



FLORA OF AUSTRALIA

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Guide for Contributors

Australian Biological Resources Study

2019



Australian Government
Department of the Environment and Energy



**FLORA
of
AUSTRALIA
Guide for Contributors**

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Australian Biological Resources Study

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CONTENTS

1	Introduction	7
1.1	Overview	7
1.2	Purpose and scope of the Flora.....	7
1.3	Geographical coverage	7
1.4	The digital Flora	7
1.5	Terminology used in this guide	8
2	Contributing to the Flora	9
2.1	Minor revisions.....	9
2.2	Major revisions.....	9
2.3	New taxon profiles	9
2.4	General workflow process for contributing and updating Flora content.....	10
2.5	Peer Review.....	10
2.6	Authorship and attribution	12
2.6.1	Authorship	12
2.6.2	Acknowledgements	12
2.6.3	Citing sources of information in Flora taxon profiles	12
2.6.4	Citing Flora of Australia treatments	13
2.6.5	Citing linked data	13
2.6.6	Copyright.....	13
2.7	Governance.....	13
2.8	Contact	13
3	Managing Flora content on the platform	14
3.1	Flora editing access	14
3.2	Creating a new taxon profile	14
3.3	Copying an existing taxon profile	14
3.4	Editing Profiles and Working in ‘Draft Mode’	15
3.5	Adding new descriptive content	15
3.6	Saving, previewing and reviewing edits to profiles	15
3.7	Taxon profile versions and archiving	16
3.8	Curating Linked Data	16
4	Preparing Flora content	17
4.1	General guidelines	17
4.1.1	Word limits.....	17
4.1.2	Terminology	17
4.1.3	Treatments as taxon profiles.....	17
4.1.4	Example profiles.....	17
4.1.5	New taxa.....	18
4.1.6	Hybrids	18

4.1.7	Doubtful and unplaced names, excluded species etc.....	18
4.2	Data fields to complete	19
4.3	Taxon Name and protologue	20
4.4	Etymology	20
4.5	Common Name.....	21
4.6	Type information.....	21
4.6.1	Family and Generic profiles	21
4.6.2	Species profiles.....	21
4.7	Description	22
4.7.1	General requirements	22
4.7.2	Sequence of organs in descriptions	23
4.7.3	Organ specific requirements.....	24
4.7.4	Family/Genus Descriptions	24
4.7.5	Species Descriptions.....	24
4.7.6	Infraspecific taxa	25
4.7.7	Non-flowering plants.....	25
4.8	Diagnostic Features	26
4.9	Phenology	26
4.10	Chromosome Numbers.....	26
4.11	Biostatus	26
4.12	Distribution.....	27
4.13	Habitat	27
4.14	Ecology.....	27
4.15	Conservation Status	27
4.16	Representative Herbarium Specimens.....	27
4.17	Uses	28
4.18	Nomenclature and typification (descriptive text field).....	28
4.19	Taxonomic Notes	29
4.20	Notes.....	29
4.21	Illustrations	29
4.22	Bibliography	29
4.22.1	Book Chapter.....	30
4.22.2	Journal	30
4.22.3	Website	30
4.23	Source.....	30
4.24	Nomenclature (automated data field)	30
4.25	Links.....	30
4.26	Biodiversity Heritage Library references	30
4.27	Specimens [links to specimen metadata].....	31

4.28	Images	31
4.28.1	Curating linked images.....	31
4.28.2	Contributing new images	32
4.29	Multimedia	31
4.30	Author.....	33
4.31	Editor.....	33
4.32	Contributors.....	33
4.33	Acknowledgements	33
4.34	Seedlings	33
4.35	Excluded or uncertain names.....	33
4.36	Ethnobotany.....	34
4.37	Diagnostic keys	34
4.37.1	Updating an existing Keybase key:	34
4.37.2	Creating a new dichotomous key on Keybase:.....	34
4.38	Distribution Map	35

1 INTRODUCTION

1.1 OVERVIEW

This guide provides information about contributing to the digital *Flora of Australia* (herein referred to as ‘the Flora’), which is available online at www.ausflora.org.au. It includes guidance on preparing and editing digital Flora content, and points on format and style. This Guide is principally written for vascular plant contributors, although the main points also apply to other groups. Guidance for Flora users (i.e. public use) is available online at www.ausflora.net.

The guide is structured as follows:

Section 1: Introduction to the Flora, including the digital platform.

Section 2: General process of contributing to the Flora.

Section 3: Technical workflow processes for contributing and editing digital Flora content.

Section 4: Guidance on preparing a Flora treatment, including appropriate content, structure, format and presentation.

1.2 PURPOSE AND SCOPE OF THE FLORA

The purpose of the Flora is to provide a comprehensive and authoritative account of Australia’s native and naturalised plants, including vascular plants, bryophytes and lichens. The digital Flora is currently focused on vascular plants, with information about bryophytes and lichens to come.

A flora should enable the reader to identify specimens and to give a concise, accurate account of the plants of a region. The Flora is intended for use by professional botanists and any persons requiring information on the names, characteristics, distribution, habitat and other characteristics of Australian plants. As such, the Flora should be understandable to anyone with a basic knowledge of plant structures.

The Flora is intended to be a synthesis of current taxonomic knowledge of the country’s flora. Although the treatment of some groups will be based on recent revisionary studies, the Flora is not intended to be a monographic work.

1.3 GEOGRAPHICAL COVERAGE

The area covered by the Flora includes the six Australian States, the Northern Territory, the Australian Capital Territory and immediate offshore island Territories. In the hard copy Flora series, Australian and State offshore Territories (Cocos (Keeling) Island, Christmas Island, Ashmore Reef, Cartier Island, the Coral Sea Territory, Lord Howe Island, Norfolk Island, Heard Island and Macquarie Island) were covered separately in Volumes 49 and 50. The digital Flora will integrate updated legacy treatments and new treatments of taxa from all Australian offshore territories.

1.4 THE DIGITAL FLORA

The Flora platform infrastructure was developed in partnership between the Council of Heads of Australian Herbaria (CHAH), Australian Biological Resources Study (ABRS, Department of the Environment and Energy) and the Atlas of Living Australia (ALA), with input and support from taxonomic botanists in Australia and New Zealand.

On the platform, digital Flora treatments are managed as a collection of taxon profiles. Each profile includes descriptive text and automatically linked data from other online Australian bioinformatics resources. Linked data include: classification and nomenclatural information from the National Species List (Australian Plant Name Index and the Australian Plant Census); diagnostic keys from Keybase;

distribution maps from the Australasian Virtual Herbarium; taxonomically verified images from the Australian Plant Image Index; and other biodiversity data from the ALA. The linked data and descriptive text can be updated by ABRs-approved users, allowing the information presented in the digital Flora to be taxonomically up-to-date, while maintaining the scientific rigour and authority of the original hard copy series. More information about linked data and their management is given in Section 4.

Content available on the digital Flora includes legacy treatments published in the hard copy series (1981 – 2015) and new treatments added since the launch of the digital Flora in 2017. The ABRs is updating legacy treatments in line with current taxonomic knowledge (largely guided by the Australian Plant Census) and systematically filling gaps to build a comprehensive and current Flora.

1.5 TERMINOLOGY USED IN THIS GUIDE

ABRS	Australian Biological Resources Study, Australian Government Department of the Environment and Energy (www.environment.gov.au/science/abrs)
ALA	Atlas of Living Australia (www.ala.org.au)
APC	Australian Plant Census. List of the accepted scientific names of native and naturalised plants occurring in Australia (https://biodiversity.org.au/nsl/services/APC)
APII	Australian Plant Image Index (http://www.anbg.gov.au/photo/apii-about.html)
APNI	Australian Plant Name Index. Lists usage of plant names in the scientific literature, in the Australian context (https://biodiversity.org.au/nsl/services/APNI)
Attribute	Technical term for data field. Descriptive information in taxon profiles is presented in a series of separate data fields, or attributes.
AVH	Australasian Virtual Herbarium (http://avh.chah.org.au/)
CHAH	Council of Heads of Australasian Herbaria (www.chah.gov.au)
Flora	Herein used to refer to the digital <i>Flora of Australia</i> (www.ausflora.org.au)
Keybase	An online repository and platform for storing, managing and deploying dichotomous identification keys (http://keybase.rbv.gov.au/)
NSL	National Species List. The infrastructure that supports the APC and APNI to deliver names and taxonomies for vascular plants, bryophytes, lichens and other organisms in the Australian context (https://biodiversity.org.au/nsl/services/)
Taxon profile	Treatments on the Flora platform are managed and viewed as independent taxon profiles, with hyperlinks to profiles of higher taxa. Within taxon profiles, information is broken into separate data fields (e.g. description, distribution, etc.). Taxon profiles also include linked data from other Australian bioinformatics resources, as outlined above.

2 CONTRIBUTING TO THE FLORA

There are four main types of contribution to the FoA: minor revisions; major revisions (including new content contributions); new taxon profiles (flora treatments); and providing peer review. This section summarises the workflows associated with these contributions (see Figure 1).

The ABRS, as administrators of the Flora, manage user access on the Flora platform and provide assistance and editorial oversight for any contributions of new or updated content. If you would like to contribute to the Flora, please contact the ABRS at abrs@environment.gov.au. More information about technical workflow processes on the digital platform, and development of descriptive content, is provided in Sections 3 and 4 respectively.

