Northern Territory Herbarium Specimen Collections Management Policy

NORTHERN TERRITORY GOVERNMENT

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Acronyms	Full form
<Eg: NT>	<Eg: Northern Territory>
DNA	Index Herbariorum code for NT Herbarium Darwin (Darwin North Australia)
NT	Index Herbariorum code for NT Herbarium Alice Springs
CHAH	Council of the Heads of Australasian Herbaria

Contents

1. Purpose & Context

This Policy outlines the physical and digital management of specimen collections obtained or donated to the Northern Territory Herbarium.

A **Herbarium** (e.g. the NT Herbarium) is an official collection housing dried plant and fungal specimens, which is primarily used to name and describe plant taxa. Herbaria maintain and database information about the specimens, and this information is made available to researchers, students, and the public around the globe.

The scientific collections of specimens ('**specimen collections**') held by such an institution provide a long-term reference and a definitive documentation of plants of a region. They are, in part, considered objects of protected moveable cultural heritage and their import and export are administered by Commonwealth legislation. These specimen collections are typically in the form of pressed and dried plant material mounted on archival card ('**plant collection**'). Increasingly, plant collections are being supplemented by additional material in the form of plant material preserved in silica gel ('**silica collection**') and alcohol ('**spirit collection**') or extended specimen collection materials such as images ('**image collection**') or digital molecular sequence information ('**sequence collection**').

The Northern Territory Herbarium operates two facilities, in Darwin (DNA) and Alice Springs (NT) to store specimen collections. These facilities operate under the same strategic frameworks for specimen collection management and development of the specimen holdings. This is undertaken at the direction of the Chief Botanist and the Senior Management of the Information and Advice Branch of the Flora and Fauna Division.

Specimen collections provide a permanent reference point for plant names and the taxonomic descriptions assigned to them. Specimen collections are particularly useful in the event that plant names 'change' or identifications made during field surveys are incorrect, so they can be updated reliably. Un-accessioned or unvouchered survey records for some groups of plants are frequently unreliable and accessioning of specimen collections is recommended where the longevity and accuracy of the data is important. The NT flora is poorly understood by broader Australian standards and new species are frequently found, through curation of the herbarium collection and in the field. Many species appear quite similar in the field and may be difficult to accurately identify. New species are frequently cryptic and have often been confused with similar, previously described taxa or have remained unrecognised within the herbarium collection, discovered only when additional collections have become available.

2. Scope

This Policy applies to all specimen collections held by the Northern Territory Herbarium and any future collecting activities undertaken by staff of the Department.

Similarly, this Policy is also of relevance to any other person or institution undertaking plant collecting activities and intending to donate the subsequent specimen collections (or duplicates of this material) to the Northern Territory Herbarium.

The Herbarium accumulates specimen collections in various ways, including collecting undertaken by staff and Research Associates, donations (including from plant identification services), exchange from other institutions and through public or professional enquiries.

This Policy does not apply to **loan specimen collections** from other officially registered institutions (see https://sweetgum.nybg.org/science/ih/). These specimen collections are not part of the Northern Territory Herbarium collection and are handled under an accompanying **Loans Policy**.

3. Criteria for accessioning specimen collections

Accessioning of specimen collections, or the electronic cataloguing of an item within a herbarium collection, creates an ongoing, verifiable and searchable record of the physical artefact. Accessioning allows for not only the recording of plant information but facilitates effective management of the specimen collections (e.g. taxonomy and nomenclature) and the update of information as species concepts and names change over time.

The primary consideration in accessioning a specimen collection to the Herbarium is that **the specimen adds significant value to the herbarium collection**. Acceptance of specimens is not automatic and the addition of any specimen collection to the Herbarium is at the discretion of the Chief Botanist in Darwin or Senior Botanist in Alice Springs.

The Northern Territory Herbarium reserves the right to retain selected specimens from those submitted for routine identification purposes from the general public in accordance with the *Conditions of Lodgement* specified on the *NT Herbarium Plant Identification Request* form. Specimens retained for the permanent collection and the associated label information thereon become property of the Northern Territory of Australia and are in the public domain.

