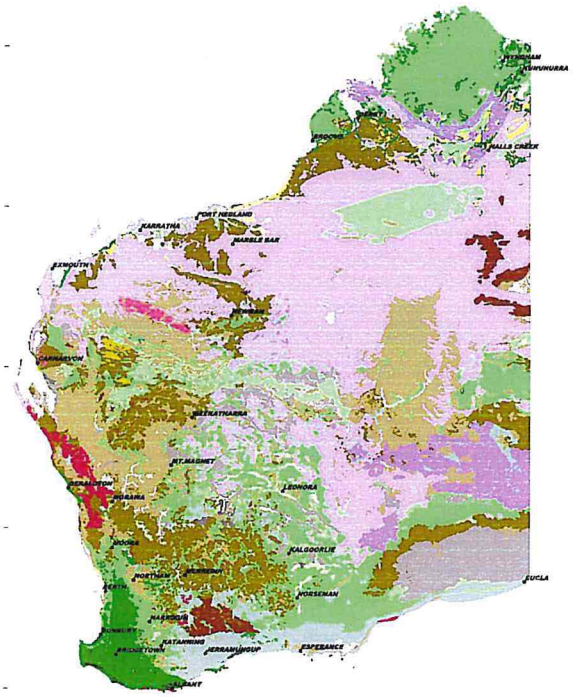
Department of Conservation and Land Management
Department of Agriculture
Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

Implementation of the National Vegetation System model in Western Australia

Milestone 6 Report
Final report on the implementation of the National Vegetation System model in Western Australia



October 2003

Implementation of the National Vegetation System model in Western Australia

Milestone 6 Report
Final report on the implementation of the National Vegetation System model in Western Australia

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October 2003

EXECUTIVE SUMMARY

This report describes work that was completed to improve the Western Australian NVIS vegetation dataset and establish a NVIS data model in Western Australia - in line with similar systems being set-up in the other Australian States and Territories.

The major part of this project involved the compilation of detailed descriptions – including extensive species lists – for vegetation units identified in Western Australia through previous work. The list of these descriptions for WA was also expanded to include sub-components for many vegetation types.

The pre-European vegetation spatial dataset was also upgraded and improved to allow the integration of more detailed descriptions based on original survey information. This had not been possible with the previous version of the dataset.

Finally there is a discussion of experiences in using the NVIS data model in Western Australia – including feedback from other users and potential future users of the system. Recommendations future maintenance and for items to be discussed at follow-up workshops are made, and there is a discussion of the possible role for the new data model in reporting vegetation status for monitoring purposes.

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1.0 Compilation of data for the new data model in Western Australia

The compilation of vegetation and structure data for the pre-European Western Australian dataset was the major time component of this project. This work involved the scanning of J.S. Beard's published memoirs (1:250,00 and 1:1 million scale series) and conversion to digital text data using optical character recognition. Species lists were then compiled from these data into the final WA data model, and cross checked and augmented with the original published material and, in a hand full of examples, ancillary information.

The species lists were compiled in Microsoft and Access (using a simple data entry form based on the core NVIS tables). The taxonomy recorded in the original material (dating from the late 1960s through early 1980s) was updated as recorded where changes were easily made. For more difficult cases – the taxonomy was checked with the State taxonomy database. In a few cases the original collected material – held by the State herbarium – was also checked.

One difficulty encountered in compiling more extensive species lists was that it became difficult to assign ranks to each taxon within each stratum. This was particularly so with the more diverse scrub-heath and heath units that are extensive in sandplain country in south-western Australia. In many cases the selection of dominant taxa, or even Genera, is somewhat arbitrary.

The entire process took more than a year to complete and the result represents a major improvement in the level of detail available for compilation of NVIS descriptions. The opportunity was also taken during this exercise to compile detailed descriptions of Vegetation Systems and Sub-regions described by J.S. Beard. These are considered interim landscape level environmental descriptors. An example of one such description is provided in Figure 1. In some cases, environmental descriptors were also described at the mapping unit level (System-Association – see section 3.2). An example of this level of environmental descriptor is also provided in Figure 2.

BANNISTER SYSTEM

Description

The Bannister System occupies the easternmost portion of the Darling District. It is in effect that part of it east of the Darling Range and extends in a long strip from Bolgart southwards for over 200 km. It includes the eastern edge of the laterite plateau where woodland replaces the jarrah forest due to declining rainfall, and the slopes descending eastward from the plateau. Its eastern boundary is determined by the eastern limit of *Corymbia*. The typical catena has two components: jarrah-wandoo-powderbark woodland on the plateau and laterite residuals, marri-wandoo woodland on the slopes below the plateau.

The plateau woodland consists of shorter, more scattered and branchy trees than in the jarrah forest, the principal components being *Eucalyptus marginata, E. wandoo* and *E. accedens*. The woodland of the slopes can be very tall and dense in some valleys in the Range but in general is still lower and more open. Relative proportions of marri and wandoo vary widely. *Acacia acuminata* and *Allocasuarina huegeliana* are still common associated species in most areas but land clearing has eliminated most of the smaller species which were once present.

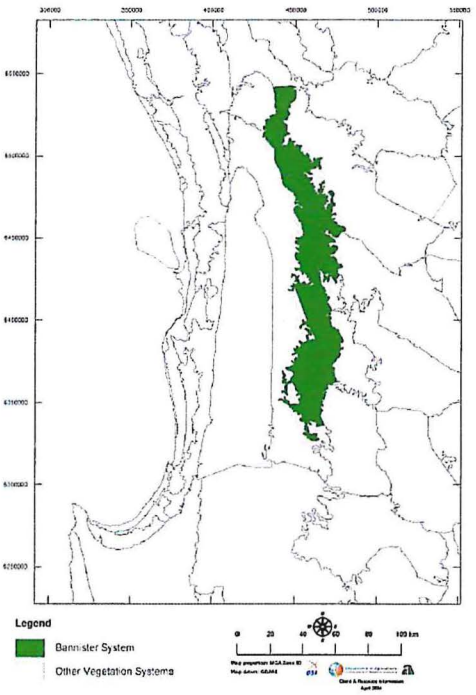

Figure 1. *Environmental descriptors used for Vegetation Systems.*

Vegetation Map Unit (System Association 3.3) - Environmental Descriptors

Description 1
DARLING - DALE - Massive gravels with sandy loam matrix on the highest ground
Description 2
DARLING - DALE - Upper slopes and ridges
Description 3
DARLING - DALE - Sandy gravels on mid and lower slopes
Description 4
DARLING - DALE - Lower and middle slopes of valleys with superficial wash of gravel and kaolinitic clay
Description 5
DARLING - DALE - Lower and middle slopes with good brown loam soil
Description 6
DARLING - DALE - Fertile loams on slopes of main river valleys
Description 7
DARLING - DALE - Gravelly sands, transitional between swamps and gravelly slopes
Description 8
DARLING - DALE - Winter-wet sandy loams on lower slopes and valley floors
Description 9
DARLING - DALE - Seasonally waterlogged sandy loams with hardpan on lower slopes and valley floors

