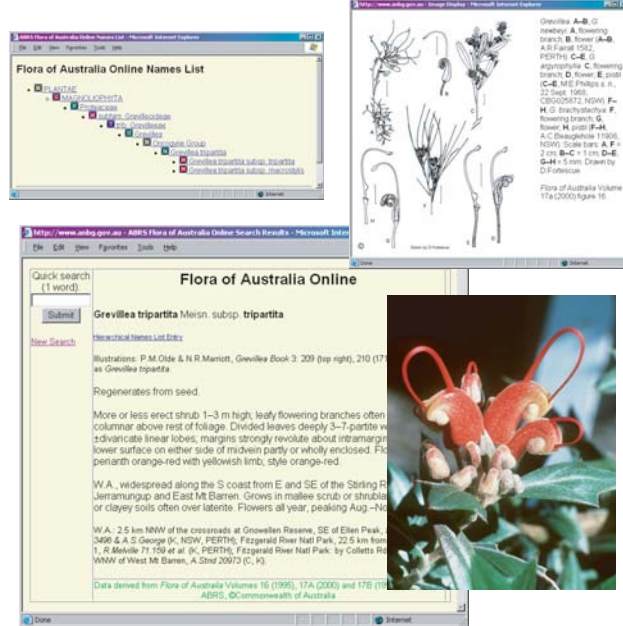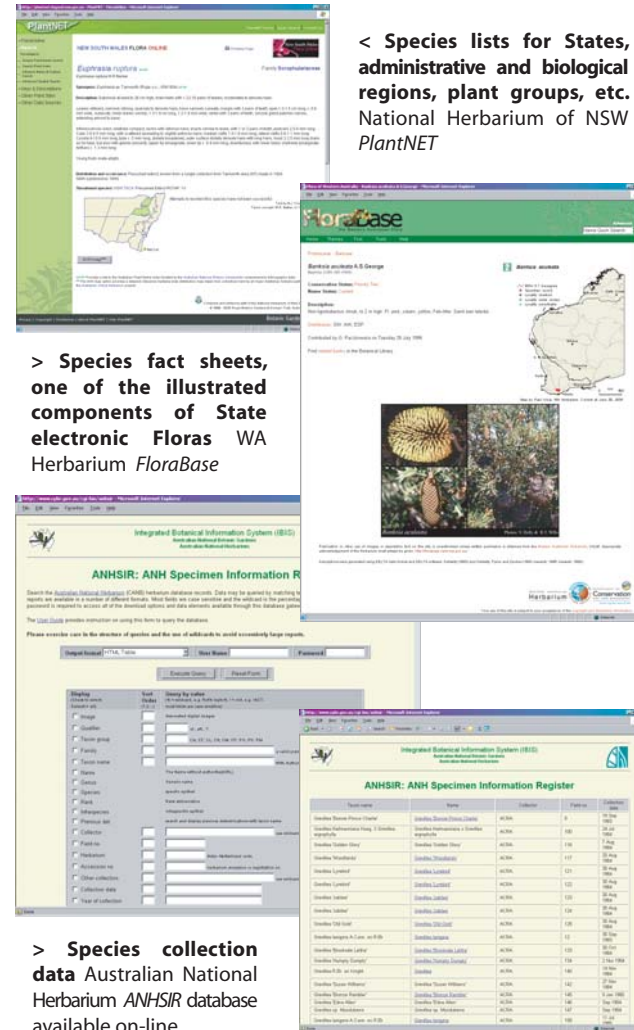## Building an electronic Australian Flora

Australian botanists have produced thousands of authoritative publications on plants, algae and fungi including scientific papers and floras and other semi-popular handbooks, founded on the cooperation and extensive resources of the Australian herbaria.

The *Flora of Australia* and *Fungi of Australia*, published by the Australian Biological Resources Study in cooperation with the Australian herbaria and botanists, are key projects in the long tradition of Australia-wide research in plant classification. These internationally recognised publications are underpinned by collection data, information outputs, such as regional floras and e-floras held by the Australian herbaria.

The ease of computer storage of data and information, and the World Wide Web, can provide sophisticated remote access to these data. It is ideally suited to projecting this important knowledge to a wider client base.

< Species lists for States, administrative and biological regions, plant groups, etc. National Herbarium of NSW *PlantNET*

> Species fact sheets, one of the illustrated components of State electronic Floras WA Herbarium *FloraBase*

> Species collection data Australian National Herbarium *ANHSIR* database available on-line

Flexible on-line search options allow you to customise the data you generate to suit your requirements, *Flora of Australia* on-line

Australia's Virtual Herbarium provides the opportunity to deliver descriptions of the flora dynamically linked to data and information from across the continent, and distributed on-line as an electronic Australian Flora - a one-stop source of current information on the plants, algae and fungi of the entire Australian continent. New observations can be released with minimal delay as they are confirmed and recorded in the database.

