estate. In order to better assess whether a donation should be accepted, the acquisition guidelines outlined in Section 4.3 should be followed. This should be documented in the Deed of Gift[5], especially in the case of collections which are to be assessed under the Cultural Gifts Program[10].

4.2 Research Goals

Collection development for the biological collections will be prioritised when it addresses one or more of the following research goals:

4.2.1 Understanding and ameliorating impacts of climate change on biodiversity

Climate change is having a significant effect on Australian biodiversity, some of which may be mitigated and predicted by research, which in turn will be supported by collection development in both zoological and geological collections. Collection of material which provides additional temporal and spatial data on the Australia biota and associated change in climatic conditions will be prioritised.

4.2.2 Understanding and managing pest species and risks to biosecurity

Collections provide valuable data on the presence/absence of pest species over spatial and temporal scales and on the change of associated biota in the presence/absence of pests and weeds. They can provide data on potential biological control agents, cryptic species which may hide the presence of pests, molecular, behavioural and morphological change in introduced pests. Collection development that builds our capacity to better understand and manage pests is a priority.

4.2.3 Understanding what constitutes and influences effective animal conservation

Collections are traditionally a source of information on historical distributions of organisms of conservation concern and associated biota. They can provide data on the impact/effectiveness of conservation management decisions, such as removal of key threatening processes, genetic structure of animal populations, pre-European animal distributions, reintroductions from isolated conspecific populations, new distributions, and the presence of cryptic or otherwise undescribed diversity. Collection development which focusses on issues associated with applied animal conservation will be prioritised.

4.2.4 Application of wildlife genomics to solve key problems

Collections will be developed to include frozen tissue samples for molecular methods while maintaining traditional fixation and preservation techniques. Other novel methods of preservation and fixation are encouraged to maximise the future use of the collections (e.g. freeze drying for monitoring trace elements or solutions such as RNALATER for RNA analysis).Voucher specimens should be deposited with tissue samples, as these are essential for the verification of the taxonomic identity of specimens sequenced. By increasing the taxonomic breadth of samples suitable for DNA analysis we can increase our ability to better answer questions associated with wildlife genomics.

4.2.5 Generate knowledge to maximise benefits from Australia's geological and biological resources

The Mineralogy/Petrology collection development will focus on acquiring specimens that address current research questions surrounding the composition and origin of minerals in limestone cave complexes, minerals, rocks and gemstones of volcanic origin, meteorites or display specimens needed for future gallery developments.

4.2.6 Foster a socially inclusive society

Research goal 6 is not addressed in this strategy for collecting as it is already covered in the *Cultural Collections Acquisition Policy 2014-2017*[9]

4.3 Acquisition Guidelines

These guidelines aim to ensure that ethical, legal and sustainable acquisition occurs within the Natural Science collections.

a) Specimens are to be acquired in a way that complies with all relevant local, state and federal laws and regulations and those international treaties and agreements to which Australia is a signatory. Provenance of donations and purchases is of particular importance, and due diligence must be demonstrated when determining whether donations have been legally acquired by the donor or others in the chain of ownership. For details to assist in this process see the *Australian Best Practice Guide to Collecting Cultural Material, 2014*[3].

b) The AM must be able to house and curate the acquisitions. For the purpose of this document the term "curate" encompasses registration, electronic databasing, fixation and preservation where appropriate, conservation and appropriate access to acquisitions and their associated documentation. The relevant Collection Manager must determine that the acquisition is a high priority, and whether the acquisitions can be accommodated within existing collection areas without placing undue stress on available space, staff resources, curatorial facilities and collection standards.

c) Acquisition of biological specimens should consider current community sensitivities; collection of vertebrate specimens by the AM will be carried out with guidance from the AM Animal Care and Ethics Committee.

d) The acquisitions must enhance the scientific or educational value of the collections.

e) Emphasis will be given to those acquisitions which permit the Museum to fully exploit its existing resources in systematics, evolutionary biology, ecology, and geology.

f) Emphasis shall be given to acquisitions which improve the geographic, historical and environmental coverage of existing collections, with special attention to acquisitions from New South Wales.

g) Priority will be given to acquisitions which are address research goals identified in the *Australian Museum Science Strategy 2014-2017*[6] (see Section 4.2).

h) The relevant collection manager is consulted prior to AM staff acquiring natural history specimens for non-research purposes.

i) Priority will be given to acquisitions which align with audience engagement objectives identified in the *Australian Museum Audience Engagement Strategy 2015-2019*[4].

j) Priority will be given to acquisitions that result in the adequate preservation of irreplaceable biological, palaeontological and geological material.

k) Acquisitions which possess the high levels of associated documentation and whose state of preservation will ensure maximum information content and utility for future research will be prioritised. If core data are not available, the specimen(s) must be a unique or significant addition to the collection, or of importance for research, display or exchange purposes.

l) Specimens in acquisitions are of reasonable condition, and if not, they are irreplaceable or rare in the collection.

m) Acquisitions by donation and specimen purchases must be free from encumbrances which would qualify or restrict the Museum's title to the use, storage or disposal of the objects. Except in exceptional circumstances, a specimen should not be accepted where conditions require permanent display of the specimen, prevent the disposal of the specimen, require that the specimen be stored in a particular way, or require that the specimen be kept together with other specimens as part of a single collection.

n) Acquisitions do not result in retention of specimens surplus to Museum needs.

o) Acquisitions which are type specimens or are specimens which have been illustrated in publications have high priority for acquisition.

5. REFERENCES

1. Australian Museum 5 Year Corporate Strategic Plan 2014-2019
2. Australian code for the care and use of animals for scientific purposes, 2013. https://www.nhmrc.gov.au/guidelines-publications/ea28
3. Australian Best Practice Guide to Collecting Cultural Material, 2014. http://arts.gov.au/collections/best-practice
4. Australian Museum Audience Engagement Strategy 2015-2019 (Internal document)
5. Australian Museum Deed of Gift for Natural Science Specimens (Internal document)
6. Australian Museum Science Strategy 2014-2017 (version 2 June 2015), http://australianmuseum.net.au/document/2014-2017-science-strategy
7. Australian Museum Trust Act, 1975, http://australianmuseum.net.au/australian-museum-trust-act-1975
8. Code of Practice for Collecting Fishes and Marine Invertebrates, 2008 (Internal document)
9. Cultural Collections Acquisition Policy 2014-2017 http://australianmuseum.net.au/document/cultural-collections-acquisition-policy
10. Cultural Gifts Program, http://arts.gov.au/cgp

11. Natural Science Collections: Procedures and Guidelines for Collection Acquisitions, Version 2013:1 (Internal document)