



Australian Government

National Land & Water Resources Audit

An initiative of the Australian Government

NATIVE VEGETATION COMMUNITIES' INTEGRITY

INDICATOR HEADING

Native vegetation extent and

INDICATOR PROTOCOL

**The remaining proportion of each
priority native vegetation type in
each IBRA sub-region measured as a
percentage of the estimated pre-1750
extent**

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.

The remaining proportion of each priority native vegetation type in each IBRA sub-region measured as a percentage of the estimated pre-1750 extent

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 remaining proportion of each priority native vegetation type in each IBRA sub-region measured as a percentage of the estimated pre-1750 extent

Matter for target:

Native vegetation communities' integrity.

Indicator heading:

Native vegetation extent and distribution.

Indicator name:

The remaining proportion of each priority native vegetation type in each IBRA sub-region measured as a percentage of the estimated pre-1750 extent

I. Definition

The remaining proportion (%) of each priority native vegetation type in each Interim Bioregional Regionalisation of Australia (IBRA) sub-region can be determined by comparing the present extent (hectares) of priority native vegetation types within each IBRA sub-region with their estimated pre-1750 extent.

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.

Estimated pre-1750 extent is 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 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.

2. Rationale

2.1 Why do we want to know it?

The extent of remaining native vegetation types compared to their pre-1750 extent (prior to European settlement) is a key input to conservation and land management decisions, both for determining priorities and for planning actions. It is an important indicator of the status of a region's natural resource base and the health of its landscapes and assists in the interpretation of impacts of landscape change since European settlement. This indicator can also be used to determine which vegetation types (and ecosystems) should be prioritised for different activities.

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) 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.

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 the 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 the collection of data in accordance with this indicator rests primarily with State and Territory agencies. Other major sources of vegetation data often not incorporated into State mapping are from local councils, environmental impact statements, privately funded surveys and data collection on Australian Government lands. Regions should consult with State agencies concerning the appropriateness of using information from such sources as a basis for measurement under this indicator.

3. Monitoring methodology

3.1 Monitoring location selection (scale) (sampling)

This section describes the ‘things which should be measured’. A key requirement for determining the proportion of remaining vegetation types is a classification system that describes how types are defined.

A National Vegetation Information System (NVIS) framework for vegetation classification has been developed by the States, Territories and Commonwealth 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 (Table 1).

Table 1. The National Vegetation Information System classification hierarchy.

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

Measuring the proportion of remaining vegetation types requires the production and analysis of spatial information. Since the aim of all resource condition indicators is to assist in the assessment of change, this indicator also details the required approach for the development of change information. Without a standardised approach to change assessment it would be impossible to ensure that reporting is consistent across all NRM regions.

The monitoring components required for this indicator are:

1. baseline information on the proportion of remaining native vegetation types; and
2. change information on the proportion of remaining native vegetation types.

In each case the proportion data set will be a derived data set based on a comparison of the extent of present vegetation types (see the Indicator Protocol: The extent of each priority native vegetation type by IBRA sub-region) and the data sets of estimated pre-1750 extent of native vegetation types.

Baseline information should cover the broadest possible geographic range (ideally the whole area of interest) and documents the proportion of remaining native vegetation types at a particular time. Baseline information for this indicator should at least cover areas for which

native vegetation targets will be set. The *baseline* is the benchmark against which change can be determined following subsequent re-measurement and comparison. Baselines may be updated at appropriate intervals if new information becomes available, resulting in the creation of new baselines against which change can be re-measured. All baseline information should be clearly identified for the year it represents as well as recording the year in which it was measured and mapped.

Change information is generated from comparison of a new measurement against the baseline. If mapping resources are limited, change information may be restricted to those areas which have undergone potential change although care is needed to ensure that all changes are monitored. The dates of the datasets (the year they represent as well as the year they were created) should always be clearly identified.