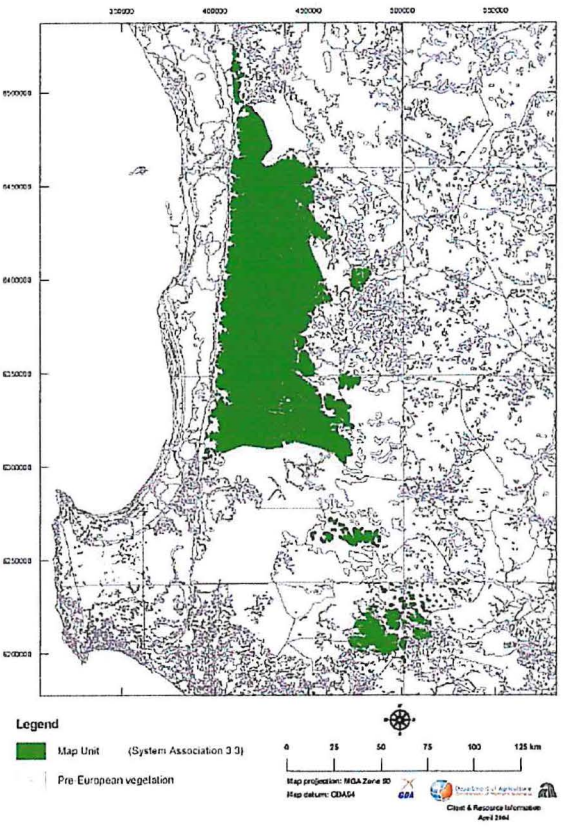

Figure 2. *Environmental descriptors used for Vegetation Descriptions.*

2.0 Updates to the Pre-European spatial dataset

During this project the c.1:250,000 scale pre-European vegetation GIS dataset was revised. The revision involved several activities:

- Rectification of the dataset to topographic features from the State topographic dataset (primarily using the coastline and lakes),
- Correction of dataset attribution of on mapsheet edges,
- Correction of boundaries to some map units.
- Creation of a new Vegetation Systems map (based on 1:250,000 map unit boundaries) that forms a scale hierarchy with the 1:250,000 scale map units and IBRA (Interim Biogeographic Regionalisation of Australia, Thackway & Cresswell eds. 1995) regions and sub-regions.

The result of this process is a dataset that is more spatially accurate and allows the integration of more detailed attribute data (see section 3.2). A comparison of the original and revised datasets is illustrated in Figure 3.

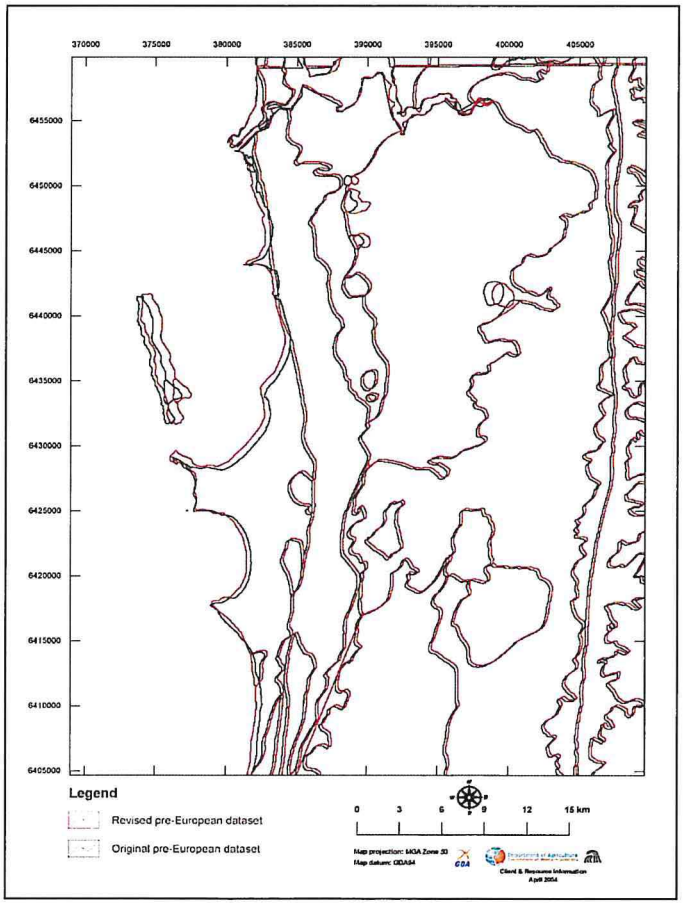

Figure 3. *Comparison of original and revised pre-European vegetation spatial dataset*

3.0 Structure and function of the final data model in Western Australia

The data model in Western Australia reflects the Commonwealth data model (see ESCAVI 2003). Following the initial development of the NVIS data model in Western Australia in March 2003, and following discussion of a number of issues raised during the WA workshop (see Milestone 2.1 Report), a number of further changes to the data model were made prior to data loading in June 2003. These changes were made principally to support the independence of vegetation descriptions from association with a particular database.

Specifically, the primary key relationship between the tables MAP_UNIT and VEG_DESCRIPTION was changed from the field MAP_UNIT_ID to NVIS_ID. This also enabled the VEG_DESCRIPTION table to be used to more effectively describe the unmapped components of mosaic map units.

During the data loading phase – May to August 2003 (with some updates made after this period) – a number of other minor changes were made to particular tables. An extra field - TAXON_DATA_GF was added to the table TAXON_DATA to facilitate the data validation process and with the intention of providing a means to produce quick summaries without referencing the table GROWTH_FORM. The field TAXON_DATA_ALWAYS_THERE for table TAXON_DATA was re-named TAXON_DATA_INDICATOR. We believe this change better reflects the nature of this field and the meaning is clearer for data entry purposes. An entity relationship diagram for the final data model used in Western Australia is presented in Figure 4.