Please note:

- The ABRS will act as the single point of contact for all queries and new contributions of Flora content. Please contact the ABRS in the first instance if you would like to contribute data to automatically-linked databases on the Flora platform (e.g. Keybase, Australian Plant Image Index. See Section 3.8 and Section 4 for more information about managing linked data).
- Contributors, especially those preparing large treatments, are welcome to submit a sample of Flora taxon profile content (e.g. descriptions) at an early stage. The ABRS will review these and provide feedback to guide preparation of remaining Flora content.

2.1 MINOR REVISIONS

Minor revisions include updates to existing Flora content in taxon profiles, or additions of new content, that do not alter the taxon concept. Examples include:

- Editorial changes, such as rearranging content or editing grammar and spelling.
- Minor addition of descriptive text, such as biostatus (endemic, naturalised, native), common names, references or links.
- Curation of linked data, such as images or the distribution map.

In general, these changes will not initiate the peer review process, and will not require creation of a new taxon profile ‘version’ (PDF files with a permanent DOI – refer to Section 3.7). However, the ABRS will retain editorial oversight and manage publication of minor revisions.

2.2 MAJOR REVISIONS

Major revisions are substantive changes to the content of a taxon profile (i.e. a flora treatment). Major revisions will generally constitute changes to the taxon concept presented, a nomenclatural change, or the addition or change of substantial sections of descriptive content (e.g. plant description, uses or ecology). In general, major revisions will initiate the peer review process and the creation of a new ‘version’ of the taxon profile as a PDF file with a permanent DOI.

2.3 NEW TAXON PROFILES

New Flora treatments are added as a collection of new taxon profiles. ABRS can assist to create new taxon profiles. Alternatively, contributors with appropriate user access permissions can create new profiles and then add descriptive content and curate linked data (refer to the workflow processes outlined in Sections 2.4, 3 and 4).

The Flora will be built primarily in-line with the Australian Plant Census taxonomy. Please contact the ABRS where exceptions arise. At this time the Flora cannot support the publication of new names or lectotypifications. Please seek to publish these first in an appropriate international or national taxonomic journal (e.g. *Australian Systematic Botany* or state herbarium journal).

2.4 GENERAL WORKFLOW PROCESS FOR CONTRIBUTING AND UPDATING FLORA CONTENT

The steps below outline the general process of contributing and/or updating Flora content. More detailed guidance on preparing Flora content, including content, style and format, is provided in Section 4.

1. Contact the ABRS at abrs@environment.gov.au, with information about the proposed contribution.
2. ABRS will assign an appropriate level of platform user access (see instructions for accessing the platform in Section 3.1).
3. Create any new taxon profiles and/or edit any taxon profile titles (taxon names) as required.
4. ABRS will lock all taxon profiles to be updated/created for editing. The profiles will go into 'draft mode'. Any changes to taxon profiles made while in draft mode (excluding taxon profile/name changes) will not be publicly visible.
5. Login to the Flora platform online at www.ausflora.org.au, and follow instructions in Sections 3 and 4 to add and/or update descriptive content and curate linked data as required (diagnostic keys, images, and synonymy. Currently, distribution maps need to be curated after taxon profiles are updated and published).
6. Notify ABRS when profiles are ready for review. As administrators of the digital Flora, the ABRS can monitor updates but will not periodically check draft profiles for completeness.
7. Major revisions and contributions of new taxon profiles may initiate the peer review process (Section 2.5).
8. ABRS will manage final editorial review and publication of new and revised taxon profiles.
9. Following publication of edited taxon profiles, distribution maps can be curated to include/exclude occurrence records as appropriate (Section 4.38).

2.5 PEER REVIEW

For new and substantially revised Flora content requiring peer review, the ABRS will manage the following process with oversight from the Flora Advisory Group (see Section 2.7 Governance).

1. The ABRS, with oversight of the Flora Advisory Group, will select and engage peer reviewers from the botanical community.
2. Reviewers will review the relevant taxon profiles and provide comments in the 'Reviewer Comments' data field within each profile. Peer reviewers will not be able to edit or add any other content. Reviewer comments can also be submitted via email to ABRS.
3. ABRS and Flora contributors will be able to see reviewer comments in the 'Reviewer Comments' field. They will appear without attribution to the reviewer and will not be publically visible.
4. The ABRS will generally request that reviewers provide comments within 3–4 weeks, although deadlines for providing reviewer feedback will be negotiated depending on the amount of content to be reviewed.
5. ABRS will notify contributors when reviewer comments are available. Contributors will have an opportunity to respond to reviewer comments.
6. ABRS will manage final editorial review and publication of new and revised taxon profiles.

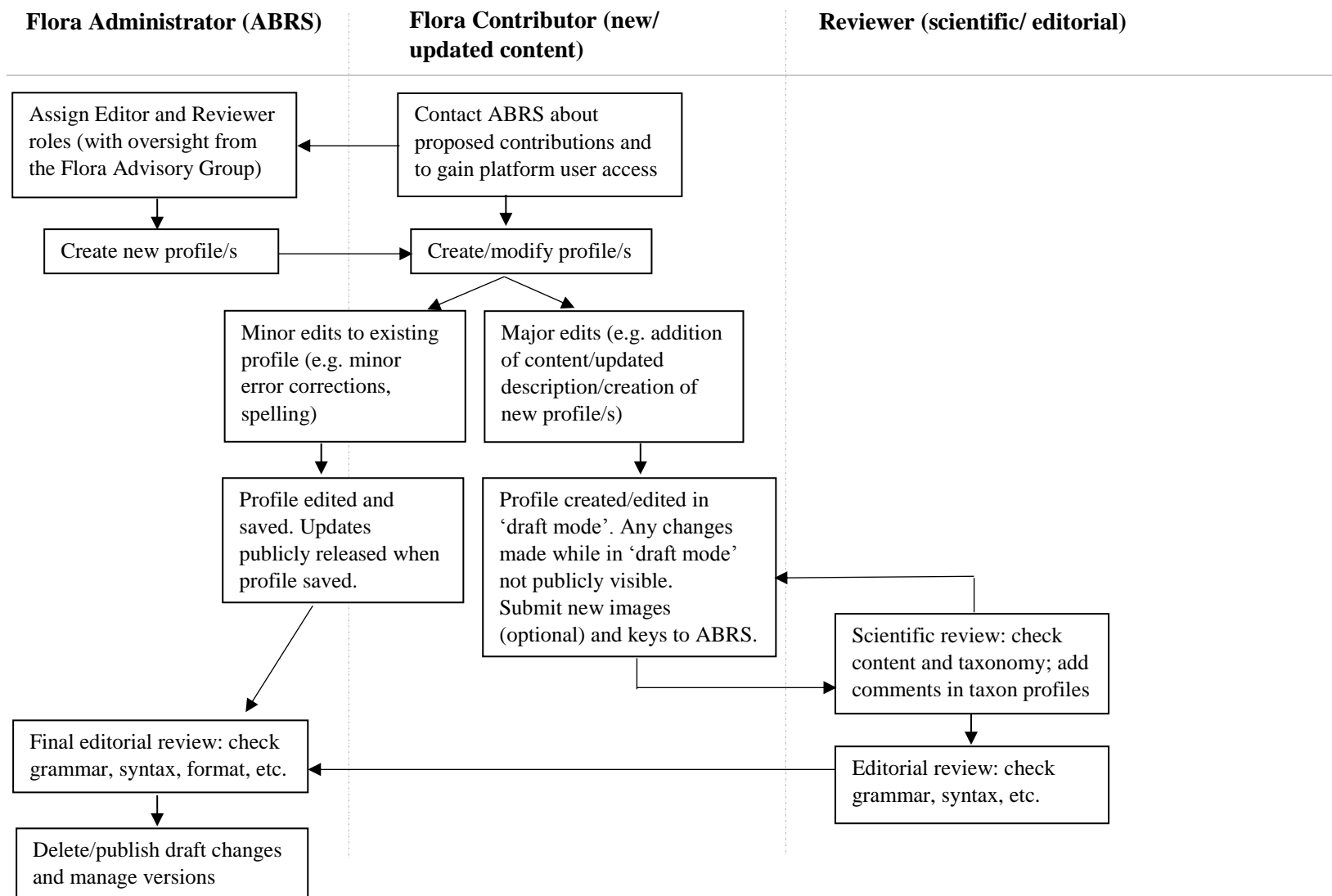


Figure 1. Overview of workflow processes for contributing and updating digital Flora content.

2.6 AUTHORSHIP AND ATTRIBUTION

This section outlines proposed management of authorship and acknowledgements of contribution to Flora content. The ABRS encourages any feedback from Flora users and contributors regarding the management of authorship and attribution on the digital Flora.

2.6.1 Authorship

Flora treatments are managed as a collection of independent taxon profiles that are arranged according to the taxonomic hierarchy. Authorship is managed and acknowledged at the level of the taxon profile, and can also be acknowledged for individual data fields on a taxon profile. At the profile level, contributors can be acknowledged as an ‘*author*’, ‘*editor*’ or general ‘*contributor*’.

In general, contributors to the Flora will be recognised as *authors* where (a) contributions constitute major revisions or new profiles (see Sections 2.1–2.2 for definitions of minor and major revisions) and (b) the content is the original work of the contributor or a synthesis of information from the scientific literature (i.e. not directly copied from other publications). Contributors collaborating on new or revised Flora content will largely be responsible for deciding on appropriate order of authorship in each taxon profile.

When contributors are individually responsible for particular parts of the taxon profile (i.e. populated data fields such as phenology or uses) then their names are cited in a specific ‘source’ field associated with the relevant data field/s (there is a separate ‘source’ field at the whole profile level).