Some major AVH stakeholder groups

- State & Commonwealth Conservation Agencies
- Natural resource, agriculture and forestry agencies
- Universities and schools
- Farmers and graziers
- Australian and overseas herbaria
- Biodiversity networks, e.g. Community Biodiversity Network, Australian Network for Plant Conservation
- Mining industry
- Streamwatch
- Bushcare
- Landcare
- Coastcare

- Scientific community
- Conservation groups
- Botanic Gardens
- Greening Australia
- Horticultural industry
- Research & Development Corporations
- Global Environment Fund
- International Organisation for Plant Information
- Global Biodiversity Information Facility
- Australian Biodiversity Information Facility
- Environmental consultants
- Ecotourism industry
- Home gardeners
- Bush regenerators

Some of the benefits of the AVH to major stakeholders

- Easy and quick access to plant information
- Location and mapping of rare and threatened species
- Correct naming of plants for science, conservation, medicine, agriculture and horticulture
- Historical and baseline information for revegetation projects
- Inspiration and enjoyment of Australia's native vegetation
- Biological information for seed collection and fauna management
- Early notification of weed species
- Better understanding of our natural heritage
- Bioprospecting and commercial utilisation of native flora, bushfoods and natural medicines
- Selection of suitable conservation reserves
- Prioritisation of resources for collecting and biodiversity surveys
- Informed environmental planning
- Historical and heritage information

The future for the AVH

The partners of the project have mapped out the workplan and development for implementation of the AVH, including:

- Completion of data capture and validation of the 6 million specimens in Australian herbaria by 2007, incorporating data quality protocols and geocoded point location data
- Enhanced spatial query and visualization capabilities
- Integrated national census of current and historic names of Australian plants - The *Australian Plant Census*
- Incorporation of enhancements such as images, descriptions and identification tools
- Development of mechanisms for interpreting spatial distribution data through strategic partnerships, used, for example, in environmental decision making
- Enhanced and sustained linkages, contributions and participation with GBIF and ABIF
- Commitment of each participating herbarium to maintain and enhance its database and associated products beyond initial databasing phase
- Further development of herbaria inter-institutional collaboration, extending to Australasia
- Raising acceptance and awareness among the community of the value of herbarium collections and applications of the data available via the AVH
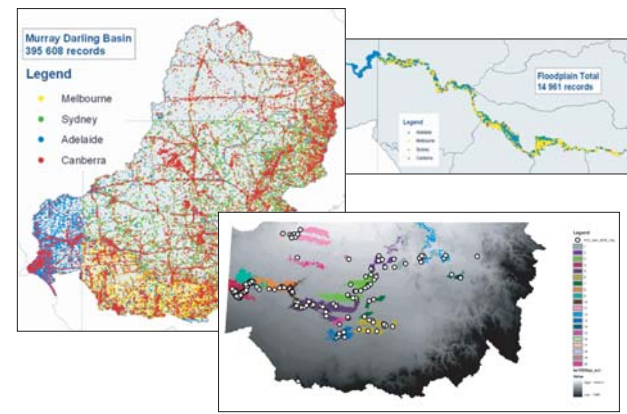
Spatial applications of AVH data and environmental stratification for population sampling. *Australian National Herbarium* Murray Darling Basin research.