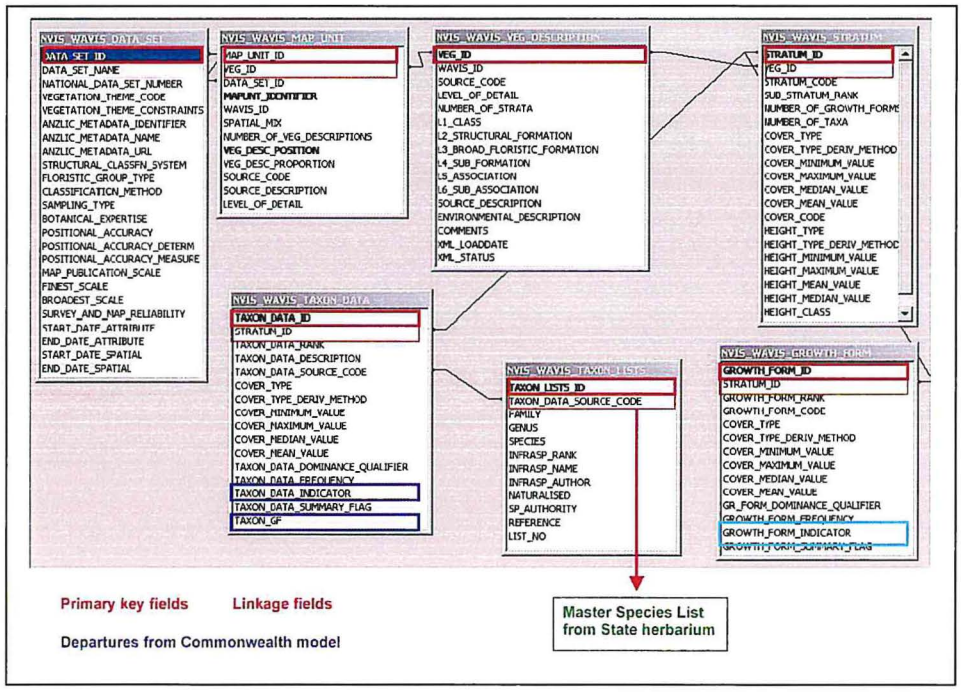

Figure 4. *Entity-relationship diagram for the final data model (highlighting departures from the Commonwealth data model).*

3.1 Data validation and Vegetation Descriptions

In addition to the data validation rules (including those relating to the use of 'hats' (^) in vegetation descriptions) agreed at the November 2002 NVIS workshop, we have implemented a number of additional rules to deal with Western Australian descriptions.

These are as follows:

- Mixed assumed if no dominance flag - autoselect taxon ranked 1 (except where summary flag indicates a taxon of a different rank, and where there is only one taxon),
- Where two dominants are indicated (with ^) then the first (rather than both) are promoted to the next level,
- First growth form is assumed dominant (except in special cases - requires expert input),
- Only promote growth forms from non-dominant sub-strata where a taxon from the sub-stratum is promoted,
- Structural formation called "Heath" where stratum height class = 2, or Stratum = G,
- The term 'Shrubland' applied to Xanthorrhoea and Cycad dominated shrublands.

Automated data validation during compilation was kept to a minimum (controlled largely by field lengths and data formats), to allow for peculiar occurrences of structure and floristics and new descriptions. This created some overhead in subsequent data validation, but allowed for a useful degree of freedom during data compilation.

The compilation of NVIS descriptions was carried-out using a combination of SQL scripting in ORACLE and manual checking and modification in Microsoft Access. We found the process of generating NVIS descriptions from the compiled data a very useful secondary validation process.

Test data from the revised dataset was sent to BRS in August 2003, however, errors were detected during compilation of the remainder of the WA dataset and corrected prior to the final data compilation. The final vegetation descriptions are listed in the Appendix to this report.

3.2 Implementation of a modified descriptive hierarchy in Western Australia

Prior to this project spatial and attribute data (consisting largely of one-line descriptions) were maintained at two levels in the Western Australian database. These were vegetation super groups (designed for use at the State-scale i.e. 1:3 million) and vegetation 'associations' – based on vegetation polygons from J.S. Beard's 1:250,000 and 1:1 million scale published maps. An intermediate level of description – the 'vegetation formation' – was originally used in developing the super groups but was not maintained. In the process of compiling more detailed attributes and generating NVIS descriptions for the current project, and in consideration of enhancing monitoring and reporting functions, it became clear that this data structure needed to be modified.

In compiling his memoirs and maps for Vegetation Survey of Western Australia, J.S. Beard developed the concept of a 'vegetation system'. Vegetation systems (described in the Milestone 2.1 Report for this project) served as reference for describing the vegetation at mapped scales. Particular mapped vegetation units – with a common map code – were actually described separately for each vegetation system. These descriptions are often quite different between vegetation systems. The memoirs also describe unmapped components and peculiar occurrences of the mapped units. By integrating the vegetation system concept (effectively a grouping of vegetation units in a local area) the detailed descriptions from Beard's published and unpublished memoir material could be linked to the spatial data. This key outcome was essential in developing NVIS level 5 and 6 descriptions. An example of the mapping of this hierarchy is illustrated in Figure 5.

Vegetation Systems were digitised during the current project as sub-units of the IBRA regions and sub-regions (Interim Biogeographic Regionalisation of Australia, Thackway & Cresswell eds. 1995), so that there is now a continuous hierarchy of phytogeographic classification – combining elements of vegetation distribution and landscape types. This hierarchy runs from IBRA regions at the broadest level, through IBRA sub-regions to Vegetation Systems, and finally to System-based Vegetation Associations (herein called System Associations) - the base mapping unit.

An example of the process of sub-dividing the existing mapping units is illustrated in Figure 6.