Flora contributors will be acknowledged as *editors* where they undertake substantial editorial review of a taxon profile, e.g. to ensure taxonomic rigour of the content presented. Contributors undertaking minor revisions of Flora content (e.g. providing minor editorial assistance) will be noted as *contributors*.

All authors, editors and acknowledgements will be publicly visible within Flora taxon profiles and any PDF exports and versions of the profiles.

Please note: As the Flora is a dynamic publication space, taxon profiles may be updated over time by new contributors (with permission of the ABRS). The ABRS will endeavour to liaise with original authors of the work on proposed changes where possible. The ABRS may include secondary authors of taxon profiles where major revisions to taxon profiles are made over time, such as the addition of new descriptive text/data fields. Alternatively, where a taxon profile is substantially revised, the ABRS may create a new ‘version’ of relevant taxon profiles (see Section 3.7) with new authors. All taxon profile versions will be publicly available as downloadable PDF files with a permanent DOI.

2.6.2 Acknowledgements

Contributors can make acknowledgements within each taxon profile, as descriptive text in an ‘Acknowledgements’ data field (see Section 4.36).

2.6.3 Citing sources of information in Flora taxon profiles

Sources of information used to develop Flora content can be included at three levels:

1. Whole profile level, in the ‘source’ data field (e.g. for taxon profiles originating from Flora treatments published in the hard copy Flora series, or when a new treatment is largely based on/adapted from a particular reference/source), and in the ‘bibliography’.
2. Data field level, in the ‘source’ field underneath the relevant data field.
3. In-text citations, abbreviated references within data fields, with the expanded reference included in the bibliography (as in scientific works).

2.6.4 Citing Flora of Australia treatments

The Flora as a whole should be cited as recommended in the ‘about’ page. Flora treatments should be cited using the format recommended within each taxon profile.

2.6.5 Citing linked data

The ABRS aims to ensure all linked data are appropriately cited within the Flora, with links provided back to the source database. Linked data presented in Flora taxon profiles should be cited as recommended by the source database, allowing for format or style differences. For example, images should be cited as per citation requirements in the APII.

2.6.6 Copyright

All Flora content is delivered under a Creative Commons ‘BY’ (CC-BY) licence in accordance with Australian Government policy and guidelines on open access data and information.

The ABRS requests that contributors to the Flora seek appropriate permissions before adapting or using content directly from another publication. Where material is mostly based on another work it may be suitable to invite the author of that work to be a co-contributor of the relevant Flora taxon profile(s). For citing sources see also Section 2.6.3.

2.7 GOVERNANCE

The Flora is managed by ABRS, a unit within the Australian Government Department of the Environment and Energy. The ABRS, as administrators of the Flora, manage platform settings specific to the Flora, including user access levels for contributors and peer reviewers. The ABRS also provides guidance and assistance to contributors of Flora content and maintains editorial oversight of all Flora content.

The ABRS will work with managers of linked data (Keybase, APII, AVH, NSL) to support national workflows for the Flora. Since the Flora is a national collaborative resource, the ABRS will consult the botanical community to decide future priorities for completing treatments to fill the identified gaps.

The Flora Advisory Group, which comprises members of CHAH and representatives of the botanical community, provide oversight and guidance for the development of the Flora content and the digital platform. This includes assisting the ABRS to identify and engage Flora contributors, editors and peer reviewers.

The ALA hosts the Flora platform and provides ongoing IT support to maintain and develop the platform infrastructure, in line with agreed priorities of the botanical community.

2.8 CONTACT

Contact the ABRS: Editor, *Flora of Australia*, Australian Biological Resources Study, GPO Box 787, Canberra, Australian Capital Territory 2600. Email: abrs@environment.gov.au.

3 MANAGING FLORA CONTENT ON THE PLATFORM

This section provides technical guidance for managing content on the Flora platform. See Section 4 for guidance on preparing a Flora taxon profile (treatment), including content and presentation.

For additional information on these processes visit the “How-To” Guides on the ausflora.net help site.

3.1 FLORA EDITING ACCESS


To add and edit Flora content, contributors will need to:

1. Register online with the ALA at: <https://auth.ala.org.au/userdetails/registration/createAccount>.
2. Contact the ABRS (email: abrs@environment.gov.au) and advise which email address is registered with the ALA. Please also notify the ABRS of proposed contributions to the Flora. The ABRS will then assign appropriate user access levels on the platform.
3. Log in to the Flora platform at: www.ausflora.org.au, with the username (email address) and password registered with the ALA.

3.2 CREATING A NEW TAXON PROFILE

New taxon profiles may need to be generated for taxa not previously treated for the Flora. The new profiles can then be populated and linked data curated.

To create a new profile:

1. Select on the hamburger menu () at the top right-hand corner of any page on the Flora and select “Add a new profile”.
2. In the dialogue box, type the name of the taxon and select ‘Check Name’. This will search the ALA name index for a match to an APC-compliant name.
Matched name: the name is APC-compliant. Select ‘Create Profile’.
No matched name: the name is either non-APC-compliant or not yet included in the ALA names index. Please contact the ABRS. A profile can be created for non-matching names, but they will not include any linked data (keys, images, etc.). The ALA names index is the basis for linking these data on the platform. For non-matching names, contributors can ‘Specify the hierarchy’. This can only be done when the profile is created and not subsequently.
3. This has created a new profile with the occurrence, images from ALA and nomenclature data from NSL linked automatically. This profile is now ready to populate (see Section 4).
4. **Note:** All new profiles will automatically be in ‘draft mode’. This means they will not be publicly visible until published by the ABRS.

3.3 COPYING AN EXISTING TAXON PROFILE

When working with large groups, an existing profile can be used as a proforma for building others. New profiles can be created as a copy of existing ones, including all descriptive content in the copied profile.

To copy an existing profile:

1. Select the hamburger menu at the top right-hand corner of any page on the Flora and select “Copy an existing profile”.

2. Type the name of the existing profile you wish to copy, and the name of the new profile. Follow step 2 above to check APC-compliance of the name.
3. Select 'create profiles'. The new profile will inherit all descriptive text from the copied profile, and linked data relevant to the new target taxon. The profile can now be edited.

3.4 EDITING PROFILES AND WORKING IN 'DRAFT MODE'

Draft mode: Flora taxon profiles should always be 'locked for editing' before changes are made. A notification will appear that the profile is 'currently in draft'. Changes will not be visible to the public until the profile is completed and the draft is released by the ABRS. New profiles will default to draft mode.

To lock a profile for editing ('draft' mode):

1. Login to the platform and use the quick search or browse functions to open the target taxon profile.
2. At the top of the taxon profile select 'Options' and 'Edit'.
3. Select 'Options' again, and 'Lock for major revisions'.

To edit existing Flora content:

4. Follow the steps above and then make required changes to the existing content. Formatting options are provided within each data field and additional formatting and symbols can be copied from a word document.

Deleting draft changes:

5. Changes made to a taxon profile while in draft mode can be reversed by selecting 'Options' > 'Discard draft changes'. Note that this will delete all changes made since the profile was put into draft mode.

3.5 ADDING NEW DESCRIPTIVE CONTENT

Descriptive information is presented in taxon profiles in a series of data fields (technical term on the platform is 'attributes'). Data fields will only appear on a published profile if populated. When a taxon profile is in edit mode, some data fields will automatically be available for populating (the most regularly used fields). Additional data fields can be added by selecting 'add attribute' at the top of the taxon profile. Please refer to Table 1 (Section 4) for guidance on which data fields that should be populated for taxon profiles at each major rank.

1. To populate existing data fields: text can be added or copied directly into empty data fields.
2. To add new data fields: Select 'Add Attribute' at the top of the profile page (under the map) and select a subheading from the drop-down list. Please contact the ABRS if a desired subheading is not available in the list.
3. To add new linked data: refer to Section 3.8 and Section 4 for information about managing linked data. All new keys and images should be provided to the ABRS for submission to linked databases.

3.6 SAVING, PREVIEWING AND REVIEWING EDITS TO PROFILES

Save changes as each data field is updated. This will ensure no changes are lost if the platform times out (after several hours of non-use) or unexpectedly closes due to technical issues.

To preview a draft profile in public view (as it would appear after release of draft changes), select ‘Public View’ at the top of the profile page.

Recent changes to descriptive content in a taxon profile can be reviewed at two levels:

1. Data field: under the data field, select ‘Show History’. This will display recent versions of the data field content with an option to ‘revert’ to a selected version.
2. Whole profile: in the taxon profile, select ‘Options’ > ‘Edit’ and then ‘Options’ > ‘Show revision history’. This will show a list of changes made to the profile, with date and person responsible, including added or deleted attributes. Clicking on ‘compare with previous version’ will open a new dialogue box that outlines the type of changes made.

3.7 TAXON PROFILE VERSIONS AND ARCHIVING

Taxon profiles can be exported, versioned and archived.

- Exporting profiles: Any Flora user can export publicly available taxon profiles by selecting ‘Options’ > ‘Export as PDF’. Users can select which attributes to include in the PDF (e.g. keys, maps) including profiles of any subordinate taxa (to a maximum of 100 profiles).
- Versions: the ABRS, as Administrators of the Flora, can create snapshot versions of taxon profiles, as PDF files with a permanent DOI. These will include any linked data presented on the taxon profile (e.g. keys, images) at the time the version was created. Generally, a new version will be created when a profile is substantially edited (major revisions, see Section 2.2). Links to each version are provided in taxon profiles.
- Archived profiles: Archived profiles will no longer appear in search results or the taxonomic hierarchy, but will be stored as a snapshot version (PDF with a DOI). This is useful for retaining profiles that are no longer needed on the Flora, e.g. for combined taxa. Links to archived profiles can be provided in related profiles (e.g. retained taxa following a combination).