AVH
Australia's Virtual Herbarium
Linking a continent's dispersed data and information on plants, algae and fungi
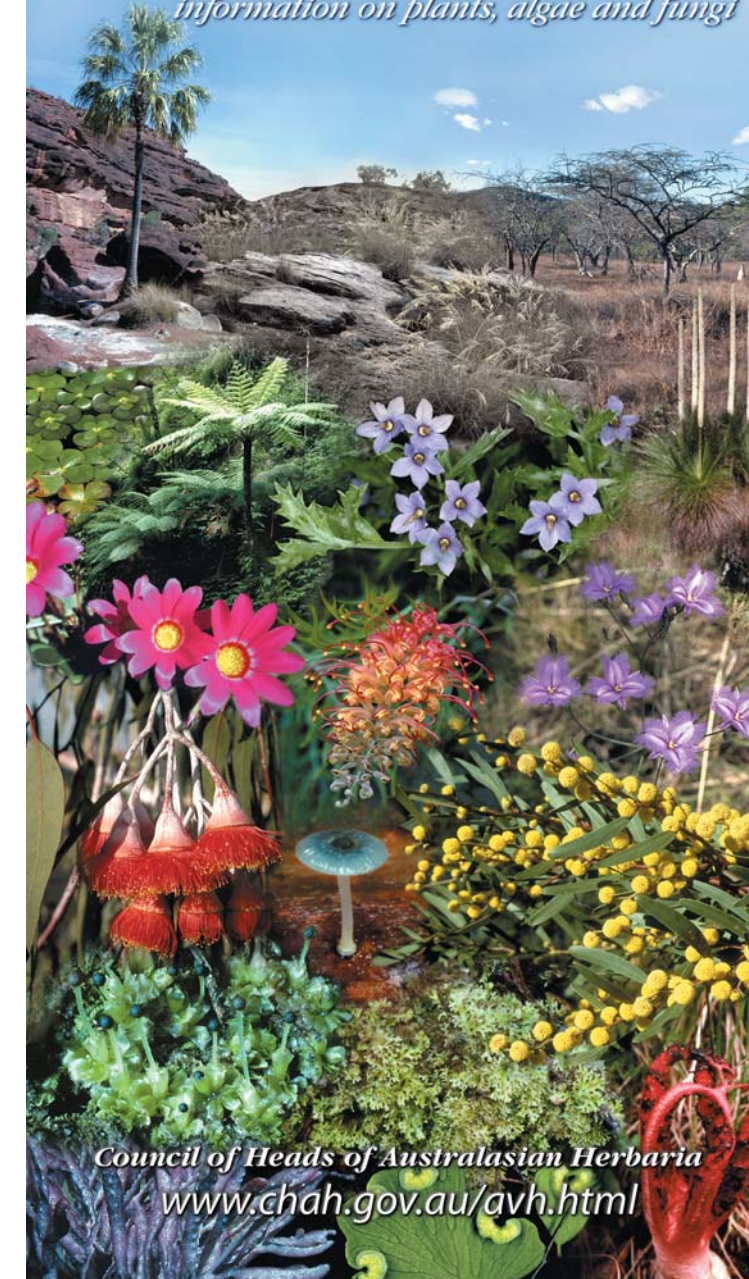
Council of Heads of Australasian Herbaria
www.chah.gov.au/avh.html

What is Australia's Virtual Herbarium?

Australia's Virtual Herbarium (AVH) is an on-line botanical information resource accessible via the web. It provides immediate access to the wealth of data associated with scientific plant specimens in each Australian herbarium. Six million specimen records, of particular value in displaying geographic distribution, will be enhanced by images, descriptive text and identification tools.

Australian herbaria hold specimens ranging in age from Cook's 1770 voyage to the present, including all plant groups.

The AVH is a collaborative project of the State, Commonwealth and Territory herbaria. It is being developed under the auspices of the Council of Heads of Australasian Herbaria (CHAH), representing the major Australian collections.

Australian herbaria house over six million specimens that date from the earliest days of European exploration and are a primary source of information on the classification and distribution of plants, algae and fungi. These specimens are the working tools of scientists who contribute to our knowledge and understanding of biodiversity and conservation through the discovery, classification and description of new species.

Every specimen held in an Australian herbarium is accompanied by information on where and when it was collected, by whom, its correct botanical name, and often information on associated species and ecological preferences. This seemingly simple information has great power when organised into a single distributed database system such as the AVH.

Our herbaria hold an historical record of over two hundred years of changes to our vegetation - unparalleled data for conservation and revegetation work, and a permanent reference collection to monitor changes in plant names. It is the only plant information system based on scientifically verifiable voucher specimens, maintained by herbaria to ensure the currency of names as knowledge improves.

Since the mid 1970s Australian herbaria have been cooperatively digitising their data on plants, algae and fungi. "HISPID", a set of specimen data interchange standards developed by Australian herbaria, has now been adopted internationally.

How the AVH works

The AVH is accessed via the website of any participating herbarium. A gateway at each of these herbaria links to the databases of all the other herbaria, consolidating the combined data into a nation-wide view of the botanical information. Most data related to specimens will be stored by the custodial institution, and there will be some resources, such as the scientific names database (Australian Plant Names Index, APNI) which will be common to all.

From the website of each participating herbarium, users will also be able to access regional botanical information and locally generated e-flora products.