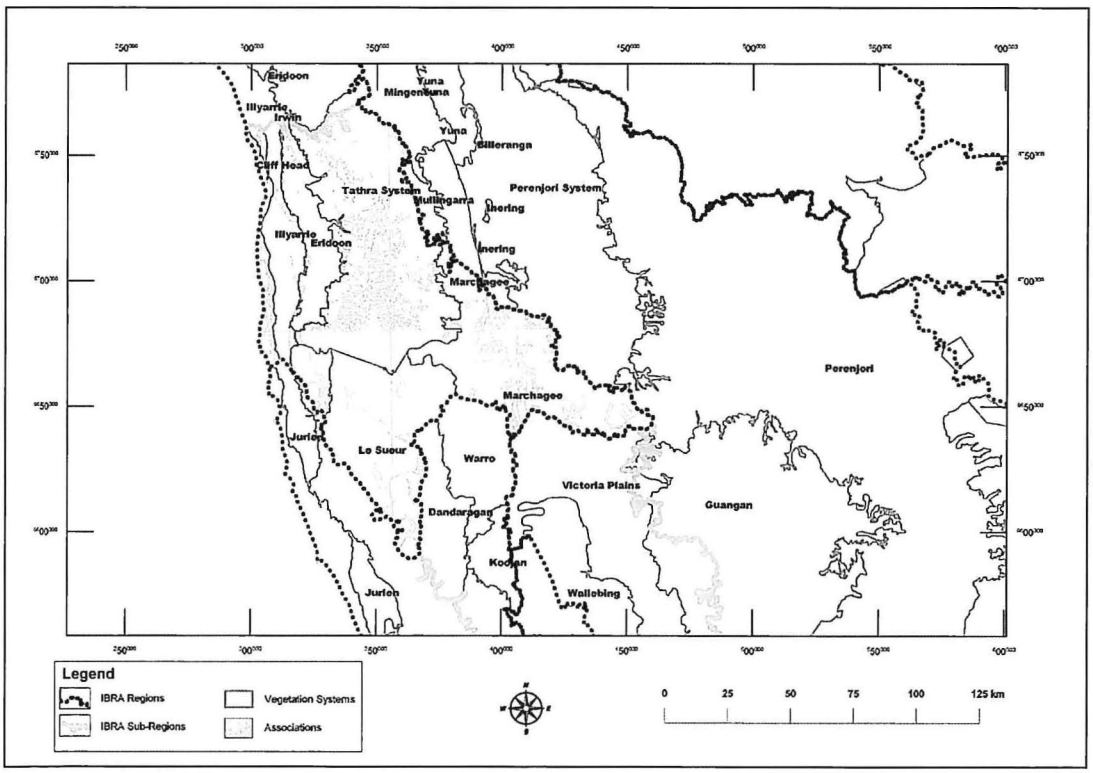

Figure 5. *The four levels of pre-European vegetation mapping – illustrated in the Leseur Sandplain IBRA Sub-Region, Western Australia. Vegetation Systems are named.*

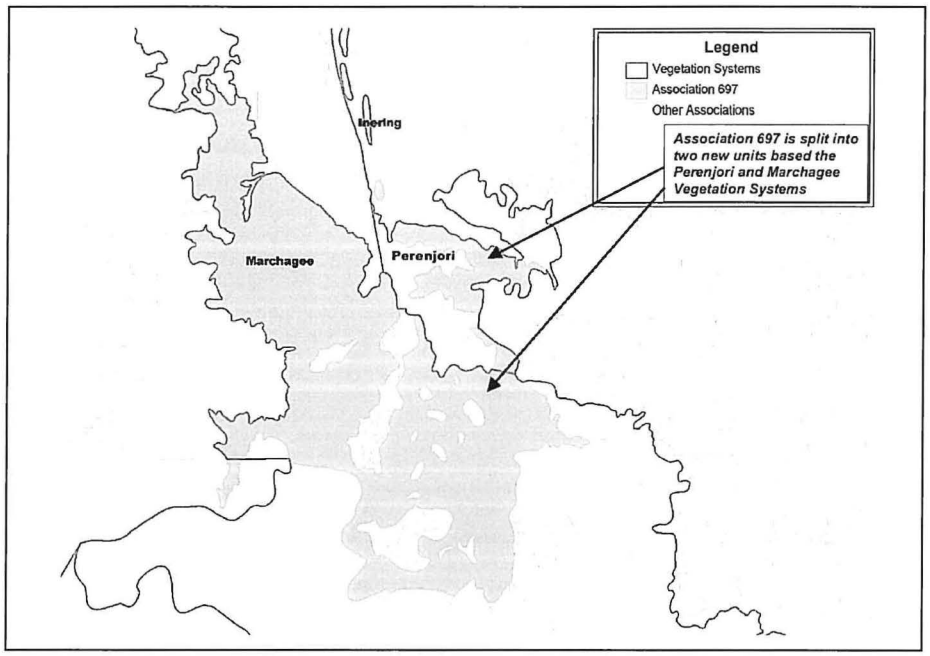

Figure 6. *Sub-division of Vegetation Associations in the pre-European Vegetation dataset.*

4.0 Equivalency in the Western Australian dataset

During this project a large number of map units in the Western Australian dataset were split spatially into new map units that are better defined geographically. In addition many of these units are now described as mosaics – with individual vegetation descriptions for each component.

Where practical, only a single description is given to a unique vegetation configuration (having the same structure and composition). However, in many cases the same configuration has been described for units that are widely geographically separated. In these cases we have assumed that, although the vegetation description is the same (equivalent), that it is likely that the units still differ – at least subtly – and separate vegetation descriptions have been retained. This is also the case where a particular vegetation description occurs in a pure unit and a mosaic unit.

A significant issue prior to this project related to fundamental differences between NVIS vegetation descriptions between WA and other jurisdictions – particularly NT and SA (arising from different structural classification systems). A significant example of this issue relates to the description of tropical grasslands and woodlands. Most of these units in WA were defined as grasslands for the purposes of NVIS Stage 1. However, the same units (albeit at broader scales) in NT were defined as woodlands.

The current project has used the rule set agreed at the November 2002 NVIS workshop for generating NVIS descriptions. The resultant descriptions appear to be a better match across jurisdiction boundaries. However, this issue needs to be examined in more detail

in future workshops, and following the revision of the NT dataset/s. The structural formation descriptions generated during the current project are illustrated in Figure 7.

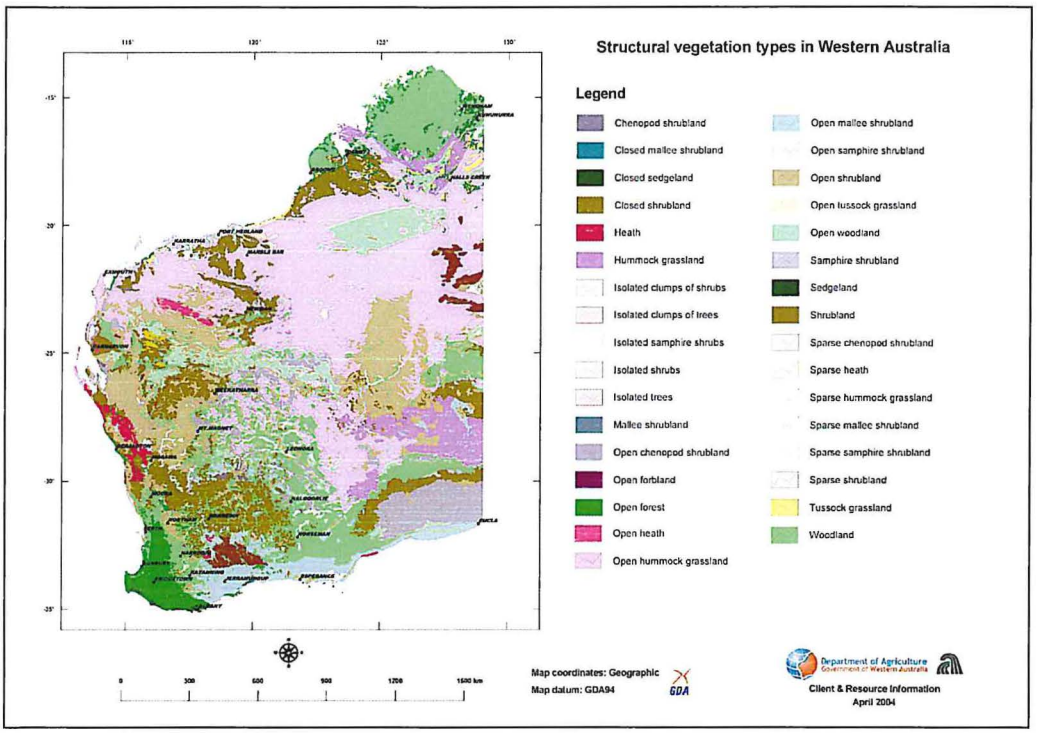

Figure 7. *Structural formation descriptions generated from the new Western Australian NVIS pre-European vegetation dataset.*