3.8 CURATING LINKED DATA

As outlined in Section 1 (Introduction), the Flora platform links data from various online sources, including maps, keys, images and nomenclatural information (synonymy). Instructions for contributing and curating linked data are provided in Sections: 4.24 (nomenclature); 4.28 (images); 4.37 (diagnostic keys); and 4.38 (distribution maps).

4 PREPARING FLORA CONTENT

This section provides guidance on preparing Flora taxon profiles, including detailed instructions about populating each field and managing linked data (keys, maps, images, nomenclatural information).

For additional information on these processes visit the “How-To” Guides and the “Formatting Essentials” on the ausflora.net help site.

GENERAL GUIDELINES

4.1.1 Word limits

Word limits are given in the description of each data field below. Contributors to the Flora are asked to take particular care not to exceed the recommended maximum length of descriptions. Longer descriptions may be edited for brevity.

4.1.2 Terminology

Technical terms are useful, but should be restricted as much as possible to those in common use and those which occur in the Flora Glossary: <https://profiles.ala.org.au/opus/foa/glossary#?page=a>. If a technical term is necessary in the description but does not occur in the Glossary please contact ABRs editors with its botanical definition for inclusion in the Glossary.

A list of botanical glossaries and specialist publications, which may assist with plant morphological terminology, can be provided by the ABRs on request.

Avoid terminology that is relative to time of publication, such as “recently”. Rather, state when things occurred, such as “in 2008”.

4.1.3 Treatments as taxon profiles

As outlined in Section 1.4 (Introduction) the Flora is managed as a collection of independent taxon profiles at various levels (e.g. family, genus, species, infraspecific taxa). Taxon profiles stand alone and their content should reflect this.

4.1.4 Example profiles

The following taxon profiles have been formatted for the Flora and may serve as useful templates while developing your treatment:

Anarthriaceae <https://profiles.ala.org.au/opus/foa/profile/Anarthriaceae>

Anarthria <https://profiles.ala.org.au/opus/foa/profile/Anarthria>

Anarthria gracilis <https://profiles.ala.org.au/opus/foa/profile/Anarthria%20gracilis>

Balsaminaceae <https://profiles.ala.org.au/opus/foa/profile/Balsaminaceae>

Impatiens <https://profiles.ala.org.au/opus/foa/profile/Impatiens>

Impatiens walleriana <https://profiles.ala.org.au/opus/foa/profile/Impatiens%20walleriana>

Caryophyllaceae <https://profiles.ala.org.au/opus/foa/profile/Caryophyllaceae>

Rutaceae <https://profiles.ala.org.au/opus/foa/profile/Rutaceae>

Zieria <https://profiles.ala.org.au/opus/foa/profile/Zieria>

Zieria arborescens <https://profiles.ala.org.au/opus/foa/profile/Zieria%20arborescens>

Zieria arborescens subsp. *arborescens*

<https://profiles.ala.org.au/opus/foa/profile/Zieria%20arborescens%20subsp.%20arborescens>

Zieria prostrata <https://profiles.ala.org.au/opus/foa/profile/Zieria%20prostrata>

Please contact ABRS editors should you require further examples or advice on dealing with taxa that may be complex, rare, naturalised natives, of uncertain status, etc.

4.1.5 New taxa

See Section 2.3 (New Taxon Profiles) regarding publication of new taxa in the Flora.

4.1.6 Hybrids

Hybrids at each species or infraspecific level which have a formal nothotaxon name should be treated in the appropriate place, as if the initial hybrid sign (×) was not present. Where hybrids are frequent, but have no formal name, they can be referred to by a hybrid formula. These, and other extensive lists of putative hybrids are best grouped at the end of the genus or (for infraspecific hybrids) at the end of the species. Where hybrids are only occasional, or their existence is suspected but not considered established, then they are best discussed in the 'Notes' data field (see Section 4.20) in relevant taxon profiles.

4.1.7 Doubtful and unplaced names, excluded species etc.

Doubtful and unplaced names and excluded species are included within the relevant generic or family taxon profile. Refer to Section 4.35 for more information and examples.

4.2 DATA FIELDS TO COMPLETE

Table 1 outlines which data fields are required to be populated within a taxon profile at each major rank. Data fields are presented below in the order they appear in taxon profiles (the order may change with editorial considerations by ABRS), but can be populated in any order.

Table 1. List of the main data fields available in Flora taxon profiles showing how they can be populated with data at each major rank, and the order they will be presented on the platform.

Section	Attribute Name	Family	Genus (subfamilies, tribes etc)	Species (infraspecific taxa)
4.4	Etymology	Optional	Optional	Optional
4.5	Common Name	Optional	Optional	Required (if any)
4.6	Type	Required	Required	Required
4.7	Description	Required	Required	Required
4.34	Seedlings	Optional	Optional	Optional
4.8	Diagnostic Features	Optional	Optional	Optional
4.9	Phenology	N/A	N/A	Required
4.10	Chromosome Numbers	N/A	N/A	Optional
4.11	Biostatus	Optional	Optional	Required
4.12	Distribution [including number of genera/species for family & genera]	Required	Required	Required
4.13	Habitat	Optional	Optional	Required
4.14	Ecology	Optional	Optional	Optional
4.15	Conservation Status	Optional (but recommended)	Optional (but recommended)	Optional (but recommended)
4.16	Representative Herbarium Specimens	N/A	N/A	Required
4.17	Uses	Optional	Optional	Optional
4.36	Ethnobotany	Optional	Optional	Optional
4.18	Nomenclature and Typification	Optional	Optional	Optional
4.35	Excluded or Uncertain Names	Optional	Optional	Optional
4.19	Taxonomic Notes	Optional	Optional	Optional
4.20	Notes	Optional	Optional	Optional
4.21	Illustrations	N/A	N/A	Required (if any)
4.22	Bibliography	Required	Required	Required
4.23	Source	Required	Required	Required

4.3 TAXON NAME AND PROTOLOGUE

Taxon names, including authorship, will become the taxon profile title. The taxon name, author, and original reference are drawn automatically from the NSL.

4.4 ETYMOLOGY

Derivation of the name, presenting the original words and language from which the epithet is derived, and where known, why this has been applied to the taxon (see original papers/protologue). Where the etymology is not provided or difficult to locate, the following titles and similar works could be consulted:

Baines, J.A. (1981). *Australian Plant Genera - an etymological dictionary of Australian plant genera*. (Society for Growing Australian Plants: Chipping Norton).

Burbidge, N.T. (1963). *Dictionary of Australian Plant Genera. Gymnosperms and Angiosperms*. (Angus & Robertson: Sydney).

Brown, R.W. (1956). *Composition of Scientific Words. A manual of methods and a lexicon of materials for the practice of logotechnics*. (Revised) (Smithsonian Books: Washington).

<https://archive.org/details/compositionofsci00brow>

Charters, M.L. (2005–2016). *California Plant Names: Latin and Greek meanings and derivations*. A dictionary of botanical and biographical etymology. <http://www.calflora.net/botanicalnames/index.html>

Council of Heads of Australian Herbaria (CHAH) (2016). Biographical notes on plant collectors and illustrators or others relevant to Australian botany. <http://www.anbg.gov.au/biography/>

Eckel, P.M. (2011). *A Grammatical Dictionary of Botanical Latin*. (Missouri Botanical Garden).

<http://www.mobot.org/mobot/LatinDict/search.aspx>

Fitzgerald, H.P. (1885). *Dictionary of the Names of British Plants: intended for the use of amateurs and beginners, as a help to the knowledge of the meaning and pronunciation of the scientific names of British wild flowers*.

(Baillière, Tindall and Cox: London). <https://archive.org/details/b24864833>

George, A.S. (2009). *Australian Botanist's Companion*. (Four Gables Press: Kardinya, W.A.).

Hollinger, J. (n.d.). Plant Latin Dictionary. <http://alumnus.caltech.edu/~hollin/botany/latin/dictionary.html>

Perrin, D. (1988). *Dictionary of Botanical Names: Australian plant names, meaning, derivation and application*. (Recliff Education Centre: Kippa Ring, Qld).

Quattrocchi, U. (1999). *CRC World Dictionary of Plant Names: common names, scientific names, eponyms, synonyms, and etymology*. (CRC Press, Taylor & Francis: Boca Roca, U.S.A.).

Quattrocchi, U. (2006). *CRC World Dictionary of Grasses: common names, scientific names, eponyms, synonyms, and etymology*. (CRC Press, Taylor & Francis: Boca Roca, U.S.A.).

Sharr, F.A. (1996). *Western Australian Plant Names and Their Meanings. A glossary*. Enlarged edn. (University of Western Australia Press: Nedlands).

Short, E. & George, A.S. (2013). *A Primer of Botanical Latin with Vocabulary*. (Cambridge University Press: Cambridge).

Spencer, R., Cross, R. & Lumley, P. (2007). *Plant Names: a guide to botanical nomenclature*. (CSIRO Publishing: Melbourne).

Stearn, W.T. (1992). *Botanical Latin* 4th edn. (Timber Press: Portland, Oregon).

Stearn, W.T. (2002). *Stearn's Dictionary of Plant Names for Gardeners. A handbook on the origin and meaning of the botanical names of some cultivated plants*. Revised edn. (Cassell: London).

