PRELIMINARY BIOREGIONAL VEGETATION PROJECT (STAGE 1)

NSW WESTERN REGIONAL ASSESSMENTS

[JANUARY 2000]

Brigalow Belt South

Resource and Conservation Assessment Council

PRELIMINARY BIOREGIONAL VEGETATION PROJECT

BRIGALOW BELT SOUTH

WESTERN REGIONAL ASSESSMENTS (STAGE 1)

New South Wales National Parks and Wildlife Service

Western Directorate

A project undertaken for
the Resource and Conservation Assessment Council
NSW Western Regional Assessments
Project number WRA O6

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EXECUTIVE SUMMARY

The Preliminary Bioregional Vegetation Project sought to achieve two key aims;

1. to increase knowledge of the vegetation communities of the Brigalow Belt South bioregion, focussing on State Forests, National Parks estates and Crown land, particularly the Pilliga and Goonoo areas, and
2. to improve information on which to base forest and conservation management, and to make land-use decisions on a bioregional basis.

The project team collated as much available and relevant information as possible. This information included vegetation maps and data from survey plots, reports and publications, and personal communications with a broad range of experts from natural resource management agencies, universities and consultancies.

The project team found that there is an urgent need for plot-based survey and bioregional mapping to be undertaken at a scale of 1:100 000, covering all tenures, and mapped to agreed statewide standards.

Detailed mapping at a scale of 1:25 000 of regionally significant and endangered ecological communities, is also required. Such mapping could form the basis of regional vegetation management plans and appropriate on-ground management, and would facilitate the protection of threatened communities.

The limited time in which this project has been undertaken, meant that detailed analyses of the vegetation mapping and plot data were not achievable. Preliminary analyses were conducted, and the following has been determined:

- approximately 24% of woody vegetation still exists in the bioregion occurring mostly on Crown land. Of this, 40.5% is State Forest;
- plant communities are not adequately conserved across the bioregion. There are no comprehensive, adequate and representative (CAR) reserve systems across the bioregion. The proportion of land protected within the NPWS estate (2.6% of the bioregion) falls below national and international guidelines which recommend that between 10 and 15% of land (biomes or ecosystems) be preserved;
- the Pilliga Nature Reserve and Pilliga and Goonoo State Forests contain a significant amount of the bioregion's remaining ironbark communities, and the communities exhibiting relatively good condition and health. These communities have generally been modified in both their structure and plant species present by selective logging;
- little or no data are available to determine what vegetation communities remain on the eastern side of the bioregion;
- outside these forested areas, the condition, health or extent of remnant vegetation communities remaining in the bioregion is not definitively known;
- clearing remains a key threat to the biological diversity of the bioregion;
- remnant vegetation communities are a diminishing landscape feature due to pressures such as selective logging, firewood collection, grazing, cropping and the extraction of timber for fencing materials; and
- from the available vegetation mapping, it is apparent that the vegetation outside larger reserves or State Forests is highly fragmented. This level of fragmentation would suggest that these communities are in moderate to poor condition.

Preliminary Bioregional Vegetation Project
PROJECT SUMMARY

The report describes a project undertaken for the Resource and Conservation Assessment Council as part of the regional assessments of western New South Wales. The project defines the extent of regional vegetation mapping and knowledge of vegetation communities of the Brigalow Belt South bioregion. An essential process for the Western Regional Assessments is to identify gaps in data information and the best ways in which to proceed with data gathering and evaluation. The is one of several regional biodiversity assessment projects.

Project Aims

The overall aims of the Preliminary Bioregional Vegetation Project were to:

- increase knowledge of the vegetation communities of the bioregion focusing on State Forests, National Parks estates and Crown land, particularly the Pilliga and Goonoo areas; and
- improve information on which to base forest and conservation management, and to make land-use decisions on a bioregional basis.

Stage 1 of the project achieved the following objectives:

- an audit of known and available key datasets and literature related to the vegetation of the bioregion;
- the collation of available resource information;
- the establishment of data storage and manipulation systems;
- liaison with key agency staff.

Stage 2 of the project will enable completion of the remaining objectives. These are to:

- analyse available data;
- examine the possibility of producing a broad (1:100 000) vegetation map (woody layer only) of the bioregion that is suitably robust to provide useable data about plant communities at the bioregional level;
- prepare such a map, if possible. If not possible, to determine what level of information is available to provide a qualitative description of all known plant communities within the bioregion including their current and pre-clearing extent, conservation status and known threats; and
- undertake a preliminary interpretation of the map and survey results prepared, including a full description of each recognised and mapped plant community including floristics, structure, likely habitat value, as well as its relative current and pre-clearing distribution and area; and

Ironbark and native cypress pine communities are an initial focus of the project as they are often a dominant feature of the vegetation communities within bioregion. Ironbark and native cypress pine species are also sought after commercially by private landholders and the timber industry for a range of purposes. These uses may significantly impact on the long-term viability of these communities if not managed appropriately.

Methods

Methods were developed in order to determine two key elements:

1. the types of vegetation communities occurring across the bioregion and their conservation status; and
2. the distribution of ironbark and native cypress pine communities across the bioregion. These two communities are sought after commercially by private landholders and the timber industry for a range of purposes. Little is known of their status, particularly on private land.

Key Results and Products
Key results arising from the limited analyses that have been undertaken are:

- approximately 24% of woody vegetation still exists in the bioregion occurring mostly on Crown land. Of this, 40.5% is State Forest;
- plant communities are not adequately conserved across the bioregion. There are no comprehensive, adequate and representative (CAR) reserve systems across the bioregion. The proportion of land protected within the NPWS estate (2.6% of the bioregion) falls below national and international guidelines which recommend that between 10 and 15% of land (ecosystems or biomes) be preserved;
- the Pilliga Nature Reserve and Pilliga and Goonoo State Forests contain a significant amount of the bioregion's remaining ironbark communities, and the communities exhibiting relatively good condition and health. These communities have generally been modified in both their structure and plant species present by selective logging;
- little or no data are available to determine what vegetation communities remain on the eastern side of the bioregion;
- outside these forested areas, the condition, health or extent of remnant vegetation communities remaining in the bioregion is not definitely known;
- clearing remains a key threat to the biological diversity of the bioregion;
- remnant vegetation communities are a diminishing landscape feature due to pressures such as selective logging, firewood collection, grazing, cropping and the extraction of timber for fencing materials; and
- from the available vegetation mapping, it is apparent that the vegetation outside larger reserves or State Forests is highly fragmented. This level of fragmentation would suggest that these communities are in moderate to poor condition.

Limitations
Full analysis of the limitations of the existing datasets requires resources currently not available. Some general comments can be made about the datasets. The absence of complete mapping coverage, inconsistent past data collection methods, and the short time available for this project limited the scope for analysis and use of data layers.

1. INTRODUCTION

This report has been prepared for the Resource and Conservation Council (RACAC) as part of the preliminary (Stage 1) Western Regional Assessment of the Brigalow Belt South bioregion.