5.0 Experiences in utilizing the Western Australian NVIS Data model

Since the establishment of the Western Australian NVIS data model, and population of the database with attributes and NVIS descriptions there have been a number of opportunities to test the outputs from this system with users. Access to 'locally' specific descriptions and species lists have been well received, although it has been important to note the limitations of updates to taxonomy in the database. A challenge for users of the system and its outputs has been in relating field-based data to the broad descriptions of vegetation in NVIS levels 1-6. Although most potential users understand that the NVIS (Australian Vegetation) attributes are not prescriptive in the specifics of information collected (i.e. does not impose cover and height classes in data collection), some potential users still have reservations about how appropriate the NVIS structural classes are in summarizing site-based data.

Other feedback indicates that many users are challenged by the highly coded vegetation descriptions for NVIS Levels 5 and 6. In Western Australia, where there are well-established textual descriptions at the vegetation 'association' level, there is a strong reluctance to adopt a new descriptive system. One mechanism for dealing with this problem is to include Level 4, 5 and (where they exist) Level 5 attributes together when describing vegetation. However it is suggested that this is not the optimal solution. There

may also be further opportunities to deal with this problem as better definitive vegetation descriptions are developed and through publication of updated standards (see Walker & Hopkins 1990) for vegetation mapping incorporating the Australian Vegetation Attributes.

6.0 Recommendations for maintaining the Western Australian data in the NVIS using a distributed data model

The feedback from users has important implications to the use of distributed data model for the maintenance of the NVIS. There needs to be better-defined process for incorporating site data into the system. The proposed updates to the commonly used 'yellow' field handbook may assist here. Detailed examples of how this process can be undertaken should also be developed – preferably based on the experiences of the existing NVIS collaborators.

Although the NVIS Level 5 and 6 descriptions are useful for resolving equivalency issues, there is a need to make this level of description more readily comprehensible to a broader range of users. The challenge is to incorporate an intuitive element to the descriptions (based on traditional structural and floristic nomenclature), rather than simply decoding the descriptions.

Finally, the complexity of the data model provides some challenges to developing an easily portable data model. The system has been designed with a large corporate system in-mind - the WA database now exists in corporate systems in two WA Government Departments. However experiences with the early data compiler illustrate difficulties in developing local data collection.

Although WA has developed access and ORACLE front-end forms for data entry, the development of a self-contained distributed database was outside the scope of this project.

7.0 Recommendations for future workshops to resolve outstanding equivalency and data management issues

The issues of equivalency between the current WA NVIS dataset (pre-European vegetation) and other datasets – particularly the Northern Territory – have been largely resolved in this project (see Section 2.0 of this report). The opportunity for identifying equivalent units within the WA dataset has also been enhanced during this project through the development of more detailed descriptions of the mapped units (including unmapped components).

The key issues to be resolved in Western Australia relate to data management. A number of issues remain:

- Awareness and acceptance of the importance of NVIS in reporting the regional status of native vegetation,

- Development of a distributed data model to allow local data collection and integration with the State database,

- Development and testing of formats/methods for NVIS-compliant field data collection.

There is a critical need to resolve these issues as regional groups in Western Australia, and across the country prepare to implement strategic plans developed through the NAP/NHT2. In Western Australia, these groups are still at the stage of formulating strategic plans. This work includes development of plans for biodiversity monitoring – WA NVIS – derived products are already being used to define baseline condition and matters for targets.

8.0 Recommendations for monitoring regional trends and changes in vegetation in Western Australia

An important outcome of the process of combining Vegetation Systems and Associations is the significant enhancement of reporting capabilities on the status of vegetation in Western Australia. Prior to the current project, vegetation units in the established pre-European vegetation spatial dataset mapped at scales between 1:250,000 and 1:1 million were, in effect, mosaics of potentially quite dissimilar vegetation. Areas of these were reported against a number of broad regionalisations – principally the IBRA regions and sub-regions.

Following the current work it is possible to report at finer scales than used for previous assessments of the status of vegetation types (eg. Shepherd et al 2002). This can be achieved using the largely disaggregated vegetation descriptions described through the current project. This capability is in line with those currently used in Queensland (eg Satler and Williams eds. 1999) and Victoria, and being developed in New South Wales. This will also more adequately satisfy the requirements of indicators for State of Environment (SoE) reporting (ANZECC 2000).

Prior to the current project, 831 vegetation types (Associations) were recognised in Western Australia, as the current project nears completion – we now recognise nearly 3000 vegetation types (System-based Associations). Some of these still consist of mosaics, but there are now separate descriptions for each component of the mosaics.

The more detailed data will also be invaluable as a reference source for recognising and monitoring native vegetation condition. A methodology incorporating NVIS data is currently being considered by the Executive Steering Committee for Vegetation Information (ESCAVI).

The relationship of each level of the phytogeographic hierarchy and levels of reporting on the status of vegetation types in Western Australia is illustrated in Figure 8.