Wapstra, A., Wapstra, M. & Wapstra, H. (2010). *Tasmanian Plant Names Unravelling*. (Fullers Bookshop: Launceston).

4.5 COMMON NAME

List known common names in regular use in Australia. This information will be unavailable for many taxa. Some common names are already included in APNI and these will be automatically imported. A useful reference for common names is Lazarides, M. & Hince, B. (1993). *CSIRO Handbook of Economic Plants of Australia*. (CSIRO Publishing: Melbourne). Names should not be made up, nor should names of very local application be cited. Where a common name is used only in one State or major region and might be used for a different plant in another region, it should be qualified as, for example, Tasmanian Blue Gum or Blue Gum (Tasmania). Where indigenous names are known, it is preferable to also include the group/language from which the name is derived.

Each word should start with a capital, except for hyphenated names. Each name is separated by a comma.

4.6 TYPE INFORMATION

4.6.1 Family and Generic profiles

The name and author of the type species is given. No further information is given about the type unless it is lectotypified in the Flora (Note the Flora is not yet set up to include new lectotypifications).

4.6.2 Species profiles

Formal designations (e.g. selection of a Lectotype) will need to be made in a separate publication.

Type citations should match the following examples:

Dampier's Archipelago, W.A., July 1818, *A. Cunningham 148*; holo: G-DC; *n.v.*; iso: BM 001015857, CANB, K 000357262, photo CANB; MEL 59422; possible iso: 'Interior, N.W.C., *A. Cunningham s.n.*', K 000357263, K 000357265.

Cultivated plant, Norfolk Island, Mission Road, Botanic Garden. Ex cult. Phillip Island, N.S.W., 11 Nov. 1998, *P.J. de Lange NF154 & G.M. Crowcroft*; holo: AK 238188; iso: CHR 522402, K, NSW 821334.

Peron Peninsula and Port Freycinet, Shark Bay, W.A., Oct. 1877, *F. Mueller s.n.*; holo: MEL 0044400; iso: BM 001015743, K000786676, P 00720470.

France, Dep. Aude, plages des environs de l'île Sainte-Lucie et de Narbonne, July 1853, *J.B.L. Companyo & P.C. Billor*; distributed as *Flora Gallica Exsiccata no. 1541* (Feb. 1855); syn: BM 000752219, BM 000752220, G 00440177; JE 00011818, MPU 021444, MPU 021445, S 10-4547, WAG 0004690.

'Habitat in Sicilia, Palaestina, Africa.' (lecto: LINN 395.33), designated by M.H. Bohkari in E. Nasir & S.I. Ali, *Flora of West Pakistan* 28: 9 (1972).

JSTOR *Global Plants* <https://plants.jstor.org/> is a very useful repository of Type specimen images and should be consulted, but note that coverage is far from complete and the specimen label data presented on the website is often incomplete and should be verified against what is actually written on the sheet. A subscription is also required to access the full images. All major Australian herbaria and some Universities have access rights, so if you are not in a herbarium, contact your local institution to see if they can assist with access.

There are a number of additional online databases that are very useful for locating type specimen images. Note that a number of these herbaria are not covered by JSTOR searches, and many Australian collections may not have been correctly identified as types, so the absence of a scanned specimen does not necessarily mean that a specimen is not held by the relevant herbarium:

B: <http://ww2.bgbm.org/herbarium/default.cfm>
BM: <http://www.nhm.ac.uk/our-science/collections.html>
BR: <http://www.br.fgov.be/research/COLLECTIONS/HERBARIUM/simplesearch.php>
C: <http://botanik.snm.ku.dk/english/Samlinger/Herbarier/dokument2/>
E: <http://elmer.rbge.org.uk/bgbase/vherb/bgbasevherb.php>
G: <http://www.ville-ge.ch/musinfo/bd/cjb/chg/?lang=en>
GH, A, AMES, ECON, FH: http://kiki.huh.harvard.edu/databases/specimen_index.html
K: <http://apps.kew.org/herbcat/navigator.do>
L, U, WAG: <https://science.naturalis.nl/en/collection/naturalis-collections/botany/>
LD, GB, OHN, S, UME, UPS: <http://herbarium.emg.umu.se/>
NY: <http://sweetgum.nybg.org/science/vh/>
P: <https://science.mnhn.fr/institution/mnhn/search>
US: <http://collections.nmnh.si.edu/search/botany/>
W: <http://herbarium.univie.ac.at/database/search.php>
European herbaria: <http://www.europeana.eu/portal/en>

Some others are linked at: <http://www.virtualherbarium.org/vh/othersystems.html>

For typification of Linnaean names, consult: Jarvis, C. (2007). *Order Out of Chaos: Linnaean plant names and their types*. (The Linnean Society of London in association with the Natural History Museum: London); and the associated website: <http://www.nhm.ac.uk/our-science/data/linnaean-typification/index.html>. At the time of writing this guide, the printed book version was more up to date than the website. Note that some of the earlier barcode numbers allocated to pages in folio herbaria and cited in these sources have since been replaced with barcodes for each specimen on each page (e.g. *Herb. Hermann*, held at BM). In this case, the single barcode is shown on the website, but a new set of barcodes is shown on JSTOR *Global Plants*.

A similar project is underway for names published by Robert Brown. Note that a list of specimens collected by Brown in Australia (1801–1805) based on his original collection labels held at BM is available at: <https://florabase.dpaw.wa.gov.au/brown/>

4.7 DESCRIPTION

4.7.1 General requirements

The description data field should be restricted to 300 words. However, if you genuinely believe that longer descriptions are required to accurately discriminate taxa in difficult groups, please contact the ABRS with an example description and suitable justification. Terminology should follow the Flora glossary (available on the digital Flora: www.ausflora.org.au) but additional terms can be used if an accurate term is not available (see Section 4.1.2).

Descriptions should describe the taxon as a whole, but be especially relevant to the Australian context. Attributes that occur only outside Australia should have the qualifier ('not in Australia'), as can be seen in the description of the sepals in Thymelaeaceae (<https://profiles.ala.org.au/opus/foa/profile/Thymelaeaceae>). Such qualifiers may be necessary, for example, if Australia has only a few species of a large family.

Because Flora taxon profiles are managed and viewed independently it is important that descriptions cover all of the characters needed to understand the taxon.

If a taxon or a character has one or several attributes that are common and others that are rare it is often worthwhile to say so, for example, 'Leaves alternate or rarely almost opposite'.

The treatment should contain the Australian taxa included in each rank (e.g. genera in each family) as per the APC. A list of these can be obtained from the NSL (<https://biodiversity.org.au/nsi/services/>). Contact the ABRIS regarding instances where the APC taxonomy does not reflect latest scientific knowledge. Some groups may be more appropriately treated in a different position in the hierarchy. Where treatments are not APC-compliant, this should be explained in the 'taxonomic notes' data field.

4.7.2 Sequence of organs in descriptions

Throughout the Flora the organs of all taxa are arranged in a fixed sequence. This facilitates the comparison of descriptions. The sequence for flowering plants is as follows.

Habit; sexuality; include underground parts if relevant
Indumentum if it can be described easily for the whole (or most of) plant
Stems; branches
Bark
Leaves, presence or absence of stipules; petiole; lamina;
Inflorescence; form, position; bracts; bracteoles
Flowers; form, sex
Receptacle
Calyx
Corolla
Disc
Androecium
Gynoecium
Fruit
Seeds

Not all these organs will be needed in every description, but note that inclusion of all/most characters is encouraged where practical to minimise the degree to which multiple profiles need to be cross-referenced.

Each principal organ (e.g. leaves, stamens) begins a new sentence and its attributes are separated by commas. Secondary organs (e.g. lamina, anthers) are preceded by a semi-colon and the attributes again are separated by commas. For example in the description of the leaf in Thymelaeaceae (<https://profiles.ala.org.au/opus/foa/profile/Thymelaeaceae>): attributes of the whole leaf are given first, separated by commas and ending with a semi-colon; a part of the leaf, the stipule, is then described in a new phrase. It is most important that ambiguity be avoided. Make sure that the adjectives refer to the correct noun. See also the description of the ovary in Thymelaeaceae.

In general, if an organ has more than one of the parts being described use the plural, otherwise use the singular; for example, petals of a flower but lamina of a petal.

When expressing the number of parts, consecutive numerals should be separated by 'or', not a hyphen, e.g. 'stigmas 2 or 3', not 'stigmas 2–3'.

When one term is used to qualify another the two words may be separated by a hyphen, e.g. sinuate-dentate. If the intention is to express a range from one to the other then the word 'to' should be used, e.g. 'linear to lanceolate'. Expressions of the form '(ob-) lanceolate to (ob-) ovate', meaning 'ranging through lanceolate, ovate, oblanceolate and obovate' should be avoided.

4.7.3 Organ specific requirements

Indumentum should be included as indicated in this sequence only if it can be described easily for the whole plant, e.g. 'tomentose in all parts' or 'glabrous except hirsute calyx'. Usage of terms for indumentum as defined in Hewson, H.J. (1988). *Plant Indumentum: a handbook of terminology*. Revised Edn. (Australian Biological Resources Study: Canberra) [Web link to be provided when available] is encouraged.

Flowers and Inflorescences: In some cases it will be more appropriate to combine the sentences for the inflorescence and flowers, as for example when the flowers are solitary and axillary. When unisexual flowers are described, the male is described before the female, and the organs are combined into one sentence for each sex, e.g. 'Male flowers: sepals 3–9, free or connate; petals 8 or absent; stamens 3–9, opposite sepals; ovary vestigial. Female flowers: ...'. Examples may be seen in Gyrostemonaceae and Causarinaceae.