The Western Regional Assessments are to be carried out across the Western and Central Divisions of NSW with the Brigalow Belt South bioregion being the first. The assessments will provide scientific information on which to base Forest Agreements. These will also provide information for the use of other regional planning processes such as Regional Vegetation Management and Catchment Management planning, and other statutory and non-statutory planning initiatives such as Local Environment Plans and Land and Water Management Plans.

The limited time in which this project has been undertaken, meant that detailed analyses of the vegetation mapping and plot data were not achievable.

This report can provide precautionary recommendations subject to further detailed assessment. Although some conclusions may be quite clear, a comprehensive Stage 2 assessment will then be necessary to verify and complete this preliminary assessment.

1.1 BACKGROUND

The Bioregional Vegetation Project provides a preliminary overview of the vegetation on a bioregional scale. It will not attempt to describe the vegetation at the individual community level. The bioregion extends from the mid-Queensland coast inland and across the New South Wales border, and covers an area of 279 496 sq km (see Map 1 – Boundaries of IBRA bioregions in hard copy version of report). Stage 1 of the project only considers the NSW portion of the bioregion.

Thackway and Cresswell, (1995) describe the vegetation of the bioregion as "…Eucalyptus woodlands and open forests of ironbarks, poplar box, spotted gum (*E. maculata*), cypress pine (*Callitris glaucophylla*), bloodwoods (eg *E. trachyphloia*, *E. hendersonii*), brigalow-belah forests (*Acacia harpophylla*, *Casuarina cristata*) and semi-evergreen vine thicket". The bioregion is floristically diverse, a result of variability in characteristics such as soil types, lithology, climate, rainfall and disturbance regimes.

Mapping and description of vegetation is a fundamental step towards the identification and protection of an area's nature conservation values (NSW NPWS, 1995). In order to ascertain the bioregional coverage of native vegetation, and also the distribution and abundance of flora species such as ironbark (eg *Eucalyptus nubila*, *E. crebra*, *E. fibrosa*), all available relevant vegetation mapping datasets were identified and collected. As shown by Howling (1997), vegetation descriptions derived from site-specific research and survey reports provide a valuable tool in

determining the likely composition of vegetation on a local scale. These seldom provide information necessary to develop a broad overview.

One of the major datasets from which information is drawn from is the vegetation mapping of the Murray Darling Basin Project M305 initiated in 1992. This mapping involved the collection and collation of vegetation data from across the entire Murray Darling Basin (Andrews and Flemons, 1997), using Landsat-TM satellite imagery. From this data, a baseline woody/non woody layer was developed that has basin-wide coverage. Floristic and structural vegetation data for the Murray Darling Basin covers an estimated 67% of the bioregion, providing a significant, though incomplete information resource.

1.2 AIMS

The overall aims of the Bioregional Vegetation project were to:

- increase knowledge of the vegetation communities of the bioregion focusing on State Forests, National Parks estates and Crown land, particularly the Pilliga and Goonoo areas; and
- improve information on which to base forest and conservation management, and to make land-use decisions on a bioregional basis.

The specific objectives of the project were to:

- audit known and available key datasets and literature related to the vegetation of the bioregion;
- establish data storage and manipulation systems;
- collate available resource information;
- analyse available data;
- examine the possibility of producing a broad (1:100 000) vegetation map (woody layer only) of the bioregion that is suitably robust to provide useable data about plant communities at the bioregional level;
- prepare such a map, if possible. If not possible, to determine what level of information is available to provide a qualitative description of all known plant communities within the bioregion including their current and pre-clearing extent, conservation status and known threats;
- undertake a preliminary interpretation of the map and survey results prepared, including a full description of each recognised and mapped plant community including floristics, structure, likely habitat value, as well as its relative current and pre-clearing distribution and area; and
- liaison with key agency staff.

Stage 1 of the project achieved the first four objectives. The remaining objectives will be completed in Stage 2.

1.3 PROJECT AREA

The NSW portion of the bioregion constitutes approximately 6.5% of the State, and approximately 18.7% of the total bioregion. It is approximately 52 409 sq km in area.

For the purposes of this project, a 50km buffer zone has been added to the NSW portion of the bioregion. Bioregional boundaries are interim (Thackway and Cresswell, 1995), and indistinct. The buffer aims to include subtle changes in vegetation which extend outside the bioregional boundary (refer to Figure 1). Analyses have only been done on vegetation within the bioregional boundary. Appendix A (Map 2) shows the National Park and State Forest tenure across the bioregion.

Figure 1 - Location of Brigalow Belt South bioregion (NSW portion) with a 50km buffer zone

2. METHODS

2.1 DATA COLLATION

Vegetation data is important for effective development and implementation of policies and initiatives relating to a broad range of issues such as biodiversity conservation, threatened species protection, and sustainable forest management (Confinas et. al.,1999). The purpose of collating vegetation data for this project was to determine two main things:

1. the distribution and types of vegetation communities occurring across the bioregion and their conservation status; and
2. the distribution of ironbark and native cypress pine communities across the bioregion. These two communities are sought after commercially by private landholders and the timber industry for a range of purposes. Little is known of their status, particularly on private land.

Key data providers such as regional offices of the Department of Land and Water Conservation (DLWC), research organisations, individuals or Shire councils and NSW State Forests (NSW SF) were identified, and were contacted primarily using telephone or email. More obscure and incomplete data sources will be researched in Stage 2 of the project.

Inter-agency data sourcing protocols and licensing agreements were initiated to manage data transfer effectively. The GIS Division of the NSW National Parks and Wildlife Service, Head Office, facilitated access to and transfer of information between agencies. At the end of the project, a list of all datasets acquired will be provided to the NPWS GIS Division for its records.

Table 1 (see Appendix B) lists the key digital datasets obtained from the process of collation, and information relevant to each dataset. More work, particularly in the areas of currency and the origin of data, is needed to complete these sections of the table.

2.1.1 Key Contacts

Staff from various agencies and other individuals have provided assistance and advice in the collation of data for this project. Their help has been greatly appreciated, particularly in delivering data within short times.

The primary sources of data were NSW State Forests, the Department of Land and Water Conservation, and the NSW National Parks and Wildlife Service (refer Appendix B). Further investigation on potential sources of data or contacts will be carried out in Stage 2. Refer to Table 2 (Appendix C) for a full list of key contacts.

2.2 AVAILABLE DATASETS

There was considerable variation in the scales used in the datasets collected. The scales ranged from 1:25 000 to 1:100 000. There was also variation in the level of detail in vegetation information recorded.

From a bioregional perspective, the Murray Darling Basin Project M305 (M305) is the most useful dataset from which to draw conclusions about distribution of vegetation and communities, particularly ironbark. It is a digital dataset interpreted from Landsat TM imagery. It contains three layers, two of which are useful for this project. They are the woody/non-woody layer and the structural vegetation layer. The major deficiencies of the dataset are:

- the inconsistent recording of vegetation classes within the study area;
- the structural vegetation layer has a smaller coverage than the woody/non-woody layer; and
- the methodology used in collecting woody/non-woody vegetation records only vegetation with a greater than 20% cover.