Baseline of the present extent of vegetation types (as measured in the indicator: The extent of present native vegetation by IBRA sub-region) and estimated pre-1750 vegetation types

Scale of mapping

The scale of mapping priority native vegetation types and the mapping of estimated pre-1750 type must match closely to allow for meaningful analysis. The Audit's report *Australian Native Vegetation Assessment 2001* highlights the difficulties where the scale of mapping did not match: 'Pre-European mapping methods and scale of data collection are different within and between jurisdictions making the interpretation of the type and extent of pre-European vegetation types difficult and analysis compared to present vegetation often impossible.' (NLWRA 2001a).

As discussed for the extent indicator, mapping at the suggested scales is important for target setting across the region to inform regional planning and management: information. Finer detail is required in areas with more intensive land use and clearing. The intensive land use areas include nationally critical areas for biodiversity loss, dryland salinity, soil erosion, urban expansion and degradation to key ecosystems such as rivers and estuaries.

As a general rule, less detail and precision is required for vegetation information in the extensive land use zone either because there have been fewer human impacts as the areas are remote or not used intensively. This extensive use zone broadly conforms with that part of Australia known as rangelands (NLWRA 2001b).

Mapping at the required scales reflects current thinking about the appropriate scales for native vegetation mapping for regional planning and on-ground planning and management. Mapping at 1:25,000 scale for riparian vegetation is recommended in the Riverine Vegetation Mapping Scoping Study (Sinclair Knight Merz 2000).

Required

The scales of mapping of the estimated extent of pre-1750 vegetation types should be as close as possible to those used for mapping priority native vegetation types (see the indicator: The extent of each priority native vegetation type by IBRA sub-region), which in turn should reflect the degree of variation in vegetation types in each region. The mapping scales required for the previous indicator are as follows:

- 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.

Where the mapping of the estimated extent of pre-1750 native vegetation types is either not available or is at a coarser scale, an expert interpretation, which may be non-spatial, will be required.

Currency of mapping

To assess the change in distribution of native vegetation types from the baseline, the information needs to be collected within an appropriate timeframe to ensure that the documented changes are as close as possible to the on-ground reality at the time of reporting.

The currency of mapping means the date at which the distribution of native vegetation types shown on the map was assessed to be a true-as-possible representation of the on-ground distribution. Currency requires some interpretation depending on the methodology used to map the estimated extent of pre-1750 vegetation types, as follows.

- When mapping or modeling the vegetation types that were likely to have been present prior to 1750, then the maps should be based on historical information, including aerial photographs, gathered prior to extensive clearing or modification of the vegetation in the region. Currency in this context could be cited as '1750-estimated'.
- When the mapping or modeling approach seeks to describe the vegetation types that once could have occurred in areas where native vegetation has been cleared, and uses present vegetation types (remnants) and environmental information as a basis for modeling, then the currency would be the date at which the mapping was completed but also needs to note the date of the source remanant mapping.

Required

For the baseline of present distribution of native vegetation types, the requirement is as per the extent of type indicator - that is at most within 18 months before reporting and preferably within 12 months. For the estimated extent of pre-1750 vegetation types, a similar currency to that of present distribution should apply if the mapping is modeled on existing information, otherwise currency will be cited as '1750-estimated'.

Classification of native vegetation types

Use the NVIS framework (see beginning of section 3.1 and Table 1).

Required

The level of vegetation classification should be as close to those mapped for present distribution of native vegetation types as possible. If only coarser classifications are available of estimated extent of pre-1750 vegetation types, then expert interpretation will be required to provide consistency to the type classifications. In addition to using an appropriate definition of 'native vegetation', mapping of estimated pre-1750 vegetation types should ideally be at NVIS Level V (vegetation association) or equivalent. This is the same as the requirements under the extent of type indicator.

Data measurement method

Most native vegetation data are held by State and Territory agencies. In November 2001, the Executive Steering Committee for Australian Vegetation Information (ESCAVI) resolved to ensure that vegetation data collection accords with the approaches of State and Territory agencies to survey and mapping, and is consistent with the National Vegetation Information System framework. These in turn are consistent with the standards established in the Australian Soil and Land Survey handbooks published by CSIRO. This will ensure that native vegetation data and secondary information such as targets and performance monitoring can be aggregated at a national scale.