Descriptions are complicated if the plants are monoecious or dioecious, necessitating the description of some characters for each sex separately. The characters common to both sexes should be covered first, followed by separate sentences for the male and female flowers or plants. In these cases the organs that are usually given a sentence each are separated by semi-colons.

Characters of the seed, such as endosperm and arrangement of the cotyledon(s), are often included.

4.7.4 Family/Genus Descriptions

Details of attributes such as size, margins of leaves and petals, colour and texture, are usually omitted from descriptions of families but may be included if useful for recognition.

References to Genera/Species may be included within a description.

In general, genus descriptions should not repeat attributes that are consistent across the family, nor include information more appropriate for species descriptions (e.g. leaf dimensions). However, since Flora taxon profiles are managed and viewed independently, generic descriptions may include important diagnostic characters. Where the family description includes various character states, then the state that applies in each genus should be described.

4.7.5 Species Descriptions

Species descriptions should relate to the generic description. Species descriptions within any one genus or subdivision of a genus should be directly comparable as far as possible. If, for a particular species, an organ described for all other species has not been seen, this should be stated.

Characters common to all species should be covered in the generic description.

Species descriptions usually contain a number of measurements. These are always given in metric units, – μm , mm, cm or m. As a rough guide, use cm for sizes over 3 cm, but consideration should be given to the level of precision intended. For example 1–2 cm is less precise than 10–20 mm. It is important to be consistent within descriptions and in particular for individual organs. If nine of ten species in a genus have leaves less than 3 cm long but the other has leaves 9 cm long then use the same unit of measurement (cm in this case) for them all. For long, narrow organs it is acceptable to use different units for length and width, e.g. leaves 2–4 m long, 2–3 cm wide. The form 3–4 cm \times 1–2 cm should be avoided in most circumstances (except for non-vascular descriptions), but may be acceptable where there is no ambiguity in deciding which measurement refers to length and which to breadth. The form 3 \times 4 cm should be used for non-vascular descriptions. An example might be ‘Fruit usually 3–5 mm long, 1–2 mm wide (rarely up to 7 \times 4 mm)’.

Description of leaves can be particularly complex. The following general order should be followed (although not all points will be needed in all taxa): arrangement, deciduous/non-deciduous/evergreen; overall shape (compound leaves), overall size (compound leaves), simple/compound type, petiolate/sessile; stipules; petiole shape, petiole size; lamina shape, lamina size, base, margin, tip, midrib, secondary venation, indumentum; leaflet characteristics in same order as lamina. In very simple leaf descriptions, to avoid ambiguity the lengths of the lamina and petiole should be described separately.

The practice of expressing extreme measurements in brackets may be used in the *Flora* but should be employed sparingly. The convention used is of the form ‘petals (5–) 7–9 (–12) mm long’, indicating that the normal range is between 7 and 9 mm, with occasional extremes as small as 5 or as long as 12 mm. If the extremes are not significantly outside the normal range consideration should be given to amalgamating them with the normal measurements to eliminate the brackets. Other methods of expressing ranges, such as ‘petals 7–9 mm long (rarely only 5 mm)’ or ‘petals 7–9 mm long, rarely longer’ are also acceptable. In some cases a specimen of unusual size may be worth discussing in the notes following the citation of collections.

4.7.6 Intraspecific taxa

Intraspecific taxa should be included in separate profiles, to ensure they are visible in the taxonomic hierarchy. As stand-alone profiles it may be useful to include a full description as for a species-level profile. However, it is sufficient to include only diagnostic characters for distinguishing this from other intraspecific taxa. For example, see *Adenia heterophylla* subsp. *australis*

[<https://profiles.ala.org.au/opus/foa/profile/Adenia%20heterophylla%20subsp.%20australis>]

4.7.7 Non-flowering plants

The examples above are based on flowering plants. For contributors working on revisions in non-flowering plants they should follow the general format described in the table below, whereby the description starts broad and narrows to reproductive structures and then the next generation. Contributors are requested to adhere to the existing styles for non-flowering plant family treatments. See existing descriptions for more details. For example, Pteridaceae

[<https://profiles.ala.org.au/opus/foa/profile/Pteridaceae>] and Zamiaceae

[<https://profiles.ala.org.au/opus/foa/profile/Zamiaceae>] (and subordinate taxa).

Non-seed plants (ferns and allies)

Habit

Rhizomes/stems

Leaves

Sporophylls

Non-flowering seed plants (Gymnosperms)

Habit; sexuality; roots

Stems; branches

Bark

Leaves

Sporangia
Spores
Gametophytes

Reproductive organs:
Male cones/sporophylls
Female
Seeds
Seedlings

4.8 DIAGNOSTIC FEATURES

The key features that enable confident identification of the taxon, particularly with respect to its closest relatives, sympatric species, or morphologically confusing taxa.

4.9 PHENOLOGY

Provide separate flowers and fruiting times. Months are preferred to seasons. Use ‘mainly’ if there are unusual outliers in the records. Outlier months may be indicated in brackets.

4.10 CHROMOSOME NUMBERS

$n = _$. Include a citation if available (Author Date, See section 4.21 for citation style) with full reference included in the ‘Bibliography’ attribute. For novel counts cite a voucher specimen (Collector; No.; Herbarium).

4.11 BIOSTATUS

Native, Naturalised or both. Cultivated may be included if current. For weed taxa include formal Australian listings such as Declared Pest Plant (include state or territory where Declared) and Weed of National Significance:

WONS: <http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html>

DPP Western Australia: <https://www.agric.wa.gov.au/pests-weeds-diseases/weeds/declared-plants>

DPP Northern Territory: <https://nt.gov.au/environment/weeds/list-of-declared-weeds-in-the-nt>

DPP South Australia: http://www.pir.sa.gov.au/biosecurity/weeds_and_pest_animals/weeds_in_sa

DPP Queensland: <https://www.business.qld.gov.au/industry/agriculture/species/invasive-plants>

DPP New South Wales: <http://weeds.dpi.nsw.gov.au/>

DPP Australian Capital Territory: <http://www.legislation.act.gov.au/di/2015-59/current/pdf/2015-59.pdf>

DPP Victoria: <http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/protecting-victoria-from-pest-animals-and-weeds/legislation-policy-and-permits/declared-noxious-weeds-and-pest-animals-in-victoria>

DPP Tasmania: <http://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/weeds-index-declared-weeds>

4.12 DISTRIBUTION

Provide a general distribution within Australia and globally. Specify region of origin if not native to Australia. Include the number of genera and species and distribution worldwide, the Australian content and the number of native, endemic and naturalised taxa. For endemic families the figures are the same and are not repeated.

4.13 HABITAT

Provide general information on habitat including vegetation type(s), landforms, geology, and soils, as appropriate. Commonly co-occurring taxa may be included here if there is a strong association.

4.14 ECOLOGY

Provide brief notes on specific ecological aspects that are taxonomically relevant, e.g. species-specific interactions with pollinators, fungi, herbivores, response to fire.

4.15 CONSERVATION STATUS

Provide comments about the conservation status of the taxon according to international, national, state or territory conservation listings. Text can describe how well protected a species currently is (presence in conservation reserves etc.).

‘Least Concern’ (IUCN Category) can be stated here for non-threatened taxa but only if an assessment has been made and can be cited. Plants that have been previously listed, but have since been de-listed, can be commented on here to document this history. While alternate regional conservation assessments exist, emphasis should be placed on the IUCN (2012) ‘IUCN Red List Categories and Criteria: Version 3.1. Second edition. IUCN Species Survival Commission.’ (IUCN: Gland, Switzerland and Cambridge, UK) <https://portals.iucn.org/library/node/10315>.

Listing under the *Environmental Protection and Biodiversity Conservation Act (EPBC Act)* can be mentioned here. In the future, the conservation status will be automatically updated through a link to a database of species listed under the *EPBC Act*. Reference can be made to State and Territory conservation lists which are updated periodically.

4.16 REPRESENTATIVE HERBARIUM SPECIMENS

List selected, representative specimens (suggest about 5, maximum of 10). The primary function of these specimens is to provide a voucher for the author’s taxonomic concept. Criteria to consider when selecting representative specimens include the degree of variation, geographical distribution, representation of important morphological features, and presence of duplicates in several herbaria. The data cited are locality (with distances in km), collector’s name (with initials) and number, and herbaria where lodged (in alphabetical order). Specimens from dioecious plants can be cited using male and female symbols available on the editor.

Contributors are strongly encouraged to view physical specimens in the Herbarium, but relevant records on the AVH may be cited if an indication specimen was not seen is appended to the citation (i.e. *n.v.* see the Queensland cited specimen below). All sheets seen by the contributor when preparing a *Flora* account should be annotated with *Flora of Australia* ‘determinavit’ or ‘Seen for’ labels.

Locality data can be generalised to the nearest primary location provided on the collection label. Latitude/longitude should be excluded. Collection date is included where there is no unique collector number and is in the form 16 Aug. 2016. Barcode numbers should be excluded here unless other data are ambiguous. Precise locality details are not to be provided for rare and listed taxa. Naturalised records are indicated with a preceding asterisk (*) where there are native and naturalised specimens.

When specimens from more than one State or Territory are given, the following order and abbreviations should be used: W.A., N.T., S.A., Qld, N.S.W., A.C.T., Vic., Tas. Each state or territory starting on a new line, as per examples below.