Of all the datasets collated however, it has the broadest coverage.

2.2.1 Quality

Datasets for which a formal quality assessment has been performed are the M305 and the Native Vegetation of the Northern Wheatbelt.

The standard for vegetation mapping for use in Comprehensive Regional Assessments is based on a floristic classification derived from quadrat samples. It is mapped from aerial photography at a scale of 1:25 000. There are no datasets covering the bioregion of this standard, so data quality has been assessed in terms of whether:

- the plant community description is based on a floristic classification;
- there is a structural classification such as Specht used (Groves, 1974);
- the community descriptions contain recognisable species names; and
- there were any of the species names from the list of important ironbark species

The important ironbark species within the bioregion are identified as (Doug Beckers pers. comm.):

Narrow-leaved ironbark *Eucalyptus crebra*
Blue-leaved ironbark *E. nubila*
Broad-leaved ironbark *E. fibrosa*
Silver-leaved ironbark *E. melanophloia*
Corky ironbark *E. beyeriana*
Red or mugga ironbark *E. sideroxylon*
Caley's ironbark *E. caleyi*

2.2.2 Coverage

The bioregional coverage of each dataset was calculated by overlaying the bioregional boundary with the area covered by each individual dataset and within the area of the bioregion . Coverage maps were produced for all datasets except for the Eastern Bushlands Database. These can be seen in Appendix D (Maps 3 – 18).

2.2.3 Limitations of Each Dataset

More work is needed to analyse fully the limitations of each dataset.

2.3 DATA STORAGE

All digital data have been collated and stored on the NSW NPWS server, and are held as ArcView shape files or ArcView grids.

Some data used in the data collation process were generic Land Information Centre (LIC) data. These data were processed under appropriate licensing conditions from LIC. These preliminary data will be provided to Resource and Conservation Division (RACD) for use in the regional assessment.

2.4 DATA ANALYSIS

Full analysis of the limitations of the existing datasets requires resources currently not available. Some general comments can be made about the datasets. They are:

- the scales at which data were collected vary between datasets;
- the quality of vegetation data collected varies considerably. Some datasets include plot-based data which provides a relatively higher level of scientific rigour in defining communities. Much of the vegetation mapping data that has been collected is based on imposed structural classification systems with some generalised floristic descriptors, which reduces the ability to quantitatively define communities;
- the currency of datasets varies; and
- there are inconsistencies in the typing of vegetation communities. This means that difficulties may arise when comparing communities typed from different surveys.

2.4.1 Native Vegetation Distribution – Current and pre 1750

Vegetation community descriptions for the bioregion were provided by Morgan and Terrey (1992). These descriptions provide a broad outline of the communities across the bioregion. They were not based on systematic quadrat surveys, and lack the level of detail that would normally be provided from quadrat surveys.

The Coonabarabran Shire dataset is the only available dataset that predicts the extent of vegetation pre 1750. It covers 14% of the bioregion and records vegetation at the community level.

The only dataset of existing vegetation covering a substantial percentage of the bioregion is the M305 woody/non-woody layer. These grid data were analysed to show current woody vegetation distribution across the bioregion by intersecting with tenure information. Grid cells in this dataset are 25 x 25m in size and therefore woody vegetation in blocks smaller than this are not captured.

For this data layer, woody vegetation was defined as:

- a crown cover density of greater than 20%, and
- a woody plant height of greater than 2m (Volframs and Wilkins, 1998).

The M305 woody/non-woody mapping layer has been used as the basis for defining where woody vegetation occurs. Woody vegetation in other datasets has been constrained to that defined as 'woody' in the M305 layer.

Plant communities were mapped by the M305 - Structural Vegetation Layer following the specifications set out in Ritman, 1995. This mapping covers the western two thirds of the bioregion and coincides with the remaining forested areas. This data layer contained plant name descriptors. These were used in the present study to analyse the distribution of ironbark and native cypress pine. This data layer does not map shrubland and grassland plant communities. It uses a very generalised classification of woody plant communities.

Further resources including field surveys, will be required to produce maps detailing the distribution of identified plant communities, and highly restricted plant communities such as the threatened Ooline *Cadellia pentastylis* community.

2.4.2 Ironbark

The first method devised to assist in determining the extent of ironbark across the bioregion was a combination of presence/absence data and floristic descriptors. The steps taken were as follows:

1. Records of ironbark species or communities containing ironbark were selected from each data set.
2. The above selections were saved as separate Arcview shape files.
3. Resulting ironbark shape files were merged into one theme containing multiple polygons.
4. This theme was dissolved into a single polygon representing the **presence of ironbark but not indicating density.**
5. The resulting shapefile was converted to grid.
6. This grid was intersected with the M305 woody/non-woody grid layer, ie the prediction of ironbark was cut to where the M305 indicated there was woody vegetation.
7. ERIC* clearing data was converted to grid. (***Note**: This data layer came from a DLWC project on the rates of clearing between 1995 and 1998 and was a consultancy to the Environmental Resource Information Company (ERIC), Canberra)
8. Result from Step 6 was intersected with resulting ERIC grid, as per Step 7, allowing for areas that have been cleared since the woody/non-woody data was collected.

An alternative method used the Murray Darling Basin Structural Vegetation Layer to identify all polygons that contained a reference to an ironbark “important species” in the field labelled “Descriptio”.

Plate 1 – Narrow-leaved Ironbark *Eucalyptus crebra*, Pilliga East, 1997
(Photo E. M. Date)

2.4.3 Native Cypress Pine

Native cypress pine was identified by using the Murray Darling Basin Structural Vegetation Layer to identify all polygons that contained a reference to cypress in the field labelled “Descriptio” (see Appendix G – Map 24 – Distribution of Cypress Communities).

The methods used to determine ironbark distribution will be used to determine cypress pine distribution in Stage 2 of the project.

Plate 2 - White Cypress Pine *Callitris glaucophylla*, Bulbodrey State Forest, 1999
(NSW NPWS Threatened Species Unit Library)

2.4.4 Other Dominant Vegetation

The methods used to determine ironbark distribution will be used to determine the distribution of other dominant vegetation communities in Stage 2 of the project.

2.4.5 Endangered Ecological Communities and Regionally Significant Communities

Endangered Ecological Communities

Three plant communities occurring within the bioregion have been listed under the *Threatened Species Conservation Act 1995.* These are:

1. Ooline or Scrub Myrtle *Cadellia pentastylis*
2. Carbeen or Morton Bay Ash *Corymbia tessellaris*, and
3. Semi-evergreen vine thickets.

Regionally Significant Communities

Benson (1999) lists Brigalow, Box woodlands and *Austrostipa* grasslands as being the most threatened plant communities in this bioregion. Additionally, a list of plant

communities of possible conservation concern has been compiled by regional experts. It is outlined below.