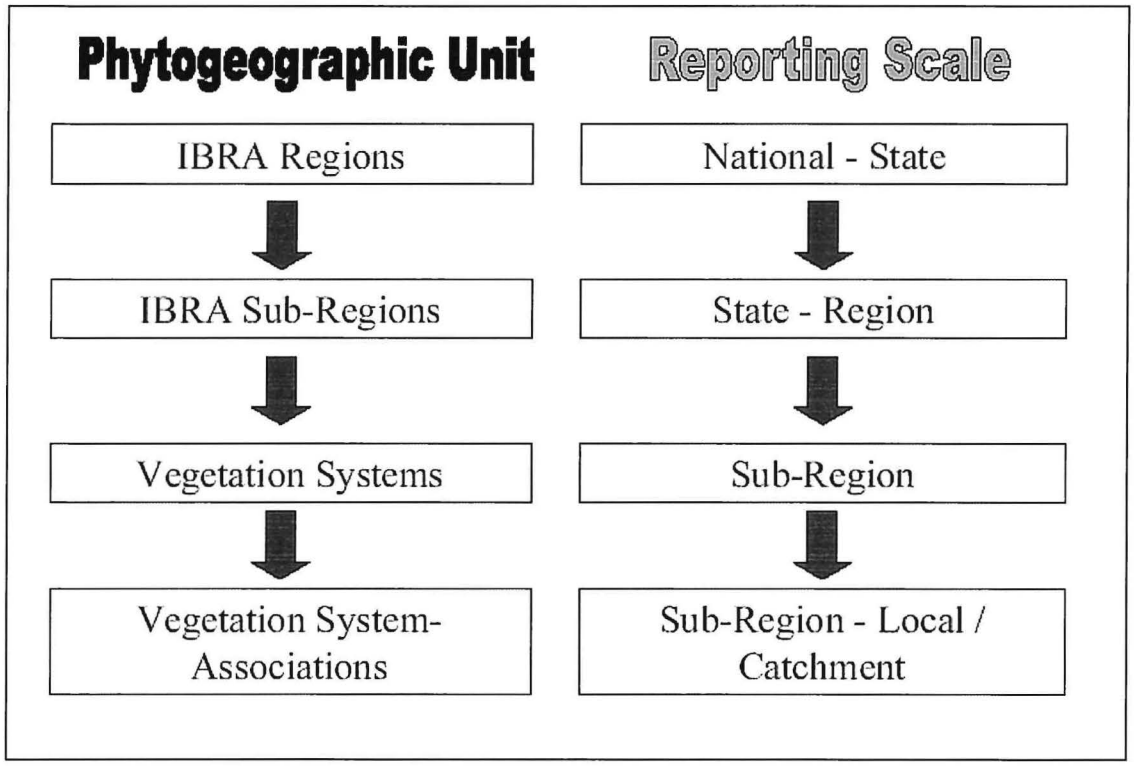

Figure 8. *The relationship of levels of vegetation-landscape mapping to common reporting scales for the status of vegetation in Australia.*

9.0 References

Australian and New Zealand Environment and Conservation Council (ANZECC) State of the Environment Reporting Taskforce 2000, Core Environmental Indicators for Reporting on the State of the Environment, Environment Australia, Canberra.

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Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M (2002). Native vegetation in Western Australia – Extent, type and Status. Technical report 249. Department of Agriculture, Western Australia, South Perth.

Thackway, R and Cresswell, I.D. (eds) (1995), An Interin Biogeographic Regionalisation for Australia: A Framework for Setting Priorities in the National Reserves System Cooperative Program. Version 4. Australian Nature Conservation Agency, Canberra.

Walker J. and M.S. Hopkins (1990). Vegetation. In: McDonald, R.C., R.F., Isbell, J.G., Speight, J. Walker, and M.S. Hopkins. (Eds) Australian Soil and Land Survey. Field Handbook. 2nd edn. Melbourne: Inkata Press.

10.0 Acknowledgments

The following personnel contributed significantly toward the outcomes of this project:

Gabriella Seredenco (DAWA) carried-out all rectification and other corrections of the digital dataset and generated the new Vegetation Systems dataset. Anna Hopkins (DCLM) identified attribution errors in the original dataset. Roger Walker (DCLM) collated information from the scanned original material, compiled vegetation attributes for most of the Rangelands and updated taxonomy for many of the units. Nicholas Rowe (DAWA) carried-out the data model implementation in ORACLE. Angas Hopkins provided valuable guidance and comment throughout the project. Margaret Langley (DCLM) also provided useful comment during the project.

We also wish to thank Evert Blyes (DEH) who provided valuable feedback on the database implementation. Matt Bolton (DEH) coordinated the development of the Australian Vegetation Attributes and provided useful feedback throughout the project on their implementation. Christine Ateo (BRS) provided feedback on project administration and Richard Thackway provided national coordination and comments on the database implementation throughout the project.

Using the Pre-European Vegetation Data

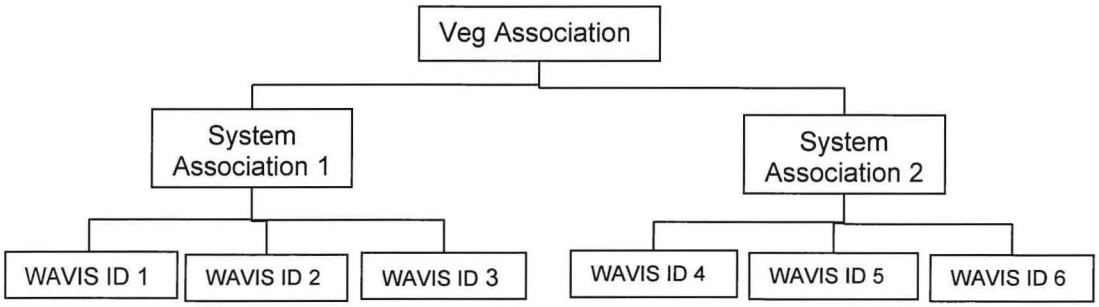
The most commonly used attribute of the Pre-European Vegetation data is the "Vegetation Association", whose codes and descriptions are directly available in the spatial attribute table. There are 815 different Vegetation Associations.

However, there is also the more detailed Vegetation "System-Association" which is a combination of "System" and "Vegetation Association". There are 2,877 different System-Associations.

In the CAR analysis spreadsheet for 2007 there will be reporting at both the Vegetation Association and the System-Association levels of description.

For each System-Association there is more detailed descriptive information available in the lookup table VegDescriptions.dbf. This information includes NVIS (National Vegetation Information System) classifications. Some System-Associations are identified as having a mosaic of vegetation types and hence have more than one record in VegDescriptions.dbf.

Graphically the hierarchy of vegetation categories looks like this



Below is a description of the key fields in both the attribute table and the lookup table, with instructions on how you can link them in ArcMap 9.x There is no way to link the tables in DECgis, but you could apply the same principles in a manual fashion.