Within each state, citations should be presented in alphabetical order by the last name of collector, and then by collector number.

Examples:

W.A.: 4 miles [6.4 km] E of Mary River crossing on Great Northern Hwy, *J.R. Maconochie 1144* (DNA, NSW); 21.5 km SW of Nicholson Homestead on road to Halls Creek, *B.R. Maslin 7135* (K, MEL, PERTH).

W.A.: [localities withheld for conservation reasons] *S. Barrett 1412* (PERTH); *G.J. Keighery 8893* (PERTH).

W.A.: Cunderdin, Nov. 1903, *W.V. Fitzgerald* ♂ (NSW, PERTH); 3 km E of Meckering, 11 Nov. 1968, *P. Wilson 6413* ♀ (NSW, PERTH).

N.T.: Old Tanami mine site, *D. Keith 136* & *B. Pellow* (MO, NSW, SYD).

*Qld: 10 km N of Stanthorpe, *L. Pedley A7418* (BRI *n.v.*).

N.S.W.: 12.3 km W of Dudauman Exchange, *R.G. Coveny 11981* & *P.D. Hind* (B, MO, NSW, NY, PE, PERTH); 26 km S of West Wyalong on Narrandera road, *G.M. Cunningham 2403* & *P.L. Milthorpe* (NSW); *1 mile [c. 1.6 km] S of Lawson, Blue Mountains, 14 Jan. 1961, *M.D. Tindale s.n.* (NSW).

A.C.T.: Black Mountain [precise locality withheld for conservation reasons], Canberra, *A.B. Smith 5555* (CANB, NSW).

* = naturalised.

4.17 USES

Notes, references and links can be provided for information relating to the uses of a plant taxon, e.g. food, ornamental, forestry, medicinal.

4.18 NOMENCLATURE AND TYPIFICATION (DESCRIPTIVE TEXT FIELD)

Any notes relating to typification and synonymy relating to the concept selected in the 'Nomenclature' dropdown menu (Section 4.24).

Note that the Shenzhen Code (Turland *et al.* 2018) takes a very particular view on the interpretation of type specimens and should be consulted if in doubt.

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>

4.19 TAXONOMIC NOTES

Any additional taxonomic notes. Related taxa notes. Unusual specimens. Doubtful specimen/literature records. Differing taxonomic concepts. Infra-taxa.

A note about the status of a non APC-compliant taxon can be included here, such as “recently published and based on strong phylogenetic evidence (cite reference) likely to be accepted by the APC”.

4.20 NOTES

Other notes that are not specifically taxonomic in nature (e.g. fruit poisonous/edible). Information should be included in this attribute by exception only. If possible, place information in an appropriate, specific attribute (e.g. Notes on the economic importance of plant taxa into “Uses”, notes on species interactions into “Ecology”).

4.21 ILLUSTRATIONS

Bibliographic data on published illustrations in the following form: Author, title, volume number: page number, fig./figs/pl./pls (Year)

Multiple citations are presented in chronological order, separated by semicolons, on a single line.

Cited illustrations do not need to appear in the final bibliography.

For example:

B.R. Maslin & A.B. Court, *Muelleria* 7(1): 132, fig. 1 (1989); T. Tame, *Acacias of Southeast Australia* 133, fig. 140, pl. 140 (1992); T.J. Entwisle *et al.*, in N.G. Walsh & T.J. Entwisle (eds), *Flora of Victoria* 3: 636, fig. 127g (1996); B.R. Maslin, in A.E. Orchard & A.J.G. Wilson (eds), *Flora of Australia* 11A: xiv, pl. 7; 254, fig. 11A–F (2001).

E.P. Ventenat, *Jardin de la Malmaison* 1(1): t. 21 (1803), as *Mimosa pubescens*.

K.A. Meney & J.S. Pate, *Australian Rushes* 405 (1999); B.G. Briggs & L.A.S. Johnson, *Telopea* 8(4): 495, fig. 5d–i (2000).

G.M. Cunningham *et al.*, *Plants of Western New South Wales* 369 (1981); B.A. Lebler, *Wildflowers of South-eastern Queensland* 2: 38 (1981); T. Tame, *Acacias of Southeast Australia* 123, fig. 128, pl. 128 (1992).

4.22 BIBLIOGRAPHY

Provide comprehensive reference information for publications cited in the body of the profile and suggested further information/reading, especially those sources consulted in preparing the treatment. Cite references according to the Flora style below. In-text citations should be provided in chronological order, in the following format: Smith *et al.* 2018a, Smith *et al.* 2018b.

Examples of Flora reference formatting:

4.22.1 Book Chapter

Briggs, B.G., Marchant, A.D., Gilmore, S. & Porter, C.L. (2000). A molecular phylogeny of Restionaceae and allies, in Wilson, K.L. & Morrison, D. (eds), *Monocots – Systematics and Evolution*, pp. 661–671. (CSIRO Publishing: Melbourne).

Chippendale, G.M. (1988). *Eucalyptus*, in George, A.S. (ed.), *Flora of Australia* 19: 1–448. (Australian Government Publishing Service: Canberra).

Mabberley, D.J. (2011). Meliaceae, in Kubitzki, K. (ed.), *Families and Genera of Vascular Plants* 10: 185–211. (Springer-Verlag: Berlin).

4.22.2 Journal

Hosking, J.R., Conn, B.J., Lepschi, B.J. & Barker, C.H. (2011). Plant species first recognised as naturalised or naturalising for New South Wales in 2004 and 2005. *Cunninghamia* 12: 85–114.

4.22.3 Website

Murray, L. (2018). *Corymbia citriodora*, in *New South Wales Flora Online*. Available at <http://plantnet.rbg Syd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Corymbia~citriodora> [Accessed August 2018].

4.23 SOURCE

When multiple sections of the profile content has been derived or adapted from a single source, such as hard copy *Flora of Australia* treatments, indicate this source here. See Section 4.22 for citation style.

4.24 NOMENCLATURE (AUTOMATED DATA FIELD)

Nomenclatural information (synonymy) is automatically displayed in Flora taxon profiles via a link to the relevant taxonomic concept in the National Species Lists (NSL/APNI). Contributors can change the synonymy displayed in a taxon profile by selecting a different APNI reference from the drop-down list in this data field. Ideally, contributors should choose the concept indicated by an APC Tick on APNI, unless the APC is no longer current for that taxon. Note: synonymy is not currently displaying in Flora taxon profiles. The ABRS is working with the ALA to address this. Please notify the ABRS of any identified errors or suggested edits to synonymy in APNI references.

4.25 LINKS

Provide links to other relevant information (e.g. PDF files of open access taxonomic revisions). Links can be made to type specimen images on JSTOR Plants or other databases here, but the URL cited should be one that is unlikely to change (e.g. a search string or permalink).

Links provided here appear on a separate ‘Literature & Links’ tab.

4.26 BIODIVERSITY HERITAGE LIBRARY REFERENCES

Web links can be provided to publications in the Biodiversity Heritage Library (BHL; <http://www.biodiversitylibrary.org/>). In this data field, click ‘add new reference’ and populate the

required fields. The ‘title’ should include the taxon name and ‘description’ the type of information available in the linked publication (e.g. *sp. nov.*; *comb. nov.*; description; illustration).

Anything added to this attribute will appear in the separate tab ‘Literature & Links’, with publication details and a thumbnail of the front page.

For some taxa, BHL links may already be available in APNI, and many names have links through *Tropicos*. However, more recent literature may need to be manually searched for in the BHL (or volumes may not be available at all). Many volumes less than 70 years old are not included due to copyright restrictions in the United States, but an increasing number of Australian herbaria are giving permission for more recent publications to be included.

Below is an example of how to add a BHL reference.

URL

✓

Title

B ***I*** **U** **x₂** **x²**

Achyranthes australis & *A. canescens*

Description


B ***I*** **U** **x₂** **x²**

spp. nov.

BHL Title: Prodrromus florum Novae Hollandiae et Insulae Van-Diemen, exhibens characteres plantarum

Publisher: typis R. Taylor et socii,

DOI: [10.5962/bhl.title.3678](https://doi.org/10.5962/bhl.title.3678)



4.27 SPECIMENS [LINKS TO SPECIMEN METADATA]

This field includes web links to metadata associated with specimens held in Australian herbaria.

4.28 IMAGES

Images automatically display in taxon profiles based on a name match to data sourced from the APII (Flora line illustrations and photographs), and the Australian Virtual Herbarium (herbarium sheets). The purpose of images is principally to supplement the text in aiding identification. New images can be submitted to the ABRS for inclusion in the Flora, following the guidelines below.

4.28.1 Curating linked images

Flora contributors can curate the automatically linked images to:

1. Select which images will display on public view. Use the Yes-No buttons to choose images.
2. Select one image that will display on the main profile page. Use the Yes-No buttons to choose an image.

3. Add extra image caption information. (The original metadata associated with the image cannot be modified.)

Curating images of higher-level taxa: Profiles of larger or higher-level taxa may include large numbers of automatically-linked images. The ABRS encourages contributors to reduce these to a set of taxonomically representative and diagnostically useful images.

Please visit the relevant [“How-To” Guide](#) on the ausflora.net help site to see how to correct errant image records. For queries regarding the APII images, please contact abrs@environment.gov.au

4.28.2 Contributing new images

The ABRS encourages contributions of new images to the Flora, particularly where taxa are taxonomically under-represented or where additional images would assist identification or to distinguish among similar taxa. Images may include digital photographs or digital scans of diagnostic scientific illustrations. Submission of slides is discouraged.

