Australian Government

National Land & Water Resources Audit

An initiative of the Australian Government

NATIVE VEGETATION COMMUNITIES' INTEGRITY

INDICATOR HEADING

Native vegetation extent and distribution

INDICATOR PROTOCOL

The extent of each priority native vegetation type by IBRA sub-region (measured in hectares)

Endorsed

This protocol has been endorsed by the National Land and Water Resources Audit Advisory Council. Version 1 – June 2008. The indicators will need to be further developed as identified within the protocol.

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The extent of each priority native vegetation type by IBRA sub-region (measured in hectares)

Status of indicator agreement

The National Land & Water Resources Audit (the Audit) coordinates the collation of data to support reporting on natural resource condition required under the National NRM Monitoring and Evaluation Framework (National M&E Framework).

The National M&E Framework identifies three requirements for monitoring natural resource condition:

- a set of resource condition indicators to measure progress toward the agreed national outcomes on a medium and long term basis
- a set of indicators for monitoring community and social processes relevant to or affected by NRM programs, as well as measures of the adoption of sustainable development and production techniques
- contextual data pertinent to the indicator being considered.

The Audit Advisory Council has agreed to a process for achieving a practical set of indicators under the National Monitoring and Evaluation Framework.

This process is to:

- obtain on-going **recommendations** from the relevant **National Coordination Committees** for each thematic area (including "Matters for Target") on appropriate indicators, protocols and information needs
- seek **endorsement** from the **Audit Advisory Council** that the indicators and protocols can be implemented at the national, state / territory and regional levels
- seek **agreement** from the Natural Resource Policies and Programs Committee (**NRPPC)** (or the Marine and Coastal Committee –**MACC**- for Estuarine, Coastal and Marine) that the indicators will be used and promoted by jurisdictions to underpin evaluations of NRM initiatives.

The NRPPC and MACC report to the Natural Resource Management Ministerial Council (NRMMC).

Indicator Protocol:
The extent of each priority native vegetation type by IBRA sub-region (measured in hectares)

Matter for target:

Native vegetation communities' integrity.

Indicator heading:

Native vegetation extent and distribution.

Indicator name:

The extent of each priority native vegetation type by IBRA sub-region (measured in hectares).

1. Definition

The extent of priority native vegetation types by IBRA sub-region means the total number of hectares of priority native vegetation types occurring within each sub-region of the Interim Bioregional Regionalisation of Australia (IBRA).

The IBRA (see <http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/index.html>) provides a valuable bioregional context to the mapping, monitoring and reporting of native vegetation types.

Priority native vegetation types are those types identified (and agreed with the Australian Government, State or Territory and regional NRM bodies) as regionally significant.

2. Rationale

2.1 Why do we want to know it?

Native vegetation types are useful surrogates for the extent of ecosystem types. An understanding of the diversity of native vegetation types and how they may be changing over time provides an insight to the provision of a range of potential ecosystem services. For example, where a vegetation type corresponds with the recognised habitat for an endangered species, the monitoring of changes in extent of that vegetation type assists in tracking the likely status of the species concerned.

2.2 Context in which it has been measured with regard to national, state and regional resource management programs

Tracking changes in the extent of priority types requires ongoing mapping, which in many

cases will be from a mapping program of all vegetation types (priority and non-priority, native and non-native, woody and non-woody) in a region. Maps showing the distribution of native vegetation types are fundamental inputs to NRM planning activities such as determining biodiversity conservation priorities, planning conservation and land management actions, predicting potential fire behaviour, planning for improved water catchment management and monitoring the effectiveness of NRM action.

All states and territories have long standing programs for native vegetation extent assessment and mapping, and increasingly for monitoring. The Australian Government provides leadership and coordination to improve the national consistency of vegetation information, as collated through the National Vegetation Information System (NVIS) (see <http://www.environment.gov.au/erin/nvis/about.html>).

Indicators for native vegetation communities' integrity have been developed and recommended by (ESCAVI) a high level committee with representation from the Australian Government, each State and Territory government and the National Land & Water Resources Audit.) ESCAVI provides on-going inter-government coordination of vegetation information.

3. Monitoring methodology

3.1 Monitoring location selection (scale) (sampling)

Monitoring means repeated assessment over time in comparison to a known baseline (see below). People differ in their ideas about monitoring vegetation. From one perspective it is about repeat assessments over time at particular sites. This can be powerful in detecting site-level changes and giving some indication as to the effectiveness of management (particularly if control sites are used). However, site level assessment and monitoring on its own tells little about the status and trends of vegetation types across landscapes or regions. To do this requires mapping to describe the extent and distribution of vegetation types. From a landscape perspective, vegetation monitoring is about repeated vegetation mapping exercises (generally relying on a significant amount of site data, as well as remote sensing) to determine change over time. This protocol is focussed at the landscape level and therefore sets out a map-based approach to monitoring native vegetation.