For a specimen collection to be accessioned, the **essential requirements** detailed below must be met:

a. **The specimen must be legally collected** in accordance with State, Territory and/or National permit requirements and land owner permissions (if applicable). These details should be provided by the collector with the specimen for accessioning. This requirement is for the purposes of meeting international obligations under the Nagoya protocol related to benefit sharing arising from the utilisation of genetic resource and other jurisdictional legislation aimed at achieving similar outcomes (*Northern Territory of Australia Biological Resources Act 2006*).
b. **The specimen must be of suitable quality**:
    i. An appropriate size (not scraps, fragments or excessively thick);
    ii. Free of mould, decay and significant insect damage;
    iii. Properly pressed; and
    iv. Leaves and reproductive organs are still attached to stems.
c. **The specimen must be identifiable to species or subspecies.** For most species this means it should have flowers and / or fruits.
d. **The specimen must be appropriately labelled.** Label information **must include** at a minimum :
    i. Collector name;
    ii. Collection date; and
    iii. Collection locality with sufficient detail to allow someone to return to the same locality for re-collection (a GPS derived position in Decimal Degrees with a Datum recorded is the preferred standard).

It is desirable that the label data also includes:

i. Information on **habit**, and other attributes of the plant (e.g. flower colour, bark);
ii. **Habitat** in which the plant was growing at the collecting locality (e.g. associated plant species; soil type; vegetation community etc.); and
iii. A qualitative estimate of **abundance** and **extent** at the collecting locality (e.g. number of plants observed; estimated area covered by plants).

The essential requirements may be **waived** in **exceptional circumstances** as outlined in the cases below, although there is still a general preference that the specimen collection is identifiable to species based on available vegetative or reproductive features:

a. Specimen collection is of particularly **high scientific value** (e.g. significant range extensions (see below));
b. Specimen collections of particular **biocultural value**;
c. Specimens of significant **historical interest or significance** e.g. those >70 years old where duplicates are only now being distributed to DNA/NT;
d. Specimens of **taxa** which are notorious for **shedding leaves** or other parts on drying or **which normally turn black** on drying and the specimen represents a high quality or 'fresher' example of the taxon that adds to the useability of the collection;

At least one of the following **additional criteria** listed below also need to be met, before specimen collections will be considered for accessioning:

a. The specimen collection is considered to represent **a new species record for the Northern Territory** (including non-native species).
b. The **specimen collection is a designated reference** for a Park or Reserve survey, regional survey, threatened species survey, photographic image (within quality limits), propagation purposes, Biocultural study or for a particular research purpose (e.g. phytochemical, phylogenetic or population genetic studies) that has been endorsed by the Chief Botanist or Senior Botanist (Alice Springs).
c. The **species is poorly collected** (less than 10-20 collections) or, the species has not been collected for more than 10 years from the locality (i.e. adds to the temporal distributional record).
d. The specimen collection represents **a significant range extension or a significant 'infill' in distribution** for the species (including introduced species). A significant range extension or infill of distribution for a species is considered to be 10 % of the shortest axis of the known Extent of Occurrence for that species. For a very restricted endemic with an Extent of Occurrence of 1km^2 (minimum axis 1.5 km), a 150 m range extension is significant while for a species occurring across northern Australia but extending from Katherine to Tennant Creek in a north-south direction, 67 km would be a significant range extension.
e. The specimen collection is the **first record or a significant addition to the records** for a taxon in a 0.5 degree grid square.
f. The specimen collection is of **a listed threatened (CR, E,VU), approaching threatened (NT) or data deficient (DD)[1] taxon** collected from a new locality or location (typically defined as being a minimum of 1 km in distance from an existing known location or locality)
g. The specimen collection contains **significant uncaptured or unusual morphological variation**, or **particular phenological states** (such as flowering or fruiting material) or a **range of plant growth stages or parts** (e.g. seedlings, bulb and corms) poorly represented in the herbarium collection.
h. The specimen collection is of **unusually good quality**, with a number of duplicates that can be distributed to other herbaria as exchange.
i. There is a **taxonomic research need** for the specimen (e.g. it is a potential type specimen, or morphological variation in the taxon is poorly understood).

[1] . Not all taxa listed as DD have been assessed as such under the IUCN Red List Criteria. This category also includes taxa on which recent taxonomic work has seen an update to the species concepts resulting in changes to names. In these cases the category DD has been applied to a taxon where curation is required to clarify the species limits (both taxonomically and geographically) and subsequently the IUCN category. Typically these entities do not qualify as a threatened category.

Sterile specimens, fertile specimens of poor quality or those that do not add significant value to the collection will not normally be accessioned. If the criteria are not met and the specimen appears to be an important record, an additional specimen that does meet the criteria should be sought. If this is not possible then the specimen may be accessioned at the discretion of the Chief Botanist in Darwin or Senior Botanist in Alice Springs based on the guiding principles outlined above.