*****NB if you create any products using Pre-European Vegetation you will need to include this reference**

- **Shepherd, D.P. (2003) Implementation of the National Vegetation Information System model in Western Australia. Milestone 6 Report. Final report on the implementation of the National Vegetation System model in Western Australia. Unpublished Report to the Bureau of Rural Sciences, Canberra. October 2003.**

Description of the Fields

Pre-European Vegetation Spatial Attribute Table

Attribute Name	Attribute Description
ID_LUT-	Unique identifier from the original data
SYSTEM -	Areas or groups of areas in which vegetation types occur in a recurring pattern of topography, soils and vegetation
VEG_ASSOC -	Vegetation Association number denoting the vegetation type
SOURCE_COD -	Code from source mapping dataset
SOURCE_DES -	Full text description of the Vegetation Association
SYSTEM_ASS -	Vegetation System-Association description
SA_CODE -	Vegetation System-Association code
MAPUNIT_ID -	Map Unit identifier

Vegetation Descriptions Look up Table (VegDescriptions.dbf)

Attribute Name	Attribute Description
WAVIS_ID -	WA NVIS vegetation description unique identifier. This field can be used to link to the national database using their NVIS_ID field
DESC_NO -	Description number for map unit
SA_CODE -	Vegetation System-Association code
SOURCE_COD -	Code from source mapping dataset
VEG_ASSOC -	Vegetation Association number denoting the vegetation type
SOURCE_DES -	Full text description of the Vegetation Association
MAP_CODE -	Original coded notation used by J.S. Beard in the Vegetation Survey of Western Australia
L1 -	NVIS level 1 description - Vegetation Class
L2 -	NVIS level 2 description - Structural Formation
L3 -	NVIS level 3 description - Broad Floristic Formation
L4 -	NVIS level 4 description - Vegetation Sub-Formation
L5 -	NVIS level 5 description - Vegetation Association
L6 -	NVIS level 6 description – Vegetation Sub-Association
ENVIRO_DES -	Description of the Vegetation System in which the unit occurs and any environmental constraint on distribution.

Linking the Spatial Attributes to the Look up Tables in ArcMap

Vegetation Association Attributes

Relating the Vegetation Association Attributes to the Spatial Data

This link is based upon the SA_CODE and the following method which uses a "Relate" function to relate the data but not physically join the attribute information to the spatial data. If you would like to join the attribute data to the spatial attributes then follow the instructions for joining the look up table.

1. Open a new or existing ArcGIS map document
2. Add in the Pre-European Vegetation data via the Corporate Data menu or manually
3. Right click on the Pre-European Vegetation layer and select Joins and Relates> Relate...
4. For step 1 select "*SA_CODE*"
5. For step 2 click on the browse button and load the Vegetation Descriptions look up table from the location V:\GIS1-Corporate\Data\Vegetation\Pre_European\VegDescriptions.dbf
6. For step 3 select "*SA_CODE*"
7. Leave step 4 as "Relate1" unless you have reason to call it something else.
8. Click "OK"
9. Do a selection to get the record(s) of interest from the Pre-European Vegetation layer
10. Open the attribute table for the layer (if its not already open)
11. On the Options tab at the bottom of the window go to Related Tables and select Relate1
12. This will open the VegDescriptions.dbf table (if not already open) and all related records in this table will be selected. Note that you may only have had one record selected in the attribute table, but there may be multiple related records in the lookup table (this indicates a mosaic of vegetation types with different descriptive information for each).
13. The relate works the other way too, i.e. you can select records in VegDescriptions.dbf and then use Options > Related Tables > Relate1, to select the related records back in the attribute table.

If you wish to create a table that has the descriptions in there permanently you should export the data to a new shapefile.

Joining the Vegetation Association Attributes to the Spatial Data

This link is based on the SA_CODE and follows a similar method to the Relate function with the major difference being that the attribute information from the look up table will be joint to the spatial information.

1. Open a new or existing ArcGIS map document
2. Add in the Pre-European Vegetation data via the Corporate Data menu or manually
3. Right click on the Pre-European Vegetation layer and select Joins and Relates> Join...
4. For step 1 select "*SA_CODE*"
5. For step 2 click on the browse button and load the Vegetation Descriptions look up table from the location V:\GIS1-Corporate\Data\Vegetation\Pre_European\VegDescriptions.dbf
6. For step 3 select "*SA_CODE*"
7. Click "OK"
8. Open the attribute table for the Pre-European Vegetation layer (if its not already open). You will now see that the attributes from the look up table have been joined to the spatial data. This is not a permanent join and it is only valid for that project.

If you wish to create a table that has the descriptions in there permanently you should export the data to a new shapefile (Right click> Export Data).

Joining the data to get the NVIS Code Attributes

There is a one to many relationship between the System Association Code and the NVIS categories. Thus for every "SA_CODE" there is many "WAVIS_ID"s. Therefore the join must be done by joining the spatial attributes in the shapefile to the look up table.

1. Open a new or existing ArcGIS map document
2. Add in the Pre-European Vegetation data via the Corporate Data menu or manually
3. Add in the Pre-European Vegetation look up table from the location V:\GIS1-Corporate\Data\Vegetation\Pre_European\VegDescriptions.dbf
4. Ensure that you are in the "Source" tab in the Table of Contents otherwise the VegDescriptions look up table will not be visible
5. Right click on the VegDescription look up table in the Table of Contents and select Joins and Relates> Join…
6. For step 1 select "*SA_CODE"*
7. For step 2 select "pre-european" as the table to join to the VegDescriptions look up table
8. For step 3 select "*SA_CODE"*
9. Select "ok". This will temporarily join all the attributes from the spatial data to the look up table
10. If you would like to make the join permanent then you will need to export the data to a new table by right clicking on the VegDescriptions table and then selecting Data>Export

DEPARTMENT OF
Conservation
AND LAND MANAGEMENT
Conserving the nature of WA

Metadata Statement - Department of Conservation and Land Management, W.A.

Title: Pre-European Vegetation – Westerns Australia (NVIS Complient Version)

Custodian: Department of Agriculture Western Australia

Jurisdiction: Western Australia

Abstract: A comprehensive database of the vegetation of the state has been developed. This is a State-wide coverage at a scale of 1:250 000 based on the work of J S Beard, supplemented where necessary to give a uniform standard of mapping detail.

The database includes map linework as design files in a Geographic Information System (GIS), and tabular data about the vegetation in each of the map polygons in ORACLE table linked through a Data Base Management System (DBMS). There are c 30 000 polygons covering 160 1:250 000 map sheets. Data on the original vegetation of all of Western Australia, with the exception of three map sheets in the south-west corner, were captured from J S Beard's original working drawings, where these were available, or from published maps, all at a scale of 1:250 000. For the three map sheets in the south-west corner, a new data set was compiled in a form consistent with Beard's approach, from existing data (AJM Hopkins, unpublished).

This version updates two previous versions (metadata dates 08/09/03 and 29/04/04).

The version corresponding to metadata date 29/04/04 significantly revised the long standing previous version. The following revisions of the original were made:

- Rectification of the dataset to topographic features from the State topographic dataset (primarily using the coastline and lakes)
- Correction of dataset attributes of on mapsheet edges
- Correction of boundaries to some map units
- Creation of a new Vegetation Systems map (based on 1:250 000 map unit boundaries) that forms a scale hierarchy with the 1:250 000 scale map units and IBRA (Interim Biogeographic Regionalisation of Australia, Thackway and Cresswell eds. 1995) regions and sub-regions

The result of this process was a dataset that is more spatially accurate than the original and allows the integration of more detailed attribute data. Attribute data have been compiled in accordance with the Australian Vegetation Attributes (Version 6.0) making the attributes complient with the National Vegetation Information Systems (NVIS)

The current version is merged on the attribute SYSTEM_ASSOCIATION and includes further spatial corrections- principally to remove slivers and unattributed gaps. These were processed to an accuracy of 1mm.