A key requirement for the demarcation and mapping of vegetation types is a classification system that describes how types are defined.

The National Vegetation Information System (NVIS) framework for vegetation classification has been developed by the States, Territories and Australian Government through the National Land & Water Resources Audit (NLWRA 2001a). The NVIS framework defines a hierarchical classification for describing the floristic and structural attributes of Australian native vegetation. The hierarchical classification has six levels (I – VI) from Class to Sub-association (for information on the classification hierarchy see <http://www.environment.gov.au/erin/nvis/publications/avam/index.html>)

Scale of mapping

The scale of mapping of priority native vegetation types should reflect the degree of variation in vegetation types in your region. As a guide this should be:

- 1:25 000 or better in metropolitan areas, wetland and riparian zones and for native vegetation types with specialised habitat or which occur in small or fragmented areas;

- 1:100 000 (preferably 1: 50 000 or better) in the agricultural zone; and

- at least 1:250 000 or, if possible, 1:100 000 in the rangelands and pastoral zones.

The suggested scales relate to the scale of mapping and/or reporting products, not the scale of site data collection and capture on which mapping relies. Mapping at the suggested scales is important for target setting across the region.

3.2 Monitoring frequency required

While vegetation maps have existed for many decades in Australia, map-based monitoring of change is relatively new. Past maps have been useful for understanding the diversity of vegetation types, as an input to NRM planning, but they were rarely intended for use in change monitoring.

Monitoring involves comparison to a previously known state, or baseline. By comparing current mapping to a baseline vegetation map, change can be inferred. A key challenge in this is to achieve a high level of confidence that the changes detected are real changes to the vegetation rather than anomalies arising from differences in mapping approaches between the current mapping and that used in the baseline mapping. Confidence in the reliability of baseline mapping decreases with age, poor documentation, lack of underpinning site & remote sensing data and coarseness of scale. Many existing maps of vegetation may for these reasons be inappropriate in their existing forms for use as baselines.

Baselines of vegetation type mapping should generally be no older than 20 years. In areas of higher disturbance (i.e. where there is clearing or disturbance to vegetation structure and floristics) older baselines may be improved using information for the likely areas of clearing or disturbance which is no older than five to ten years. This could include evidence such as expert opinion and targeted reconnaissance survey and mapping.

In areas of minimal disturbance or with clearing controls, older baselines could be updated based on expert assessment with reference to current land use and land management practices.

Once a reliable baseline vegetation map has been prepared, current maps of vegetation can be compared to the baseline to determine change. Such current mapping may be restricted to areas of known disturbance, as understood from sources such as clearing applications, remote sensing and local knowledge. It is recognised that the process of mapping takes time and that "current" mapping is technically near impossible. However, it is preferable that "current" mapping be no older than five years at the time of reporting (see below) and, in areas of higher disturbance, this should be supplemented with up-to-date information relating to the areas likely to be disturbed.

3.3 Data measurement method

As discussed in 3.1 above, the monitoring methodology adopted in this protocol is map based. Remote sensing methods provide the means for reliable and efficient mapping of large regions. Remotely sensed data can also be integrated with other sources of information such as site-based information to improve the accuracy and reliability of the data set.

Remote sensing methods (digital and manual techniques) may include classification of types from:

- aerial photography;
- satellite imagery; and possibly
- videography.

The use of these methods will result in various scales of mapping and the detection of different components of the native vegetation. Choice of methods and techniques will, therefore, be dependent on the resultant required scale of mapping and the type of native

vegetation being measured. The result should be the mapping of all native vegetation (including grasslands) and the delineation of vegetation types at the specified classification level. Where possible mapping should also be extended to cover areas of non-native vegetation and non-vegetation so that a complete picture of the land cover can be determined.

Vegetation types need to be recognisable in the field and be able to be mapped. This should be supplemented with site surveys including observations in areas of non-woody vegetation. In most instances, local expertise and knowledge will need to be used. Published mapping projects using accepted methods with accuracy and quality assessment are required to ensure that the method can be repeated to allow for changes to be detected.

In addition, it is preferable that any local mapping exercises should undergo a peer review or critique process including independent field validation. Established on-ground native vegetation monitoring sites should be used, particularly where these also provide data on significant native and invasive species. New mapping should incorporate a site-based monitoring component and existing mapping would benefit from site-based information to update mapping. Survey sites should, where possible, include all combinations of climate and soil landscape types within the region in order to detect all the native vegetation types present. Vegetation types are then identified and described based on data on species, vegetation structure, soil and climate..