Table 3 - Plant Communities of Possible Conservation Concern

Plant Communities of Possible Conservation Concern	Brief Reason for Concern
Myall *Acacia pendula*	Heavily cleared, grazed, inadequate reservation
Brigalow *A. harpophylla*	Heavily cleared, grazed, not well represented in existing reserves
River Red Gum *Eucalyptus camaldulensis*	Heavily cleared, grazed, logged, not well represented in existing reserves
Blue-leaved Ironbark *E. nubila*	Inadequate reservation
Mugga Ironbark *E. sideroxylon*	Regent Honeyeater habitat, logged
Mallee *Eucalyptus* spp.	Eastern edge of range
Blakely's Red Gum *E. blakelyi*	Inadequate reservation
Broombush *Melaleuca uncinata*	Pilliga mouse habitat, restricted, harvested, not well represented in existing reserves
Themeda Grasslands *Themeda* spp.	Heavily grazed and cropped, not well represented in existing reserves
Baradine Red Gum *E. chloroclada*	Isolated populations, not well represented in existing reserves
Broad-leaved Ironbark *E. fibrosa*	Not well represented in existing reserves
Narrow-leaved Ironbark *E. crebra*	Not well represented in existing reserves

Plate 3 – Example of mallee clearing – only fragments of Mallee are left in the bioregion.
(Photo J Smith, NSW NPWS Natural Heritage Unit Library)

The methods used to determine ironbark distribution will be used to determine the distribution of the plant communities of possible conservation concern and regionally significant communities in Stage 2 of the project.

3. RESULTS

3.1 GENERAL VEGETATION COMMUNITY DESCRIPTIONS AND THEIR DISTRIBUTION

The vegetation of the bioregion is described by Thackway & Cresswell (1995) as eucalyptus woodlands and open forests of ironbark, poplar box, Spotted Gum (*Eucalyptus maculata*), White Cypress Pine (*Callitris glaucophylla*), bloodwoods, brigalow-belah (*Acacia harpophylla, Casuarina cristata*) and semi-evergreen vine thickets. Benson (1999) describes the vegetation of the Brigalow Belt South in NSW as being mainly grassy woodland dominated by White Box (*E. albens*), Bimble Box (*E. populnea*) and Pilliga Box (*E. pilligaensis*) with several species of ironbarks. White Cypress Pine and White Box mix with microphyll vine thickets on basalt rises. Woodlands or more dense thickets are comprised of Belah, Bulloak (*Allocasuarina leuhmannii*) and Brigalow. It was estimated in 1984 that only about 5 000 of the original 250 000 hectares of Brigalow remain (Pulsford, 1984). Subsequent clearing has reduced this area even further.

Detailed descriptions do not exist for all the major plant communities and plant alliances within the bioregion in NSW. The province descriptions by Morgan and Terrey (1992) provide the most complete coverage of the range of plant communities for the entire bioregion, but these are limited to one or two sentences listing the main species associated with each soil and landform type. Given that these are the only descriptions which systematically cover the whole area they are outlined below. While these communities are not mapped at all, they can be readily located in the landscape by identifying the portions of the land profile in which they occur.

Plant communities listed by Morgan & Terrey (1992) are (provinces indicated in brackets):

1. **Poplar Box woodland** with:

   (i) White Cypress Pine, Wilga and Budda on brighter red loam soils (1);
   (ii) Belah and Brigalow on lower darker red loam soils (1, 5);
   (iii) White Cypress Pine and Silver-leaf Ironbark on inner Gwydir fan (1);
   (iv) occasional Belah and Wilga in the north and Yellow Box in the south on finer alluvial soils (2);
   (v) White Cypress Pine and Bulloak (3);
   (vi) White Cypress Pine, Blakely's Red Gum, Pilliga Box and Mugga Ironbark (3).

2. **Plains Grass grassland** with:

   (i) Myall woodland and occasional Whitewood and Belah on high alluvial plains (1);
   (ii) Bluegrass, Panics and occasional White Box and Wilga, and Hill

Red Gum on steeper areas (2);
(iii) Windmill Grass and Panic with scattered Poplar Box (2).

3. **Belah woodland and open forest (2, 4) with Budda and occasional Whitewood and Wilga on low alluvial plains** (1).
4. **River Cooba on lower areas** (1).
5. **River Red Gum on lower areas and channels** (5, 7) with:

   (i) Coolibah (1, 3);
   (ii) River Oak (2, 6, 7);
   (iii) Belah, Myall or Poplar Box on alluvial flats (5).

6. **Lignum on low alluvials** (1).
7. **Open forests or woodlands of White box** with:

   (i) White Cypress Pine and occasional Rough Barked Apple, Blakely's Red Gum, Whitewood, Wilga and/or Kurrajong (2, 4, 6, 7);
   (ii) Yellow Box on coarse alluvials (2);
   (iii) Silver-leaf Ironbark and Fuzzy Box (3);
   (iv) occasional Rough-Barked Apple on northern slopes and footslopes of the Liverpool Range (4);
   (v) Yellow Box and Blakely's Red Gum on southern slopes and footslopes of the Liverpool Range (4);
   (vi) Silver-leaf Ironbark, Whitewood and Bulloak (5).

8. **Hill Red Gum open forest** (2).
9. **Yellow box open forest** with:

   (i) occasional Grey Box and Kurrajong (2);
   (ii) Blakely's Red Gum (4).

10. **Open forest or fringing communities** containing mixtures of Brigalow, Yarran, Budda, Wilga, Whitewood, Myall, Beefwood, Rosewood, Quinine Bush or Belah (3, 4, 5, 6).
11. **Tall open forest of Silver-topped Stringybark, Manna Gum, Mountain Gum and some Snow Gum** on the plateau of the Liverpool Range (4).
12. **Tallow Wood, Blackbutt, Bluegum** on the eastern slopes of the Liverpool Range (4).
13. **Vineforest with Socketwood and Lillypilly** (4).
14. **Open forest of Silver-leaf Ironbark with White Cypress Pine** on rocky areas (5).
15. **Scrubby open forest of Rusty Gum, White Cypress Pine and Blakely's Red Gum** on mid-slopes (5).
16. **Moreton Bay Ash, Poplar Box, Wilga, Rough Barked Apple, Bulloak** and occasional Whitewood on lower slopes (5).
17. **Pilliga Box woodlands with:**

   (i) Poplar Box and Grey Box and Bulloak and Rosewood in the understorey (6);
   (ii) Yellow Box and Blakely's Red Gum (6);

(iii) Rough Barked Apple on sandy alluvials, easterly aspect (6);
(iv) Bulloak, Rosewood and Wilga (6).

18. **Woodlands and open forests of Narrow-leafed Ironbark and White Cypress Pine** with:

    (i) Blue-leaf Ironbark, Hill Red Gum and occasional Black Cypress Pine, White Bloodwood and White Gum; Mugga Ironbark and Red Stringybark may also occur (6);
    (ii) Hill Red Gum, Black Cypress and occasional White Gum on rugged acid volcanics (6);
    (iii) occasional Bulloak on lower areas (7).