Increasing knowledge of Australian plants

Australia's biodiversity is still in the discovery phase. Scientific names of plants, algae and fungi continue to change with new discoveries, and as knowledge of our species continues to increase. This still happens, even in the better known plant groups and less remote regions. Australia's Virtual Herbarium will highlight the gaps in our knowledge of the flora of this country.

## Resources of Australian herbaria

Herbaria are research and information institutions developing botanical knowledge and providing information, underpinned by preserved collections.

More than 70% of the specimens housed in Australian herbaria have been databased, providing a comprehensive resource for:
• Accurate depiction of geographic distribution and occurrence of plants, algae and fungi
• Historical mapping of all plant, algal and fungal species - information valuable for understanding the threatening processes of vegetation clearance and weed invasion
• Revising classifications of each plant, algal and fungal group to give an accurate portrayal of our biodiversity

Accurate descriptions of over 60% of Australia's vascular plant species have been compiled in the past 20 years, with many already available electronically and the remainder able to be readily scanned.

Each Herbarium maintains an authoritative Census of plants for its region in electronic form.
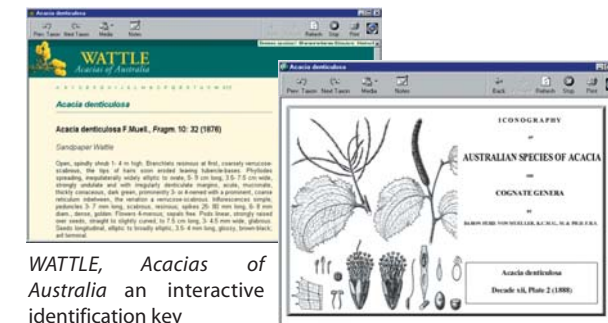
WATTLE, Acacias of Australia an interactive identification key

Computer tools have been developed for the interactive identification of some regional floras and of Australian plant families, genera and species for CD-ROM or the Web.
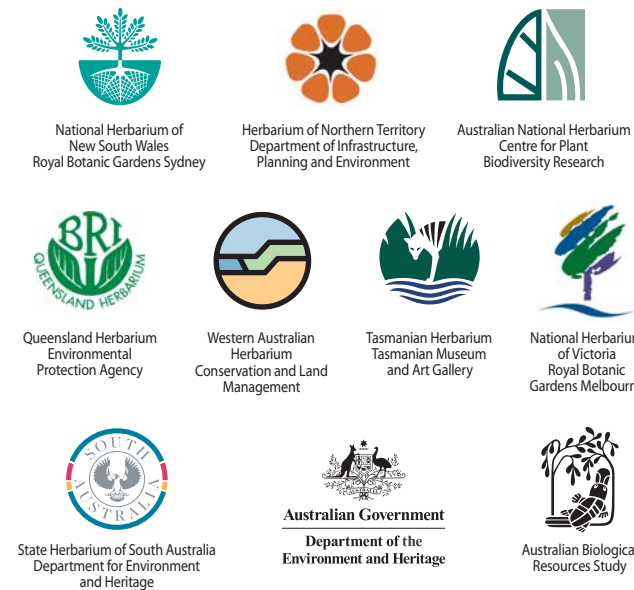
A growing resource of images (line drawings, colour photographs) is available, with only a small portion currently in digital form.

A long-term cooperative project

The vision of Australia's Virtual Herbarium is long-term, requiring commitment to the sourcing of data and making the information widely available. While some aspects of the project such as capturing the backlog of existing specimen data can be measured in years, the Virtual Herbarium itself is ongoing.

The Australian government herbaria are particularly suited to tackling this project, having actively maintained their collections for many decades. They have a long history of cooperation to meet the common goal of advancing knowledge of the plants, algae and fungi of this megadiverse continent. Increasingly, Australians now appreciate the tremendous importance of ecologically sustainable development, and the wise use of our natural resources.

Partners in Australia's Virtual Herbarium

National Herbarium of New South Wales Royal Botanic Gardens Sydney

Herbarium of Northern Territory Department of Infrastructure, Planning and Environment

Australian National Herbarium Centre for Plant Biodiversity Research

Queensland Herbarium Environmental Protection Agency

Western Australian Herbarium Conservation and Land Management

Tasmanian Herbarium Tasmanian Museum and Art Gallery

National Herbarium of Victoria Royal Botanic Gardens Melbourne

State Herbarium of South Australia Department for Environment and Heritage

Australian Government Department of the Environment and Heritage

Australian Biological Resources Study

Australia's Virtual Herbarium is being developed with support from the Nature Resources Management Ministerial Council (NRMMC)

www.chah.gov.au/avh.html