Collection of native vegetation data should adopt State and Territory vegetation protocols and mapping systems where they exist and be consistent with the National Vegetation Information System classification hierarchy. To support effective regional planning, data should be prepared at Level V of the NVIS classification hierarchy (see table in Glossary) or better where practicable.

The vegetation component of the Australian soil and land survey guidelines published by CSIRO should be used for site survey, vegetation classification and delineation of mapping units (fur further details and the latest version see <http://www.daff.gov.au/brs/forest-veg/nvis/guidelines>). Data collated using these guidelines comply with the National Vegetation Information System framework.

3.4 Data collation / calculation method

For this protocol, site data are collated and integrated with remote sensing data as part of the mapping process discussed in Section 3.3 above. There may also be a requirement to collate mapping products derived from a number of different sources in order to achieve region-wide coverage.

- Assess each data set against the monitoring methodology requirements (Section 3.3) All sources of information should meet the ANZLIC metadata standard.
- Identify gaps and determine priorities (e.g. risk assessment) and assess approaches to filling gaps (e.g. there may be coarse scale data which does not meet the requirements of this protocol but which may be informative to some end users). Where gaps cannot be filled, identify an alternative strategy or timeline for sourcing useable data.
- Fill gaps, as appropriate, and provided detailed documentation of the information used.
- For multiple sources of data, collate the various sources of data into a single or a series of spatial data sets for each date, ensuring that the most accurate data is used across the region. Maintaining a link to the source information for each polygon is critical. For example if data is collated from vegetation mapped at different dates using different methods this should be recorded.
- For multiple sources of data with different classifications across the region, collate the various sources of data as above and use the vegetation classification system within the jurisdiction or the NVIS to translate the types into a consistent

- Intersect the baseline and each subsequent date of mapping the distribution of native vegetation types with the IBRA subregional boundaries for calculations of extent by subregion by hectares within the region of interest.
- Document final data sets for each date (baseline and subsequent dates) to the ANZLIC metadata standard.

Where multiple vegetation classification systems are used, a link or lookup table establishing the relationship between all (e.g. original and reclassified) vegetation types will facilitate mapping and reporting of equivalent types across the region. Different areas within a region may need to be classified and reported at different levels of classification.

3.5 Data storage and management

The relevant State and Territory agencies should be consulted on the storage and management issues raised by vegetation data to ensure consistency with the National Vegetation Information System framework (see <http://www.environment.gov.au/erin/nvis/about.html>).

All new data should be documented according to the ANZLIC standard for data documentation (data documentation - see <http://www.anzlic.org.au/metadata/>) and registered in the appropriate jurisdictional node of the Australian Spatial Data Directory (ASDD – see <http://asdd.ga.gov.au/>).

Guidelines on best practice data and information management methods have been developed by the NLWRA and ANZLIC and published in the Natural Resource Management Information Toolkit (see <http://nlwra.gov.au/toolkit/index.html>).

3.6 Data analysis and interpretation

ESCAVI has recognised the need for collection of vegetation data to accord with existing State and Territory processes, to ensure consistency in target setting between regions and to allow compilation of monitoring data for higher level reporting. State and Territory governments have legislative responsibility for mapping native vegetation and have long-established mapping programs which are integrated with the NVIS, through the coordination of ESCAVI.

Responsibility for collection of data in accordance with this indicator rests primarily with State and Territory agencies, as represented at ESCAVI. Other major sources of vegetation data often not incorporated into State and Territory mapping are from local councils, Environmental Impact Statements, privately funded surveys and data collection on Australian Government lands. Regions should consult with State and Territory agencies that have the lead on native vegetation mapping concerning the appropriateness of using information from such sources as a basis for measurement under this indicator.

3.7 Reliability, validity and quality assurance

This section describes steps which must be taken to help satisfy end users and stakeholders that the information on which target setting and monitoring is based is as reliable as possible.

Required

When collecting data under this measure regions should document:

- all methods of data collection, collation and analysis;
- rules or models used;
- sensitivities of techniques and limitations on the use of the data;
- status of method used such as whether it is published or has been peer reviewed for

the application; and
- the degree to which the 'required' parts of this measure have been met.

Maintaining a link to the source information for each polygon is also essential. This is important in subsequent analyses to ensure that it is clear where data is collated from vegetation mapped at different dates using different methods.