19. **Blue-leaf Ironbark, Hill Red Gum, Brown Bloodwood, White Gum and Black Cypress with a shrubby understorey on rocky areas** (7).
20. **Mallee** (Congoo and Green) (6).
21. **Grey Box woodlands with Fuzzy Box, Yellow Box and Rough-barked Apple** on smaller tributaries (7).

Table 4 provides the common and scientific names for the plant communities detailed in Morgan and Terrey.

Table 4 - Plant Community Common and Scientific Species Names

Common Name	Scientific Name
White Cypress Pine	*Callitris glaucophylla*
Wilga	*Geijera parviflora*
Budda	*Eremophila mitchellii*
Belah	*Casuarina cristata*
Brigalow	*Acacia harpophylla*
Silver-leaf Ironbark	*Eucalyptus melanophloia*
Yellow Box	*E. melliodora*
Bulloak	*Allocasuarina luehmannii*
Blakely's Red Gum	*E. blakelyi*
Pilliga Box	*E. pilligaensis*
Mugga Ironbark	*E. sideroxylon*
Myall	*Acacia pendula*
Whitewood	*Atalaya hemiglauca*
Bluegrass	*Dichanthium spp.*
Panic	*Panicum spp.*
White Box	*E. albens*
Hill Red Gum	*E. dealbata*
Windmill Grass	*Chloris truncata*
Poplar Box	*E. populnea*
River Cooba	*Acacia stenophylla*
River Red Gum	*E. camaldulensis*
Coolibah	*E. coolabah*
River Oak	*Casuarina cunninghamiana*

Lignum	*Muehlenbeckia spp.*
Rough Barked Apple	*Angophora floribunda*
Kurrajong	*Brachychiton populneus*
Fuzzy Box	*E. conica*
Grey Box	*E. moluccana or E. microcarpa*
Yarran	*Acacia homalophylla*
Beefwood	*Grevillea striata*
Rosewood	*Alectryon oleifolius*
Quinine Bush	*Alstonia constricta*
Silver-topped Stringybark	*E. laevopinea*
Manna Gum	*Eucalyptus viminalis*
Mountain Gum	*E. dalrympleana*
Snow Gum	*E. pauciflora*
Tallow Wood	*E. microcorys*
Blackbutt	*E. pilularis*
Bluegum	*E. deanei*
Socketwood	*Daphnandra sp.*
Lillypilly	*Acmena smithii*
Rusty Gum	*Angophora costata*
Moreton Bay Ash	*E. tessallaris*
Narrow-leaf Ironbark	*E. crebra*
Blue-leaf Ironbark	*E. nubila*
Black Cypress Pine	*Callitris endlicheri*
White Bloodwood	*E. trachyphloia*
White Gum	*E. elliptica or E. dunnii*
Red Stringybark	*E. macrorhyncha or E. cannonii*
Brown Bloodwood	*E. gummifera (?)*
Congoo Mallee	*E. dumosa*
Green Mallee	*E. viridis*

While these descriptions provide a useful indication of some of the diversity of plant communities across the bioregion, they are inadequate. They do not include any information about the composition of the understorey or groundcover, and no systematic analysis of the variation in structure of the community. Both these factors are of critical importance when assessing the conservation value of the community and its value as habitat for wildlife. Their accuracy is also in need of assessment.

Brigalow communities in New South Wales and detailed descriptions of the soil landscapes of the bioregion have been detailed in the Bioregional Overview report.

3.2 AVAILABLE DATASETS

3.2.1 Quality

For the purposes of this project, a system was devised which enabled quick evaluation of the quality or value of each dataset. A “high value” dataset is one in which floristic and structural, and community description data have been collected and for which spatial data exist. Table 5 provides the above evaluation information

and also includes a column on “Ironbark” that identifies whether a dataset records ironbark at the common name level. The last column, “Important Ironbark Species”, identifies whether the dataset records ironbarks to species level, that have potential for use in production of charcoal due to their low ash content. Table 5 also shows the percentage of coverage for each dataset.

The number of ticks for any one dataset provides some indication of its usefulness in the bioregional assessment of vegetation.

Datasets such as the Eastern Bushlands Database and DLWC Hunter Region Vegetation Mapping provide minimal species information and no information relevant to this project. These datasets have not been used in the analysis phase of this project.

Note – The table is complete as at 29/1/2000

Table 5 – Vegetation Components by Dataset

Dataset	% of BBS Covered by Dataset	Floristic Classifica -tion (Plot Data)	Structural Classification (eg Tall open forest)	Community Descriptions (eg E. fibrosa – E. crebra tall open forest)	Ironbark	Important Ironbark Species (low ash spp.)
Native Vegetation of the Northern Wheatbelt (Sivertsen)	6.19	✓	✓	✓	✓	✓
Towarri National Park Vegetation Community Profiles	0.06	✓	✓	✓	✓	✓
Goulburn River National Park and Munghorn Gap NR Vegetation Communities	0.09	✓	✓	✓	✓	✓
Weetalibah Nature Reserve	0.03	✓	✓	✓	✓	✓
Binnaway Nature Reserve	0.10	✓	✓	✓	✓	✓
Kirramingly Nature Reserve	0.04	✓	✓	✓		
Mt Kaputar National Park	0.11	✓	✓	✓	✓	✓
Pilliga Nature Reserve NPWS Mapping	5.73		✓	✓	✓	✓
AMG Zone 55 State Forest Typing	9.33		✓	✓	✓	✓
Murray Darling Basin Commission – Structural Vegetation Dataset (M305 Mapping)	66.62		✓	✓	✓	✓
Coolah Forest Types	0.25	✓	✓	✓		
Coonabarabran Shire Vegetation. (Whitehead)	14.33			✓	✓	✓
DLWC Barwon Region Vegetation Mapping	1.64		✓	✓		✓
DLWC Hunter Region Vegetation Mapping	0.72		✓			
Eastern Bushlands Database	NA		✓			

3.2.2 Coverage

Appendix D (Maps 3 – 18) displays coverage maps for datasets containing relevant information . A map displaying the total coverage of all relevant datasets is also provided in Appendix E, Map 19.

3.2.3 Limitations

A full analysis of the limitations of each dataset will be undertaken in Stage 2 of the project. A brief summary of these limitations include:

- the scales at which data were collected vary between datasets;
- the quality of vegetation data collected varies considerably. Some datasets include plot-based data which provides a relatively higher level of scientific rigour in defining communities. Much of the vegetation mapping data that has been collected is based on imposed structural classification systems with some generalised floristic descriptors, which reduces the ability to quantitatively define communities;
- the currency of datasets varies; and
- there are inconsistencies in the typing of vegetation communities. This means that difficulties may arise when comparing communities typed from different surveys.