4. Criteria for de-accessioning specimen collections

Herbarium staff may nominate any specimen collection accessioned at DNA or NT (which is not the property of another herbarium) for de-accessioning, on the grounds that it is of no demonstrable scientific or historical value due to:

a) Being of insufficient quality to enable accurate identification;

b) An absence of essential collection data, especially locality;

c) A significantly better quality specimen collection of the same taxon collected from the same locality on the same date has also been accessioned; or

d) Excessive damage to and degradation of the specimen.

Material identified as meeting one of these criteria will be passed to the Chief Botanist, Senior Botanist (Alice Springs) or Collection Manager (Darwin) to assess the material nominated for de-accessioning. If a fertile specimen becomes available from an ex situ cultivated plant grown from the same material as an accessioned sterile specimen collection, a fertile specimen should be stored with the original field-collected sterile material.

In the case of material nominated only on criterion c) above, consideration should be given to donation of the material to another herbarium or reference set where appropriate, with priority consideration given the jurisdiction of origin.

De-accessioning is inadvisable in cases where:

a) The specimen collection is cited in a published scientific study;

b) The specimen collection was collected in association with a systematic vegetation survey site (VSD);

c) The specimen collection is associated with research work in progress;

d) The specimen collection was the first record of a new naturalisation, a new occurrence of a declared plant species under the *NT Weed Management Act* or another list of significant weeds relevant to the NT.

e) The specimen collection is of a taxon classified as a threatened category, near threatened or genuinely data deficient (i.e. not a nomenclatural DD) species under the *Territory Parks And Wildlife Conservation Act* or *Environmental Protection And Biodiversity Conservation Act*.

5. Specimen acquisitions

Strategic acquisition of specimen collections from other collectors and institutions outside of the Northern Territory is key to enabling the NT Herbarium to:

1) Respond rapidly and effectively to plant identification enquiries including matters of biosecurity importance;

2) Contextualise the flora of the Northern Territory in both an Australian and global sense (with a particular focus on regions neighbouring the Northern Territory); and
3) Facilitate broader taxonomic research into the flora of the Northern Territory.

High level specimen collection acquisition targets, typically from outside of the Northern Territory or from collectors other than those working for the Department are determined by, but not limited to, the following criteria, combining institutional goals, legislative requirements and eco-geographic and taxonomic factors:

a. **All flora taxa** (including algae and fungi) native to or naturalised in tropical Australia (occurring north of Latitude 26^0 S) including offshore islands or territories with particular foci on the flora of the monsoonal tropics for Darwin (DNA) and central Australia for Alice Springs (NT);
b. Plant taxa **not yet in the NT and/or Australia** but potentially significant weeds if introduced and/or are a prohibited matter under legislation;
c. A range of plant taxa **from areas outside of the NT** (excluding those identified in a) above), that are native in the NT or relatives of taxa native or naturalised in the NT, particularly where they occur in proximity to the NT border;
d. **Other overseas plant taxa** from the western Pacific and SE Asia, particularly Timor Leste, New Guinea and greater Malesia;
e. Taxa know to be **cultivated in the Northern Territory** with a particular focus on those that are i) known to become naturalised in other areas; or ii) those known to be of some economic importance;
f. There is an active **institutional research need** as specified in the current Managers of Australasian Herbarium Collections (MAHC) *Exchange and Donation Program (Australasian Herbaria)* list updated annually.;
g. The species is a **Weed of National Significance or a Declared Weed** (Category C) in the Northern Territory, or is **on another list of significant weeds** relevant to the Northern Territory (e.g. National Environmental Alert List, NAQS Target List) and not currently represented in the herbarium collection;
h. Collections of **special historical interest/significance** (e.g. those >70 years old where duplicates are only now being distributed to DNA/NT) or of **high scientific value**.

6. Short term vouchers

In some circumstances the Herbarium may store specimens as **'short term vouchers'** , specimen collections not intended for accessioning and permanent incorporation to the herbarium collection, for periods of up to five years (or longer on agreement between the institution and the collector). These specimens are normally either:

a) Low-quality specimen collections for species verification purposes associated with plot-based sites collected for floristic and structural vegetation assessments. These may also provide reference material whilst multiyear or extended studies are completed; or
b) Plant material associated with specialised research projects that may be required to be retained until results of the research are published (e.g. phytochemical and archaeological studies).

In some cases there is a requirement to retain all specimens for a period of time after the publication of the survey or research results or it is prudent to retain specimens for a short period to enable verification of identifications if uncertainty arises. Retention of short term vouchers allows curation of identifications and data quality assurance which would otherwise not be possible.