4. Reporting / information products

4.1 Audiences

As for all indicators, NRM regional bodies and their stakeholders will be the key users of the information generated through this protocol. Project staff seeking an improved basis for planning vegetation management actions and assessing progress will be particularly interested. Policy makers at the state/territory and national levels will be interested in this information, particularly for its capacity for contribute towards statewide and national pictures of vegetation change, as well as for its capacity to improve regional NRM planning. In most cases it is envisaged that state-based vegetation mapping and monitoring programmes will be largely responsible for generation of information under this protocol.

Secondary users are expected to be industry groups, researchers, educators and the general public.

4.2 Products

Information products refer to a range of data and information in a format that helps decision makers to answer the particular questions they have. Information products can be raw data or derived data sets that have been integrated with other essential contextual or useful data. They can be presented as maps, tables, graphs or innovative visualisations.

Maps and spatial data

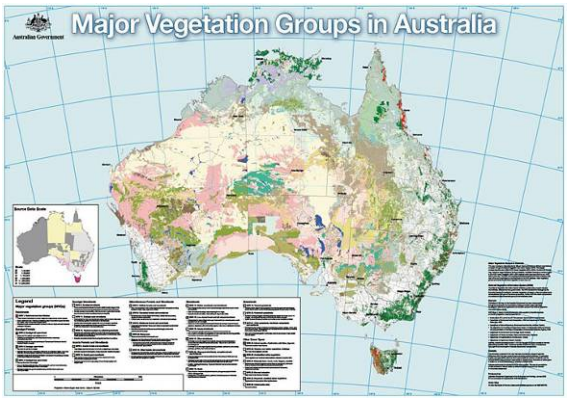
- Maps of present vegetation showing the distribution and classification of each priority vegetation type remaining within the region – a map for the baseline and a map for each subsequent date.

- Maps showing the areas of change in priority native vegetation types for each date mapped, from the earliest baseline.

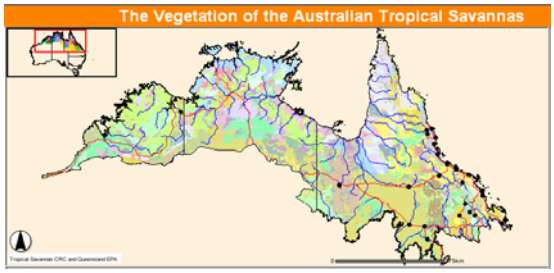
- Maps describing causes of changes in native vegetation types for each date mapped.

- IBRA subregions map showing the full extent of priority native vegetation types for all sub-regions which occur within the area of interest.

Examples



Map of major native vegetation groups derived from data collated in NVIS (2004). Department of Environment, Water, Heritage and the Arts.



The Vegetation of the Australian Tropical Savannas , (1:2 000 000 scale map in 3 sheets). Queensland Herbarium, Environmental Protection Agency, Brisbane and the Cooperative Research Centre for the Sustainable Development of Tropical Savannas, Darwin. <http://savanna.cdu.edu.au/research/fr_vegetation_map.html>

Tabular information

- Extent (ha) of priority native vegetation types by IBRA subregion (separate reporting for 'within NRM region' and 'across whole IBRA subregion') for baseline and each subsequent date mapped.
- Change (ha) in priority native vegetation types between each date from the baseline.
- Type, cause and land use for each change recorded.

Documentation

- On the selection of priority native vegetation types.
- On mapping, measurement methods and sources of information including metadata.
- On the causes of changes to distribution of priority native vegetation types.

4.3 Confidentiality

Reporting based on this protocol is not expected to precipitate confidentiality issues over and above those that might arise through existing state/territory approaches to vegetation mapping and monitoring.

4.4 Data collation/calculation method

Required

The change of extent of native vegetation types from the baseline should be calculated for each date mapped from the baseline and tagged with the type of change (positive or negative). This is achieved by intersecting the data for the baseline and subsequent date by subregion. An on-site interpretation of the changes in some areas may be required where mapped data is unavailable and could be supported by the use of targeted repeat imagery and photo points.

A change from one vegetation type to another requires a significant change in either the structure or floristics of the vegetation of a given patch of vegetation. There are currently no formal guidelines to assist identification of 'significant' change. For the purposes of this protocol, changes can be considered significant when they can be easily identified using aerial photography or site assessment.

Final data sets for each date (baseline and subsequent dates) should be documented to the ANZLIC metadata standard (as per section 3.5).

Preferred

The cause of change and changed land use and land management practices should also be recorded, according to the following four categories.

1. Type of change

- native vegetation changed to non-native vegetation;
- non-native vegetation to native vegetation;
- change from one type of native vegetation to another; or
- no change

2. Cause of change

- clearing for agriculture;
- conversion for agriculture;
- plantation establishment;
- revegetation;
- land abandonment;
- pest or disease invasion;
- farm tree planting;
- urban and/or infrastructure development;
- salinity; or
- other (please specify).