3.3 BIOREGIONAL DATA LAYER

There has been limited survey of the flora of the bioregion, limited systematic and detailed classification of the plant communities, and no definition of ecosystems. Benson (1999) indicates that most of the vegetation types of the bioregion are poorly conserved and are threatened by further clearing and overgrazing.

Estimates were made, using the M305 woody vegetation layer, of the percentage of woody vegetation remaining across the bioregion according to land tenure, as outlined below. Note that the M305 coverage accounts for only 97.5% of the bioregion.

Table 6 - Percentage of Woody Vegetation Remaining Across Bioregion According to Land Tenure

NPWS Estate

- Covers 2.6% of the bioregion
- 85.6% of the estate within the bioregion is covered by woody vegetation, which is equivalent to 114 738 ha
- Of the total woody vegetation in the bioregion, 9.2% occurs in NPWS Estate

NSW State Forests

- Covers 11.2% of the bioregion
- 88% of State Forest within the bioregion is covered by woody vegetation, which is equivalent to 505 824 ha
- Of the total woody vegetation in the bioregion, 40.5% occurs in State Forest

Crown Lands

- Covers 1.4% of the bioregion
- 33% of Crown Lands within the bioregion is covered by woody vegetation, which is equivalent to 24 064 ha
- Of the total woody vegetation in the bioregion, 1.9% occurs on Crown Lands

Freehold Land

- Covers 84.7% of the bioregion
- 13.9% of Freehold Land within the bioregion is covered by woody vegetation, which is equivalent to 604 330 ha
- Of the total woody vegetation in the bioregion, 48.4% occurs on Freehold Land

Total Land

- Of the total bioregional area there is approximately 24%, or 1 248 956 ha, of woody vegetation remaining in the bioregion.

The dominant land tenure across the bioregion is freehold land (approximately 84%). Limited information is available about the status of the vegetation on this tenure. Freehold land has been cleared extensively across the bioregion, and continues to be.

Map 20 – The Murray Darling Basin Woody/Non-Woody Layer shows that the large contiguous blocks of forest remain only on the areas of Crown tenure. Freehold land has either been cleared or contains very fragmented vegetation.

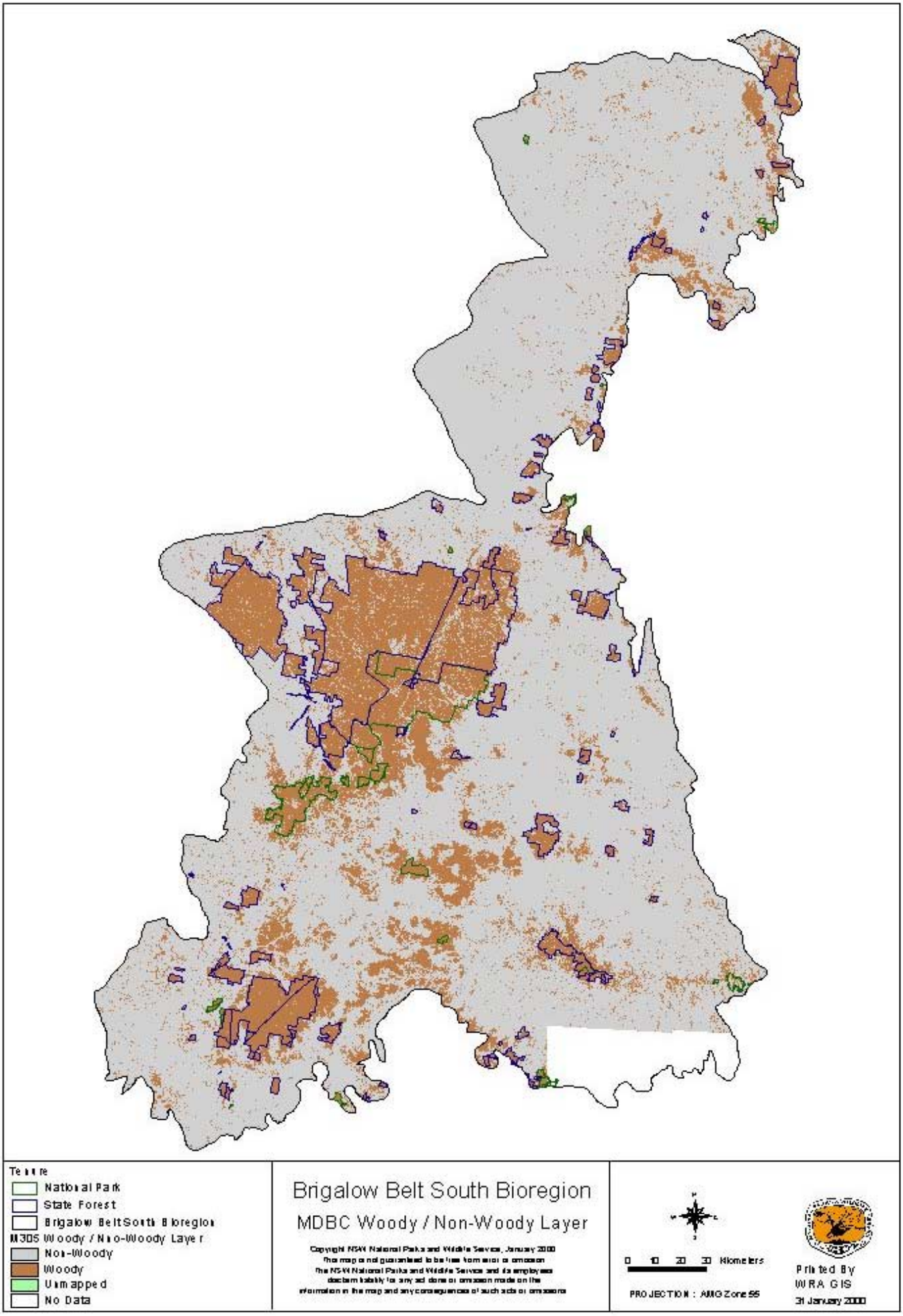
The only vegetation mapping available for the bioregion that indicates likely distribution of plant communities prior to clearing is the Coonabarabran Shire Vegetation dataset.