Required

The required methodology for the data measurement of the present distribution of native vegetation types includes remote sensing methods (including air photography and satellite

imagery) combined with field checking. Methods should preferably be based on State and Territory mapping protocols and be published and/or subject to peer review.

A variety of methods are used to map the estimated extent of pre-1750 vegetation types across Australia. These methods use a range of available data, information and modeling processes. In general, 'estimated pre-1750' mapping can be either:

- based on information (aerial photographs) preceding major disturbance events such as clearing, to produce a map of what was estimated to be present in 1750. The methodology used for this 'pre-clearing mapping' should be clearly documented to ensure confidence in its accuracy and reliability. Preferably, it should make use of all available information including key historic dates of settlement and clearing events and an expert process to produce information on the estimated extent of pre-1750 vegetation types which makes sense when compared with the mapping of the present extent of vegetation types;
- based on landscape modeling of vegetation types using up-to-date mapping of the current extent of native vegetation types and environmental information (soils, aspect, climate etc) as a basis. In some cases this mapping will rely on limited patches of remnant vegetation to inform the models used. Where current vegetation maps are updated, the updating of mapping of estimated pre-1750 extent should also be required; or
- a combination of the above.

Tabular information on this measure, not based on mapping, is inadequate for planning on-ground actions. Spatial information on estimated pre-1750 vegetation types is required to allow the planning and implementation of management actions aimed at achieving these targets.

The methods outlined are designed to ensure a consistent approach between regions, but they are broad enough to allow the best available data to be used in each region.

3.2 Monitoring frequency required

Monitoring Frequency

The frequency of monitoring for the proportions of remaining vegetation types should be the same as that for the extent indicator as outlined below .

The frequency of reporting change in the proportion of remaining native vegetation types should be higher where change is known to be most rapid. This focuses the mapping and analysis effort on areas where up-to-date information is most needed to guide decision making.

In addition to analysis of where changes are occurring in the proportion of remaining native vegetation types, it is useful for planners to have an understanding of the drivers of that change, and the nature of change (eg structural change or floristic change). This will assist in the planning of threat abatement and other management activities to best address the issues of rapid change in type-distributions, as a means towards achieving targets for priority vegetation types.

Required

Monitoring and reporting should be two to three years for high priority native vegetation types (i.e. those that are the subject of targets in regional plans). For other vegetation types, a five to ten year frequency may be sufficient. Wherever a vegetation type is identified as undergoing rapid change or as threatened with significant change, more frequent reporting should be initiated. This identification should be on the basis of expert opinion.

Regions should also assess and report on the nature of change in distribution of vegetation types (e.g. whether change is primarily to the structure or floristics or both). Expert analysis based on information on condition and threatening processes could be used for such assessment.

3.3 Data measurement method

Data measurement method

Measurement of change in the proportion of remaining vegetation types is a key requirement for tracking the progress in the management of native vegetation. This relates directly to the monitoring of progress against native vegetation targets, as well as to informing broader assessments of national progress against goals set in the NRM objectives and the National Framework for the Monitoring and Management of Australia's Native Vegetation.

Required

Change in the proportion of native vegetation types can be calculated digitally by intersecting the data sets for change in the present distribution of vegetation types (see extent indicator) with the estimated pre-1750 coverages. The mapping can be limited to those areas where change in present distribution of vegetation types is detected under the previous indicator. Where possible, expert interpretation of likely causes of change in the proportion of remaining vegetation should be provided.

3.4 Data collation / calculation method

Required

As for the extent indicator, the change in proportions of the remaining 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 sub-region. A manual interpretation by experts of the changes in some areas may be required where mapped data are unavailable and could be supported by the use of targeted repeat imagery and photo points.

A change in the proportion of the remaining vegetation types 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 measure, changes can be considered significant when they can be easily identified using aerial photography or site assessment. ESCAVI is progressing the development of measures of native vegetation condition including level of modification, resilience and time frame for recovery to fully mature benchmark.