3. Land use change

For land use change refer to Australian Land Use and Management (ALUM) Classification which is available through <http://adl.brs.gov.au/mapserv/landuse/alum_classification.html>). Use level 2 of the classification from the latest version 6 to classify prior and current land uses (e.g. from 'nature conservation' to 'grazing modified pastures').

- from one ALUM class (Version 6) to another; or
- no change.

4. Source and reliability of information

- published/unpublished;
- map based/non-map based;
- local knowledge; or
- expert opinion.

An analysis of threats to the native vegetation types could also be recorded and may act as a trigger to identify issues in the region and target management actions.

A native vegetation distribution baseline composed from a variety of mapped sources will need to be used with care, particularly when assessing change. Where information about particular vegetation types (e.g. riparian types) is lacking, expert interpretation is recommended to differentiate real change from apparent changes resulting from the use of different classification systems.

4.5 Data analysis, integration and interpretation information

Sections 3.3 to 3.7 above set out requirements for developing information under this protocol. As evidenced in those sections, the process of scaling up from site scale to landscape-wide maps of vegetation involves considerable data analysis, integration and interpretation. As a consequence, the reporting products for this indicator are already post-analysis and contain significant interpretation of site and remotely sensed information. They are readily useable in NRM planning and reporting, although it can expected that some additional interpretation will be required, particularly in relation to causality of detected changes.

4.6 Data access and storage

Information collected through this indicator should accord with existing state/territory based vegetation mapping activities. Where governments have invested public money in the preparation of data and information against this indicator there is a reasonable expectation that this information should be made publicly available and accessible. Notwithstanding this, there may be cases where the public interest is not served by providing access to detailed information, for example the location of rare species which may be targeted for illegal collection.

In most cases, State/territory agencies will be closely involved with the NRM regions application of this protocol. Data should be incorporated into the relevant state or territory-

wide datasets and made available nationally via the NVIS and Australia's Resources Online.

4.7 Product definition statement

The primary information products generated using this protocol will be regional maps and tables showing the extent and distribution of different native vegetation types, intersected with IBRA regions/subregions. Each product should have an associated product definition statement as per Appendix A so that their source data, analysis process and usage can be easily understood.

5. Current national activities

This protocol has been prepared by ESCAVI and is consistent with national level activities of ESCAVI and the Australian Government. Principal among these is the National Vegetation Information System (NVIS); a comprehensive national inventory of vegetation types developed by and through ESCAVI, with coordination and financial support from the Australian Government. Current ESCAVI activities are improving the completeness, functionality and utility of the NVIS, including building capacity to store & maintain monitoring data. Data and information generated through this protocol will meet the standards for incorporation into the NVIS database

The information base currently stored within the NVIS has a number of considerable gaps in relation to scale, currency and attribution. Additional funding and resources are required to bring data in some areas to the minimum NVIS standards of 1:100K in the Intensive Landuse Zone and 1:250K in the Extensive Landuse Zone. Addressing these gaps will require primary mapping and survey to standards capable of wider integration. Some jurisdictions are yet to develop and document definitive vegetation types and a process for incorporating new survey information. The equivalence of these a number of types also needs to be reconciled nationally, to ensure comparability across jurisdictions. These are critical requirements to improving the NVIS as an inventory of vegetation types, as well as providing a basis within the jurisdictions for baseline and change reporting in accordance with this protocol.

Notwithstanding these significant gaps in the NVIS, there is a requirement for generation of national information products representing best available data for use in decision making and reporting. The Australian Government Department of the Environment, Heritage, Water and the Arts recently produced a report entitled *Australia's Native Vegetation: a summary of Australia's Major Vegetation Groups 2007* which includes national maps based on the latest NVIS 2004 national collation. The NVIS has been used in a number of national planning and reporting processes including State of Environment reporting, EPBC Act implementation, prioritisation of biodiversity investments, reporting on the National Reserve System, assisting national NRM planning and as an input (via the National Forest Inventory) to State of Forests reporting.

While such national products are broadly and conceptually consistent with this protocol, they are not considered suitable (neither in scale nor attribution) for use in regional level vegetation management planning, monitoring and evaluation.

6. Future development

This protocol is considered sufficient to guide the generation of nationally consistent native vegetation type data for use in NRM regional planning. Future updates may be required in response to user feedback and reviews of progress in vegetation management at the NRM regional level.