3.4 DISTRIBUTION OF IRONBARK

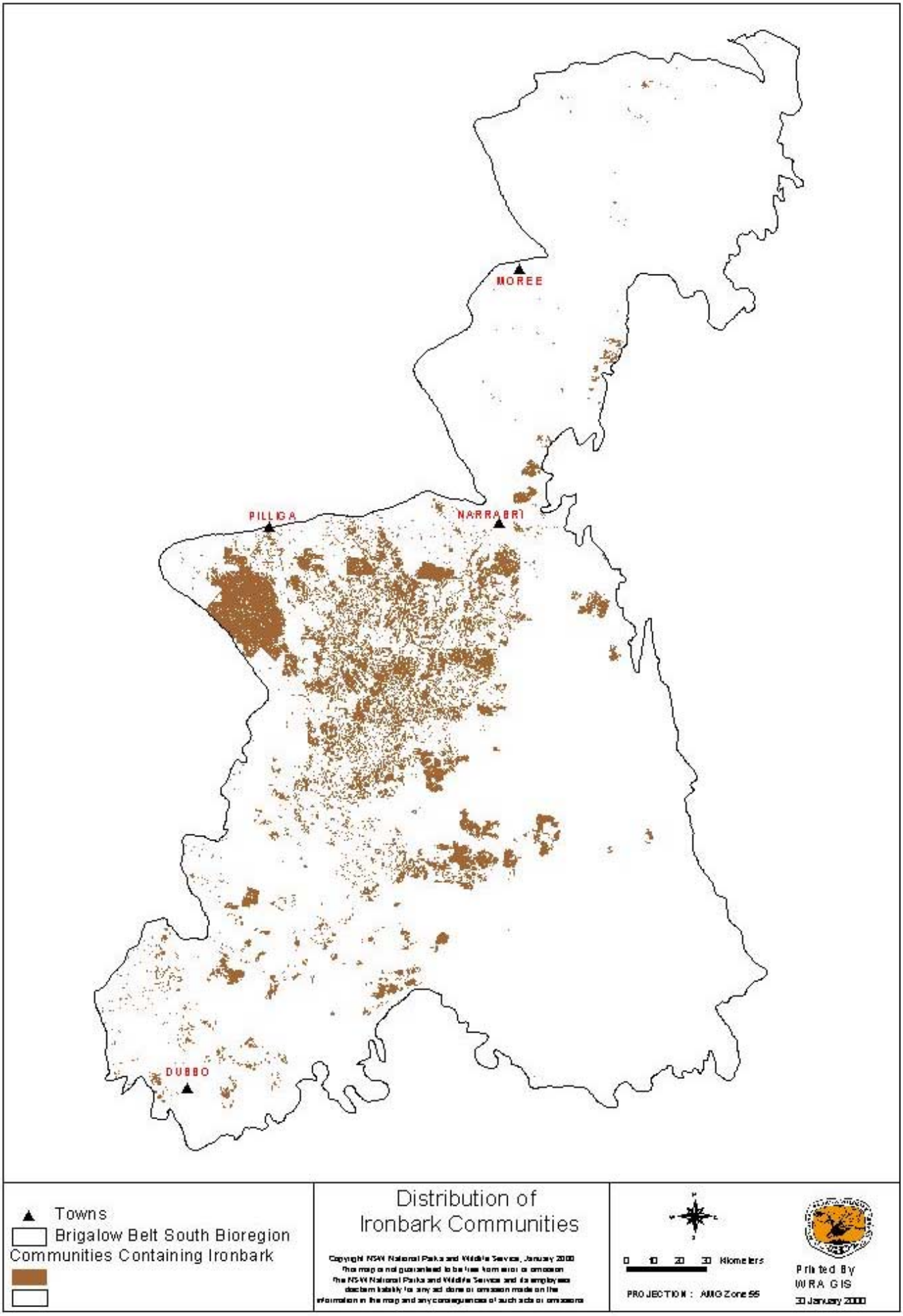
Results derived from the steps outlined in Section 2.4.2 - Data Analysis – Ironbark, indicate the most current records of the extent of areas that have some ironbark. Ironbark covers an area of 622 009 ha, with overlap calculated and removed. **This figure does not represent hectares of remaining ironbark, simply areas that are taken up by communities of which ironbark is a component**. The figure does not represent the density or condition of ironbark across the dataset (see Map 21 - Distribution of Ironbark Communities).

It was found that 412 166 ha of this ironbark present across the bioregion fell within National Park or State Forest tenure (representing approximately 66%). This figure is an underestimate, as Goonoo State Forest (63 252 ha) has not been typed (Beckers pers. comm.). Most of the ironbark within the bioregion is contained within existing Crown tenure, principally the Pilliga Nature Reserve and Pilliga and Goonoo State Forests. The presence of ironbark on freehold land is limited, and the condition of these remnants is largely unknown. It is likely that they are disturbed. Map 22 – shows that the distribution of ironbark outside of the National Park estate and State Forests is fragmented.

Map 20 – Brigalow Belt South bioregion Murray Darling Basin Commission (MDBC) Woody/Non-Woody Layer



Map 21 – Distribution of ironbark communities within the Brigalow Belt South bioregion.



Map 22 – Ironbark communities by tenure within the Brigalow Belt South bioregion.