Preferred

The cause of change in the proportion of remaining vegetation types and related change in 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
 - No change
2. Cause of change
 - Clearing for agriculture
 - Conversion for agriculture
 - Plantation establishment

- Re-vegetation
- Land abandonment
- Pest or disease invasion
- Farm tree planting
- Urban and/or infrastructure development
- Salinity
- Other (please specify)

3. For land use change refer to Australian Land Use 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').

Land use change

- From one Australian Land Use Management class (Version 6) to another class
- No change

4. Source and reliability of information

- Published/unpublished
- Map based/non-map based
- Local knowledge
- Expert opinion

A proportion-remaining baseline composed from a variety of mapped sources will require careful interpretation, particularly when assessing change. Where information about particular vegetation types (e.g. riparian types) is lacking, expert interpretation will be required to differentiate real change from apparent changes resulting from the use of different classification systems.

An apparent change in the proportion of a remaining vegetation type can be caused by a change of classification resulting in a changed estimate of pre-1750 distribution and therefore, current proportion remaining. Where this occurs, this should be recorded and a new baseline established.

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

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.

All new data should be documented according to the ANZLIC standard for metadata (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 as per the Natural Resources Information Management Toolkit published by the National Land and Water Resources Audit should be considered as required under this indicator (see - <<http://nlwra.gov.au/toolkit/>>).

3.6 Data analysis and interpretation

ESCAVI has recognised the need for collection of vegetation data to accord with existing State and Territory protocols, 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.

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 mapped 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 to 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 the extent of pre-1750 vegetation showing the distribution of priority vegetation types estimated to have been present at that time.
- Maps of estimated pre-1750 priority vegetation types cleared or modified since 1750.

- Maps of cleared or modified priority vegetation types for each present vegetation baseline measured since mapping began.
- Map of native vegetation types for each date mapped illustrating the spatial impact of each known cause of the changes.
- Maps showing trends in the proportion of remaining vegetation types for each cleared or modified priority vegetation type.

Tabular information

- Proportion (%) of estimated pre-1750 priority native vegetation types remaining by IBRA sub-region for baseline and all dates of monitoring.
- Type, cause and land use for changes identified at each monitored date.

Documentation

- On the mapping, measurement methods and sources of information including metadata.
- On the causes of changes to the proportion of remaining 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

The following applies to establishing a baseline of present and estimated pre-1750 distribution data sets required for determining the proportion of remaining native vegetation types.

Required

- List and document available sources of information which meet the ANZLIC metadata standard.
- Assess each data set against the monitoring methodology requirements.
- Identify gaps, determine priorities and assess methods to fill gaps. Where gaps cannot be filled, identify an alternative strategy or timeline.
- Fill gaps.
- For multiple sources of data with similar classifications across the region, collate the various sources of data into a single or a series of spatial coverages for each date, ensuring that the most accurate data is used across the region – data collation using geographics, then projected for area calculations. 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 classification.
- Intersect the baseline and each subsequent date of mapping (of the present distribution of native vegetation types mapped with the IBRA sub-regional boundaries for calculations of extent by sub-region by hectares within the region of interest.
- Document final data sets for each date (baseline and subsequent dates) to the ANZLIC metadata standard.

Preferred

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

4.5 Data analysis, integration and interpretation information

ESCAVI has recognised the need for collection of vegetation data to accord with existing State/and Territory protocols, to ensure consistency in target setting between regions and to allow the 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 the collection of data in accordance with this indicator rests primarily with State and Territory agencies. Other major sources of vegetation data often not incorporated into State mapping are from local councils, Environmental impact statements, privately funded surveys and data collection on Australian Government lands. Regions should consult with State agencies concerning the appropriateness of using information from such sources as a basis for measurement under this indicator.