7. Links to other indicators

Information from this indicator heading will contribute to an understanding of native vegetation ecosystems and the management actions necessary to maintain biodiversity and other ecosystem services. Data from these measures should provide input to, be linked to and be interpreted in conjunction with the related protocols for the following indicator headings:

- native vegetation condition;
- river condition;
- wetland ecosystem extent and distribution;
- wetland ecosystem condition;
- estuarine, coastal and marine habitat extent and distribution;
- estuarine, coastal and marine habitats condition;
- selected significant native species and ecological communities extent and conservation status; and
- selected ecologically significant invasive species extent and impact.

8. Further information

Further information on native vegetation data, relevant to this indicator can be found at the following sources.

- Summary data products from the *Australian Native Vegetation Assessment 2001* (NLWRA 2001) are available from the Australian Natural Resources Atlas <http://www.anra.gov.au>.
- The 'map-maker' tool from the Australian Natural Resources Atlas <http://www.anra.gov.au/mapmaker> can be used to display relevant data sets from the nationally collated NVIS.
- Summary native vegetation data for Australia can be downloaded from The Australian Government Department of Environment, Water, Heritage and the Art's Environmental Data Directory <http://www.environment.gov.au/erin/edd>.
- Detailed data are available from State and Territory data custodians.
- Other data on native vegetation can be found through the Australian Spatial Data Directory < http://www.ga.gov.au/asdd.html >.
- State of the Environment reports <http://www.environment.gov.au/soe/index.html>.
- State of the Forests reports <http://www.daff.gov.au/brs/forest-veg/nfi/state-forests-report>.

9. References

McDonald RC, Isbell RF, Speight JG, Walker J & Hopkins MS 1990, *Australian Soil and Land Survey - Field Handbook*, Inkata Press, Melbourne.

National Land and Water Resources Audit (NLWRA) 2000, Landscape Health in Australia, National Land and Water Resources Audit, Canberra. <http://audit.ea.gov.au/ANRA/vegetation/docs/landscape_health/Landscape_Health_Contents.html>.

—— 2001a, Australian Native Vegetation Assessment 2001, National Land and Water Resources Audit, Canberra. <http://audit.ea.gov.au/ANRA/vegetation/docs/Native_vegetation/nat_veg_contents.cfm>

—— 2001b, Rangelands – Tracking Changes, National Land and Water Resources Audit, Canberra. <http://audit.ea.gov.au/ANRA/rangelands/docs/tracking_changes/track_change_Contents.html>.

Sinclair Knight Merz 2000, Riverine Vegetation Mapping Scoping Study Final Project Report, <www.nlwra.gov.au/full/20_products/05_by_subject/15_land_resources_and_mgt/40_NVIS/riverine_vegetation.html>.

10. Glossary

Association

An association is defined as a climax community of which the dominant stratum has a qualitatively uniform floristic composition and which exhibits uniform structure as a whole. For each stratum, the association description of the vegetation type should include floristic information for the dominant and/or diagnostic species (maximum of 3 species per stratum) plus the structural formation (dominant growth form, cover, height are combined as per Table 4). A maximum of three strata (upper, mid and ground; Walker & Hopkins, 1990) are allowed and the dominant stratum is indicated by a plus symbol "+".NVIS Level V.Beadle and Costin, 1952.

Attribute

In a geographic information system (GIS), an attribute is analogous to a data element or column in a data base table. A standardised data field describing qualitative or quantitative information.

Class

An upper level of the information hierarchy describing growth form and broad structure of the vegetation. NVIS level I. Walker & Hopkins, 1990

Classification system

The systematic grouping of entities into categories based upon shared characteristics Lund, 1995

Community

A natural aggregate of different species of organisms existing in the same environment. While species within the community interact with each other, forming food chains and other ecological systems, they do not generally interact with species in other communities. For the purposes of NVIS, a community is described as an assemblage of plant species which are structurally and floristically similar and form a repeating 'unit' across the landscape. See also vegetation type below.

Data custodian

The data custodian is responsible for ensuring the accuracy, currency, storage, security and distribution of the data set. In fulfilling these responsibilities, the custodian is expected to consult with, and take into account the needs of users other than itself. The custodian may choose to delegate these functions while still retaining responsibility. The custodian of a data set need not necessarily be the holder of the copyright, or the originator of the data, although in many cases the custodian will be both of these. ANZLIC, 1996

Data Set or Dataset

A unique, spatially defined collection of data, which is relatively homogeneous and is able to be described by a single metadata statement. ANZLIC, 1996

Ecosystem

An aggregate of animals, plants and other organisms and the non-living parts of the environment, that interacts and which is relatively self-contained in terms of energy flow. Meagher, 1991 and Lawrence, 1996

Estimated pre-1750 extent

The extent of native vegetation estimated to have been present before European settlement in Australia. The term “pre-1750” is used because it has an international meaning in assessment and monitoring of environmental issues (e.g. greenhouse). It refers to the time before the industrial revolution (triggered by the invention of the steam engine in 18th century England), The term “estimated” is used to clarify that such data is reconstructed, given the absence of data collected at that time. There are a number of methods used to produce of estimated pre-1750 vegetation data, including the interpretation of aerial photographs taken prior to land clearing in a district, and the extrapolation of existing occurrences of vegetation types across areas of like

soil type.