Detailed guidelines for the preparation of scientific illustrations, including line-drawings, half-tone figures and colour plates are given in the *Flora of Australia Guide for Illustrators* (1988). Please contact the ABRS for a copy.

Contributors are asked to submit images that:

- Can be sent to the Australian Plant Image Index. Photos can be uploaded to the platform by negotiation with ABRS.
- Comply with the file format and resolution requirements outlined below.
- Are taxonomically verified, preferably associated with a herbarium voucher specimen lodged in an Australian herbarium.
- Include a single taxon. Images including multiple taxa can be submitted, but may only be automatically linked to a single Flora taxon profile.
- Are representative of a taxon. These may be complementary to existing images available in Flora taxon profiles. For example, images of important diagnostic features such as fruiting bodies will be useful where none are available.
- Can be provided under a CC-BY license (<https://creativecommons.org/licenses/by/3.0/au/>). Image creators (e.g. illustrators/ photographers) will be appropriately acknowledged if the image is reused.
- Are accompanied by metadata including caption and appropriate citations. The form for contributing any images to the Flora of Australia (by direct upload or via APII) is located on the [Ausflora.net contributor guidelines page](#) or contact abrs@environment.gov.au for a copy.
- ABRS will contact you, as the image producer, regarding any requests of copies for higher resolution or uncompressed images that are not held by ABRS or the APII.

Image file format and resolution requirements:

- Photographs: Due to storage limitations, widely used compressed image formats for web view are preferred (e.g. JPEG and PNG). TIFFs will also be accepted. Any resolution will be accepted for web view only, but for archival purposes images of a resolution greater than 6 megapixels is

requested. Uncompressed image formats (e.g. RAW, NEF, DNG) will be accepted under rare circumstances by negotiation only.

- Scientific illustrations: For web publication via the APII will accept JPG or PNG formats, but we prefer images to be print accessible so please provide ABRS with a high resolution (at least 600 dpi, minimum size ~2000 x 3000 megapixels) scanned copies of illustrations in TIFF format.
- Please send all new Flora images and associated metadata template (mentioned above) to ABRS. The ABRS will package and submit the images for loading to the APII.

Please note: There is likely to be a time delay between submission of images to the ABRS and delivery on the Flora platform. Time frames will vary depending on APII workloads and periodic updates of the ALA image cache (import of APII images).

4.29 MULTIMEDIA

Videos can be uploaded to the platform after consultation with ABRS.

4.30 AUTHOR

List contributing authors, preferably in the format: D.M. Mabberley. Multiple authors should be separated by commas.

4.31 EDITOR

On the Flora platform, Editors include contributors who coordinate preparation of a Flora treatment and/or have a substantial editorial role. This may include ABRS Flora editors and contributors involved with major revisions. General editorial contributions should be acknowledged in the 'Contributors' data field (Section 4.32).

4.32 CONTRIBUTORS

General editorial and minor scientific contributions (that do not warrant authorship) can be acknowledged in this data field. Please use the format: P.G. Kodela (ed. 2013, August 2018). These contributions will be publicly visible in taxon profiles.

4.33 ACKNOWLEDGEMENTS

Include relevant acknowledgements, e.g. grants or other funding sources, content reviewers, editorial or scientific assistance.

4.34 SEEDLINGS

Descriptions of seedlings are encouraged, ideally, describe the *Cotyledon stage*, *Tenth leaf stage* and indumentum. The descriptions and illustrations in the Australian Tropical Rainforest Plants interactive key provide a good model to follow: <http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/index.html>

4.35 EXCLUDED OR UNCERTAIN NAMES

Doubtful and unplaced names and excluded species are included in this data field, in the relevant generic or family taxon profile.

For example, see Anarthria: <https://profiles.ala.org.au/opus/foa/profile/Anarthria>.

4.36 ETHNOBOTANY

Notes, references and links can be provided for information relating to indigenous culture and plants such as uses.

4.37 DIAGNOSTIC KEYS

Interactive dichotomous keys are delivered on the Flora platform from the 'Flora of Australia: vascular plants' project on Keybase (<http://keybase.rbv.gov.au/>). This project is administered by the ABRS, including managing editorial access. A Keybase plug-in allows Flora users to interactively navigate through the keys and with terminal taxa linking to taxon profiles.

Flora Contributors are encouraged to prepare dichotomous keys as part of a treatment. General instructions for updating and contributing keys on Keybase are provided below. More detailed information and guidance can be provided on request. Registered Keybase users can upload or update Flora keys directly on Keybase. Alternatively, keys can be created or updated in csv format and submitted to the ABRS for uploading to Keybase. Any key can be downloaded from Keybase for use as a template. Any new or updated keys in the 'Flowering Plants of Australia' project will automatically appear in the Flora.

Links to high quality keys in other online sources can be included in taxon profiles in the 'Links' data field (Section 4.25).

4.37.1 Updating an existing Keybase key:

1. On the Keybase website, open the Flora of Australia: vascular flora project and select the target taxon from the list of available keys.
2. In the 'about' tab, select 'export' > 'csv'. Save the file in csv format.
3. Open the csv file in Microsoft Excel and update the key as needed.
4. The updated key can either be uploaded directly to Keybase (steps 5-7) or submitted to the ABRS.
5. If working directly on Keybase, contact the ABRS (abrs@environment.gov.au) to register as a contributor to the Flora of Australia project.
6. Log in to Keybase and open the key that is to be updated in the Flora of Australia project.
7. In the 'edit' tab, update the required text fields and upload the new key.
8. Keybase will automatically check the key and report any errors.
9. Once uploaded, the new key will appear on the Flora platform.

4.37.2 Creating a new dichotomous key on Keybase:

1. Follow the steps above for updating an existing Keybase key, to download a template key from Keybase and create a new key.
2. The new key can either be uploaded directly to Keybase or submitted to the ABRS.
3. To upload the new key to Keybase, log-in to the website and navigate to the Flora of Australia: vascular flora project home page (<http://keybase.rbv.gov.au/projects/show/1>).
4. Select 'create new key' and complete the relevant fields on the metadata page. Note: fields marked with an asterisk are mandatory.

Taxonomic scope is the taxon (family, genus, species etc.) that the key is for.

Geographic scope is the area for which the key is relevant. For the Flora of Australia project this will always be 'Australia'. (Note that if, for example, the key is for a genus that's endemic to Queensland, in this context the geographic scope is still Australia).

Title is any suitable title for your key. By convention in the Flora of Australia Project, and to maintain consistency with other keys, the title should be in the form 'Genera of <family f>', 'Species of <genus g>', 'Subspecies of <species s>' etc.

If this is a new key that you have written, enter your name(s) in 'Author(s)' in the form 'Surname 1, A.B.; Surname 2, C.D.'.

If your key is not newly created, but has been copied from a published source, use the 'Source' fields.

5. Use the 'load file' button to browse the key, and select 'submit' to load the key. Keybase will automatically check the key and give a warning if there are any errors (e.g. couplets that are not referenced).
6. Notes on preparing dichotomous keys for Keybase:
 - Keys to different ranks (genera/ species/ infraspecific taxa) should be created in separate csv files
 - Each line of a key must contain three elements: couplet number, lead text and goto.
 - Every couplet must comprise two (or more) leads with the same couplet number
 - Every couplet must have a corresponding goto, and every goto (except those that comprise taxon names) must correspond to a couplet number
 - Curly brackets indicate the species name in monotypic genera
 - Keys should include all taxa in the treatment with the same spelling as provided on the Flora of Australia taxon profile.

More detailed instructions for using and managing Keybase keys are available on the Keybase website: <http://keybase.rbv.gov.au/>.

4.38 DISTRIBUTION MAP

On the Flora platform, distribution maps are delivered using integrated functionality from the Australasian Virtual Herbarium (AVH). AVH maps are generated from occurrence records, including native, cultivated and naturalised, associated with herbarium specimens lodged in participating herbaria. Maps are displayed on a 'distribution' tab in each taxon profile, and are live-updated as new occurrence records become available in the AVH. As with other linked data on the Flora platform (delivered via the ALA), distribution maps are generated based on APC-compliant names, and ALA's 'inferred accepted' names.

Maps can be filtered to some extent using AVH filters (e.g. taxon, collector, establishment means, location). Ideally maps should be filtered to represent the native and naturalised (excluding cultivated) distribution of taxa in Australia, in line with the geographic scope of the Flora (Section 1.3). Once applied and saved, map filters should remain in place until edited by another contributor. Contributors have the option of creating a snapshot image of the map (filtered or unfiltered), which will display as a thumbnail on the main profile page.

Flora users can see the unfiltered maps (in public view) by selecting 'show non-vouchered occurrences' in maps. The Flora profile provides links to the ALA and the AVH for users to explore the map data more fully, e.g. occurrence record metadata.

Please note: Map filters should be applied after a taxon profile is complete and has been released for public view by the ABRIS. Currently, applied filters will only save if a taxon profile is not in draft mode.

Additional descriptive text can be included in the 'Distribution' data field (Section 4.12), which displays on the main profile page. This can be useful for distinguishing between native and naturalised distributions of a taxon, or noting ex-Australian distributions.

Please report any errors on the distribution maps (e.g. incorrect metadata associated with occurrence records) to the ABRS, or preferably via the AVH portal's "Flag an issue" functionality. See relevant ["How-To" Guide](#) on the ausflora.net help site for more information.