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 the 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 the 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 and Water Resources recently produced a report entitled *Australia's Native Vegetation: a summary of Australia's Major Vegetation Groups 2007* which includes national maps based on NVIS information. 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 extent 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. 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

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/topics/vegetation/pubs/native_vegetation/nat_veg_contents.html>.
- The ‘map-maker’ tool from the Australian Natural Resources Atlas <<http://www.anra.gov.au/>> can be used to map estimated pre-1750 and present major vegetation groups.
- Summary native vegetation data for Australia can be downloaded from the Australian Government Department of the Environment, Water, Heritage and the Arts Environmental Data Directory.
- 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://asdd.ga.gov.au/>>.
- 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

- 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>. http://www.anra.gov.au/topics/vegetation/pubs/landscape_health/landscape_health_contents.html
- 2001a, *Australian Native Vegetation Assessment 2001*, National Land and Water Resources Audit, Canberra, http://www.anra.gov.au/topics/vegetation/pubs/native_vegetation/nat_veg_contents.html
- 2001b, *Rangelands – Tracking Changes*, National Land and Water Resources Audit, Canberra, < <http://www.anra.gov.au/topics/rangelands/pubs/tracking-changes/index.html> >
- Sinclair Knight Merz 2000, *Riverine Vegetation Mapping Scoping Study*, final project report, <http://www.nlwra.gov.au/full/20_products/05_by_subject/15_land_resources_and_mgt/40_NVIS/riverine_vegetation.html>

10. Glossary

ANZLIC metadata standard

Minimum requirements for metadata to be included in the Australian Spatial Data Directory.

Australian Land Use Management classification

A national land use classification that enables land use information to be collected systematically for a wide range of potential users across Australia. Refer to Australian Land Use Management (ALUM) Classification

<http://adl.brs.gov.au/mapserv/landuse/alum_classification.html>.

ESCAVI

The Executive Steering Committee for Australian Vegetation Information. Includes representatives from all States and Territories and the Australian Government and guides the maintenance and ongoing development of the National Vegetation Information System (NVIS) including the further development of standards for vegetation extent information collection and storage.

Estimated pre-1750

The term 'estimated pre-1750' has been agreed by the Executive Steering Committee for Australian Vegetation Information (ESCAVI) to encompass the range of different terms and definitions used by different jurisdictions (e.g. pre-European, pre-intensification, pre-disturbance, etc).

IBRA sub-region

IBRA is the Interim Biogeographic Regionalisation of Australia. IBRA sub-regions provide a valuable bioregional context for mapping and reporting on the extent and distribution of vegetation. IBRA sub-region coverages and detail on this mapping is available through the Australian Government Department of Environment, Water Heritage and the Arts.

Native vegetation

Different State and Territory vegetation mapping programs currently use different definitions of 'native'.

Native Vegetation Information System (NVIS)

An agreed framework and guidelines for collecting, compiling and monitoring Australia's vegetation. The NVIS also comprises a data system which provides a common basis for analysing and reporting vegetation data, and stores information on the status of Australia's native vegetation.

NVIS classification hierarchy

A hierarchical classification, defined in the NVIS framework, for describing the floristic and structural attributes of Australia's native vegetation. The hierarchical classification has six levels (I – VI) from Class to Sub-association.

Priority native vegetation types

Priority native vegetation types are those vegetation types identified by as priorities for management or target setting. Ideally they should be determined from comprehensive information on the extent and distribution of all vegetation types. It is recognised that regions differ in the availability of information and will determine priority vegetation types through a range of means.

Vegetation type

Vegetation types should be classified at NVIS Level V (vegetation association) or equivalent.

Appendix I: 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.	<ul style="list-style-type: none"> 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?	<ul style="list-style-type: none"> a. 80-100% b. 50-80% c. 20-50% d. 0-20%
Recency	What is the age of the dominant contributing data?	<ul style="list-style-type: none"> a. 2005-2000 b. 2000-1995 c. 1995-1985 d. 1985-1970 e. 1970-1950 f. <1950

Trend	Does the dataset support trend interpretation?	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> a. Local b. Regional c. State d. National
Availability	What is the public availability of the product? Is a licence required for outside users?	<ul style="list-style-type: none"> a. Open b. Restricted/licence c. Closed
Delivery	How is the product best delivered?	<ul style="list-style-type: none"> a. Web Services b. Digital data c. Electronic document d. Paper document
Content type	What type of information does the product represent?	<ul style="list-style-type: none"> a. Real data b. Mixture of real & modelled data c. Modelled data
Update	What will be the frequency of update for the product?	<ul style="list-style-type: none"> 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.	