Search Words(s): Vegetation type, National Vegetation Information System (NVIS), Western Australia

Geographic Extent: Western Australia

Beginning Date: 1986

Ending Date: February 2005

Update Frequency: Non-planned

Stored Data Formats: Geomedia Access data warehouse and Arc View shapefiles
Available Data Formats: Geomedia data warehouse, Arc View shapefiles and ArcInfo Export files

Datum and Projection: GDA94

Access Constraint: License on request

Lineage: Pre-European vegetation mapping is based on the project AJM Hopkins, GR Beeston, JM Harvey (2000). A database on the vegetation of Western Australia. Stage 1. Unpublished. The major sources of data in this database are the published and unpublished mapping of JS Beard at 1:250 000 scale. Mapping of the south – west corner was compiled by AJM Hopkins from various sources. The original version includes some sliver polygons. These were rectified by the Department of Conservation and Land Management.

Positional Accuracy: Original mapping was done on controlled aerial photo-mosaics scale 1:63:360 for the south-west and 1:100000 (some of which were uncontrolled photo-indexes) for the remainder of the state. This was photo-reduced to a scale of 1:250000 in the south-west and 1:100000 for the rest of the state for compilation. The original photo reduced maps an acetate sheets were digitized using Microstation and attributed in the Modular GIS Environment (MGE) at the Department of Agriculture. The dataset has subsequently been transferred to Geomedia Access Data warehouse and ORACLE Spatial data formats.

Attribute Accuracy: Original mapping was carried out by plotting interpretations from field traverses onto the aerial photo-mosaics. Coded map polygon attribution form the original photo-reduced acetate plots was captured in the CAD and GIS environments described above. The current version of the dataset includes correction of original mapping errors and attribute capture errors.

Attribute Values

The following attribute descriptions relate to the look-up table fields and also the spatial data itself

1. Pre-European Vegetation Spatial Attribute Table

Attribute Name	Attribute Description
ID_LUT-	Unique identifier from the original data
SYSTEM -	Areas or groups of areas in which vegetation types occur in a recurring pattern of topography, soils and vegetation
VEG_ASSOC -	Vegetation Association number denoting the vegetation type. *This field can be used to link with the similarly named field in the "Vegetation Descriptions" look up table to get a comprehensive description of the vegetation type.*
SYS_ASSOC -	Vegetation System-Association description
VSA_CODE -	Vegetation System-Association code. *This field can be used to link to the similarly named field in the look up table "PreEuropeanVegetation_attributes.dbf" to get a better description of the Vegetation System. It should be noted that there can be many descriptions per vegetation system code.*
MAPUNIT_ID -	Map Unit identifier. *This field can be used to link to the similarly named field in the look up table "MapUnit_attributes.dbf" to get a better description of the Map Unit. It should be noted that there can be many descriptions per Map Unit id*

2. Map Unit Look up Table (MapUnit_attributes.dbf)

Attribute Name	Attribute Description
VEG_ID -	Vegetation description unique identifier (WA)
WANVIS_ID -	WA NVIS vegetation description unique identifier. This field can be used to link to the national database using their NVIS_ID field
NVIS_MU_SP -	Spatial mix (pure or mosaic)
NO_VEGDESC -	Number of vegetation descriptions per map unit
VEG_PRIOR -	Priority of vegetation description
SRCE_CODE -	Code from source mapping dataset
MAPUNIT_ID -	Map Unit identifier. *This field can be used to link to the similarly named field in the attribute table for the shapefile "pre_european.shp" to obtain a spatial location of the Map Unit. It should be noted that there can be many descriptions per Map Unit id*
SRCE_DESC -	This is a NVIS term used to describe the map polygon of the original dataset
NVIS_MU_LV -	Level of input to NVIS

3. Vegetation Descriptions Look up Table (PreEuropeanVegetation_attributes.dbf)

Attribute Name	Attribute Description
VSA_CODE -	Vegetation System-Association code. *This field can be used to link to the similarly named field in the attribute table for the shapefile "pre_european.shp" to obtain a spatial location of the Vegetation System. It should be noted that there can be many descriptions per vegetation system code*
SRCE_CODE -	Code from source mapping dataset
DESC_NO -	Description number for map unit
WANVIS_ID -	WA NVIS vegetation description unique identifier. This field can be used to link to the national database using their NVIS_ID field
VEG_ASSOC -	Vegetation Association number denoting the vegetation type. *This field can be used to link to the similarly named field in the attribute table for the shapefile "pre_european.shp" to obtain a spatial location of the vegetation type.*
DESCRIPTN-	Full text description of the Vegetation Association
BEARD_CODE -	Original coded notation used by J.S. Beard in the Vegetation Survey of Western Australia
NVIS_LV1 -	NVIS level 1 description - Vegetation Class
NVIS_LV2 -	NVIS level 2 description - Structural Formation
NVIS_LV3 -	NVIS level 3 description - Broad Floristic Formation
NVIS_LV4 -	NVIS level 4 description - Vegetation Sub-Formation
NVIS_LV5 -	NVIS level 5 description - Vegetation Association
NVIS_LV6 -	NVIS level 6 description - Vegetation Sub-Association
ENV_DESC -	Description of the Vegetation System in which the unit occurs and any environmental constraint on distribution.

Logical Consistency: The dataset has been checked for errors and edge matched where possible. Some edge matching issues remain, but these are of a botanical nature and cannot be resolved without re-mapping.

Completeness:

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Metadata Date: 14th February 2005

Additional Metadata:

- \Data\Vegetation\Pre_European\Using_PreEuroVeg.doc a detailed description on how to use the data and join tables based upon the attributes
- \Data\Vegetation\Pre_European\Milestone_6_Report.doc a detailed description of the process used to create Pre-European Vegetation
- \Data\Vegetation\Pre_European\PreEuropeanVegetation_attributes.dbf the look up table for the vegetation descriptions
- \Data\Vegetation\Pre_European\MapUnit_attributes.dbf the look up table for the map unit descriptions

References

- Shepherd, D.P. (2003) Implementation of the National Vegetation Information System model in Western Australia. Milestone 6 Report. Final report on the implementation of the National Vegetation System model in Western Australia. Unpublished Report to the Bureau of Rural Sciences, Canberra. October 2003.