ESCAVI

The Executive Steering Committee for Australian Vegetation Information. A national committee (within the arrangements of the NRM Ministerial Council under the Council of Australian Governments) comprising senior representatives from the Australian Government and each state and territory. ESCAVI was established in November 2001 following completion of Australian Native Vegetation Assessment 2001 by the National Land and Water Resources Audit.

Floristics

A description or study of the plant species that occur in a defined area or vegetation type.

IBRA region

A region delineated in the Interim Biogeographic Regionalisation for Australia (IBRA),a framework delineating natural regions or landscape patterns in each State and Territory which reflect biophysical, environmental and vegetation factors. Attributes such as climate, lithology, landform, vegetation, flora and fauna and land use are used to determine boundaries for IBRA regions.

Information Hierarchy

The systematic arrangement of NVIS vegetation attributes in order of descriptive complexity. (See NVIS Hierarchy).

Major Vegetation Group (MVG)

One of 23 dominant vegetation groups identified in a continental-level classification developed by the Australian Government Department of Environment, Water Heritage and the Arts. Each MVG represents an aggregation of many vegetation types of similar structure and dominant genus.

Major Vegetation Subgroup (MVS)

One of 67 dominant vegetation groups identified in a continental-level classification developed by the Australian Government Department of Environment, Water Heritage and the Arts. Each MVS represents an aggregation of many vegetation types of similar structure and dominant genus. The MVS classification is similar to the MVGs classification, but also has a basis in typical understorey characteristics, in addition to the woody stratum, and a more detailed assessment of floristic affinities.

Mapping methods

The identification of selected features, the determination of their boundaries or locations, and the delineation of those boundaries or locations on a suitable base using predefined criteria. Methods or techniques used to produce both the spatial and attribute information for a particular vegetation map.

Metadata

A written description for a data set. Metadata should conform to the ANZLIC Metadata Guidelines see <http://www.anzlic.org.au/metadata/>

Model

A theoretical representation of a system used to predict changes under the influence of various factors. Meagher, 1991

NVIS

The National Vegetation Information System.
http://www.environment.gov.au/erin/nvis/about.html

NVIS Hierarchy

A nationally agreed nested hierarchy of vegetation descriptions with six levels (as set out in the table below) which underpins the National Vegetation Information System. A wide variety of

vegetation datasets, from multiple sources and generated through different processes, can be interpreted for how their vegetation descriptions fit within the hierarchy. This a key pre-requisite for the inclusion of such vegetation datasets in the National Vegetation Information System, and for their use within the NVIS to generate products such as the MVGs and MVSs.

Level	Description	Structural & floristic components required
I	Class	Dominant growth form of the ecologically dominant stratum.
II	Structural formation	Dominant growth form, cover and height of the ecologically dominant stratum.
III	Broad floristic formation	Dominant growth form, cover and height of the ecologically dominant stratum.
IV	Sub- formation	Dominant growth form, cover, height and broad floristic code usually dominant genus and family of the three traditional strata (i.e. upper, mid and ground).
V	Association	Dominant growth form, height, cover and species (three species) of the three traditional strata (i.e. upper, mid and ground).
VI	Sub- association	Dominant growth form, height, cover and species (five species) of all layers/strata.

NVIS Level

The attribute groupings within the NVIS Information Hierarchy that recognise information of similar spatial, structural, growth form and floristic detail. See NVIS Hierarchy.

Present extent

Also known as “extant” vegetation, this is a view of an area’s vegetation at a particular point in time. Several methods may be used to develop such data for a region, including direct interpretation of aerial photographs of a certain date and/or overlaying the estimated pre-1750 layer with a woody/non-woody layer developed from satellite imagery of a certain date.

Protected area

An area of land (and/or sea) especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources and managed through legal or other effective means. Includes IUCN Classes I to VI.