Ideally the owner(s) of a short term voucher collection will agree on a period of retention with the Chief Botanist in Darwin or the Senior Botanist in Alice Springs that does not exceed five years. This period may be altered at any time upon agreement of the two parties. At the expiry of the retention period the NT Herbarium will make all practical endeavours to contact the owner and determine the need for further storage of the short term voucher collections. Short term vouchers will be disposed of by the NT Herbarium in the absence of agreement to transfer the collections to the custodianship of the owner or where an owner is unable to be contacted after reasonable attempts have been made.

Extension of short term voucher storage may be arranged by agreement between the Chief Botanist in Darwin or the Senior Botanist in Alice Springs and the collection owner(s). This would typically be in circumstances where there is requirement, legally or for publication, for use of the data associated with the collections to exceed the five year time frame. Extension of this storage arrangement would be then reassessed on an annual basis.

7. Storage of specimen collections for identification purposes

Bulk collections of specimens for identification purposes are routinely deposited at Herbarium facilities by collectors (both Government and non-Government). This has little operational impact on the way in which specimens are accessioned or how acquisitions for the collection are prioritised but is of particular relevance when considering storage requirements and quarantine considerations for specimen collections (including short term vouchers) at both the Darwin and Alice Springs Herbaria.

These specimen identifications are typically progressed in a timely fashion by the collector. Quarantine procedures in place at both the Darwin and Alice Springs facilities, but particularly at the former, make it necessary for secure and 'sterile' storage of specimens to be made available to collectors to facilitate ongoing identification and processing within the Herbarium.

Where agreement has been reached with the Chief Botanist in Darwin or the Senior Botanist in Alice Springs and where space permits, the Herbarium will store material for plant identification purposes for a period of up to six months under 'sterile' conditions after the collections have undergone the mandatory quarantine procedures. This will typically be in the plant identification area of the Herbarium facility or in some cases within the storage area of the main collection (DNA).

Further storage of material for identification purposes may be negotiated by the collector after expiry of this initial period at the discretion of the relevant institutional or collection manager. This will typically be for a period not exceeding an additional six months.

8. Definitions

Annotation – a supplementary label or note added to a specimen collection to provide taxonomic updates or confirmations subsequent to the original label information associated with the mounted specimen collection

Collection – see *specimen or specimen collection*.

Collector – person undertaking the sampling of plant material from the wild.

Label – essential specimen collection details in printed format affixed to the mounted specimen collection.

Locality – geographic area from which specimen collection was obtained. Typically defined by geographic coordinates but may also be derived from a description of the area with reference to known landmarks, towns, etc.

Location – as defined by the IUCN.

Separate Fruits – Specimen collections held in the designated carpological collection of the Northern Territory Herbarium.

Specimen or specimen collection – a preserved dried plant mounted on archival sheet.

Spirit Collection – plant parts or whole plants preserved in alcohol or similar preservative liquid.

Survey – a coordinated vegetation or flora sampling campaign usually undertaken for a defined purpose or project (e.g. targeted taxonomic studies, vegetation or land resource mapping etc.)

Type (or nomenclatural type) specimen – the element (typically a specimen collection) used to descried a taxon and to which the name of a taxon is permanently attached. The published scientific name and official description of the taxon are associated with this type specimen. Various categories of type specimens are defined in the International Code of Nomenclature for Algae, Fungi and Plants (Turland *et al.* 2018).

Voucher – a specimen collection retained for reference purposes but not accessioned to the herbarium collection. Includes DNA or genetic vouchers used for taxonomic and phylogenetic studies.

9. Legislation and associated documents

Protection of Objects of Moveable Cultural Heritage Act (1986) Federal Register of Legislation - Protection of Movable Cultural Heritage Act 1986

Environment Protection and Biodiversity Conservation Act (1999) Federal Register of Legislation - Environment Protection and Biodiversity Conservation Act 1999

Northern Territory of Australia Weeds Management Act (2001) Legislation Database (nt.gov.au)

Northern Territory of Australia Territory Parks and Wildlife Conservation Act (1976) Legislation Database (nt.gov.au)

Convention on the International Trade in Endangered Species of Wild Flora and Fauna (1963)

Northern Territory of Australia Biological Resources Act (2006) Legislation Database (nt.gov.au)

Turland, N. J., Wiersema, J. H., Barrie, F. R., Greuter, W., Hawksworth, D. L., Herendeen, P. S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T. W., McNeill, J., Monro, A. M., Prado, J., Price, M. J. & Smith, G. F. (eds.) 2018: *International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017*. Regnum Vegetabile 159. Glashütten: Koeltz Botanical Books. DOI https://doi.org/10.12705/Code.2018

10. Agency resources

Northern Territory Herbarium Specimen Collections Loans Policy

Northern Territory Herbarium Destructive Sampling Policy

11. Appendix 1