Scale

Map scale indicates how much the given area was reduced. For the same size map, features on a small-scale map (1:1 000 000) will be smaller than those on a large-scale map (1:1 200).. Scale effects resolution (i.e. the resolvability of features for a given map scale). In a larger scale map, the resolution of features more closely matches real-world features because the extent of reduction from ground to map is less. Map resolution may refer to a "minimum mapping unit" or the accuracy at which a given map scale can depict the location and shape of map features. .ESRI, 1994; Lund 1995

Species

A group of organisms that are biologically capable of breeding and producing fertile offspring. It is the lowest normal taxonomic unit in use. Meagher, 1991

Stratum/Sub-stratum

A layer in a community produced by the occurrence at approximately the same level of an aggregation of plants of the same habit. Beadle and Costin, 1952;

Structural formation

Dominant growth form, cover and height described for the vegetation, derived from the Level 2 of the National Vegetation Information System information hierarchy (ESCAVI 2003).

Structure

The spatial arrangement (vertically and horizontally) of plants within a community. Beadle and Costin, 1952;

Sub-Association

A sub division of the association determined by a variation in the most important subordinate stratum of the association, without significant qualitative changes in the dominant stratum. In NVIS, for each layer/sub-stratum, the sub-association description of the vegetation type should include floristic information for the dominant and/or diagnostic species (maximum of 5 species per sub-stratum) plus the structural formation (dominant growth form, cover, height are combined as per Table 4). A maximum of eight sub-strata (as per Table 2) are allowed and the dominant sub-stratum is indicated by a plus symbol "+". NVIS level 6. Beadle and Costin, 1952;

Sub-dominant

A species that occurs frequently in the vegetation type but has a lesser relative biomass than the dominant species.

Sub-formation

Dominant growth form, cover and height (combined into structural formation nomenclature according to Table 4) plus the dominant land cover genus for the three traditional strata. (i.e. Upper, Mid and Ground). NVIS level IV.

Vegetation

All plants within a specified area. It is usually considered generally and not taxonomically. Lawrence, 1996

Vegetation description

A set of attribute values pertaining to a vegetation type and contained in the NVIS Information Hierarchy and supporting tables.

Vegetation type

A community that has a floristically uniform structure and composition, often described by its dominant species. In NVIS, a vegetation type is commonly represented by a vegetation description. Meagher, 1991.

Appendix 1: Information product template (V2.2)

Information Product Name		
Product ID or reference number	Jurisdiction, agency or custodian's reference number if applicable.	
URL for product metadata	A webpage reference to where more comprehensive details of the product are recorded.	
Jurisdiction		
Custodian		
Contact details	Relevant person, position, branch/unit/section, location and phone, email contacts.	

Relevant Matter for Target	Which NM&EF Matter for Target does this product relate to?	
Relevant National Indicator	Which NM&EF Indicator(s), if any, does this product relate to?	
Relevant State/Territory Indicator	Which State/Territory Indicator(s), if any, does this product relate to?	

Description	Provide a brief description of the product including the purpose and the output file format.	
Source data name and ASDD link	Name all the source dataset(s) used to produce the product. Provide references to metadata for source datasets used. This should be either the ASDD metadata reference or other URL. If any source dataset is not already described to ASDD Page 0 standard, please complete the accompanying template.	
Source data attributes used	Please list the attributes used from each of the source datasets to produce the information product.	
Processing of source data	Please describe the steps taken in processing and combining the source data to produce the information product.	

Status	What is the current status of the product? If the product is "In progress" or "Is planned", please complete as many of the remaining descriptors as are known.	a. Currently exists b. In progress c. Is planned

Coverage	How much of the State/Territory distribution of the resource (or applicable part of the State/Territory) is covered by the product?	a. 80-100% b. 50-80% c. 20-50% d. 0-20%
Recency	What is the age of the dominant contributing data?	a. 2005-2000 b. 2000-1995 c. 1995-1985 d. 1985-1970 e. 1970-1950 f. <1950

Trend	Does the dataset support trend interpretation?	a. Sequence (e.g. river flow, rainfall) b. Multiple (few) (e.g. land use 1990 & 2000) c. Single (e.g. soil type)
Usability scale	What is the finest resolution that maintains confidence in the product, i.e. not to be used at 1:100,000 or less.	a. Local b. Regional c. State d. National
Availability	What is the public availability of the product? Is a licence required for outside users?	a. Open b. Restricted/licence c. Closed
Delivery	How is the product best delivered?	a. Web Services b. Digital data c. Electronic document d. Paper document
Content type	What type of information does the product represent?	a. Real data b. Mixture of real & modelled data c. Modelled data
Update	What will be the frequency of update for the product?	a. Frequently b. At least once/planned c. Not planned/unknown
Other relevant information	Please add any other important information relevant to this information product that should be known.	