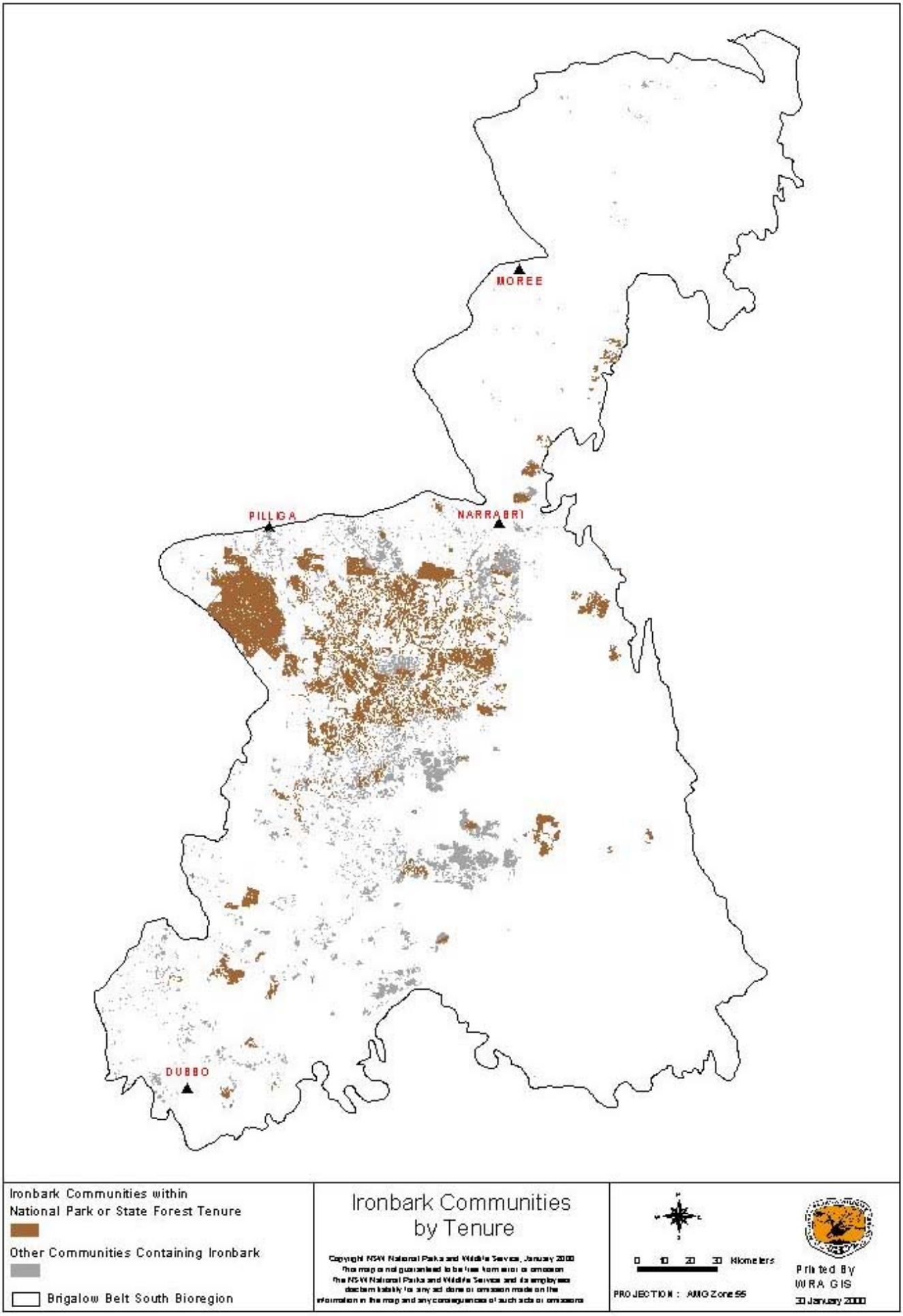


Plate 4 – Ironbark woodland (Eucalyptus fibrosa, Corymbia trachyphloia, Callitris endlicheri), Pilliga East, 1999
(Photo D. C. Paull)

Table 7 (Appendix F) provides a breakdown of the presence of ironbark within each dataset. The table below (Table 7.1) highlights the datasets of note within Appendix F. The Murray Darling Basin M305 Structural Vegetation Dataset represents the largest dataset across the bioregion from which information on ironbark can be extracted. It covers almost 67% of the bioregion. When using this dataset however, the following will be considered:

- it should only be utilised for conservation assessment and planning purposes in conjunction with ground truthing and appropriate ancillary datasets; and
- accuracy assessment of both the coding and linework of the dataset is yet to be done (Andrews and Flemons, 1997).

The Coonabarabran Shire dataset is the only dataset that represents a pre 1750 model of vegetation extent, and covers only 14.3% of the bioregion.

Table 7.1 – Presence of Ironbark Within Each Dataset.

	Column A	Column B	Column C	Column D	Column E
Dataset	**Total Hectares of Dataset Within BBS**	**% of BBS Covered by Dataset**	**Ironbark Presence within BBS (ha)**	**Ironbark Presence as % of Column A**	**No. of Polygons Containing Ironbark in BBS**
Murray Darling Basin Commission – Structural Vegetation Dataset (M305 Mapping)	3,494,576	66.62	484,039	13.85	1,429
Coonabarabran Shire Vegetation (Whitehead)	751,881	14.33	259,389	34.50	197

3.5 DISTRIBUTION OF NATIVE CYPRESS PINE

The M305 Structural Vegetation Layer shows that native cypress pine was identified in polygons covering 1 123 009 ha (or 32%) of the mapped part of the bioregion. This 32% will also include areas where ironbark occurs with other vegetation.

While the two species of native pine were distinguished in some cases, the mapping was not consistent across the region. This reduces the value of this data layer for mapping the distribution of these communities.

3.6 OTHER DOMINANT VEGETATION TYPES

To be completed when further resources available.

3.7 ENDANGERED ECOLOGICAL COMMUNITIES AND REGIONALLY SIGNIFICANT COMMUNITIES

1. The Ooline Endangered Ecological Community has been mapped but not digitised or ground-truthed.

Plate 5 - Mature tree of Ooline *Cadellia pentastylis*.

2. The Semi evergreen vine thicket Endangered Ecological Community has been located, but not mapped.
3. The Carbeen Endangered Ecological Community has been mapped together with Cypress Pine in a broader classification developed for the Wheatbelt mapping project. This mapping does not extend completely across the northern part of the bioregion where this community is found.

There has been no fine scale mapping that will allow the identification of regionally significant communities.

3.8 DISTURBANCE HISTORY

3.8.1 General Bioregional Overview

The bioregion is characterised by Brigalow *Acacia harpophylla* that forms forests and woodlands on clay soils within the bioregion. This community now covers only a small percentage of the bioregion and is considered vulnerable. The bioregion is comprised of a range of ecosystems that include Eucalypt forest and woodland, grassland, dry rainforest, cypress pine and also riparian communities.

Since the Second World War, the bioregion has become a significant agricultural and pastoral region (Sattler and Williams, eds. 1999). Much of the bioregion has been subject to rapid change through broadscale clearing, changing fire regimes and the introduction of exotic plant and animal species.

3.8.2 Disturbance Factors

Clearing

One of the most significant threats to biodiversity in NSW is the clearing of native vegetation, due mainly to continual urban development and agricultural intensification. Clearing results in the fragmentation of ecosystems and habitats and leads to decline in the condition and health of remaining native vegetation communities (NSW National Parks and Wildlife Service, 1999).

It is estimated that well over 80% of the extensive box-ironbark woodlands of the inland slopes of NSW have been cleared, and that statewide clearing is continuing at a conservative estimate of 150 000 ha per year (Environment Protection Authority, 1997).

In 1998 alone, the total area approved in NSW for clearing (with conditions) was 85 914 ha. In 1999, the total area approved for clearing with conditions was 69 315 ha (DLWC Media Release on the Internet, 1999). These figures include thinning operations and the removal of scattered trees in paddocks. Clearing of some grassland areas may not have been captured in these figures. In the past clearing was permitted under “grasslands plans”, plans designed to allow landholders to clear 85% of the grasslands on their properties without requiring consent. These plans have now expired. Illegal clearing is not covered by the above figures.

Box and ironbark woodlands of the slopes and tablelands in NSW are now one of the most significantly altered plant communities in New South Wales (Howling, 1997).

Redgum, ironbark and box species are a diminishing resource as they are targeted for firewood. These species are preferred for firewood as they are slow burning with most of the wood being sourced from private land. Ironbark is also considered a good resource for fencing, with many landholders selectively cutting these species from the remnant communities on their properties (Somerville pers. comm., January, 2000).

Clearing also continues to severely deplete the mallee, mulga and brigalow woodlands. With the exception of a number of large remnants in the north and west, clearing has reduced the natural vegetation cover to a large number of small and isolated remnants. Past logging has significantly altered the structure and condition of many of these remnants (Commonwealth of Australia, 1996).

The following table illustrates the changes in native woody vegetation cover due mostly to clearing within the region. It also shows the scale and rate at which this has happened to date. Within the areas listed in this table, the study shows a marked decline in vegetation cover for the period between the 1970s & 1990s (Environmental Protection Authority, 1997).

Table 8 - Changes in Woody Native Vegetation Cover, NSW Wheat Belt

Area	Biogeographic region	Area mapped	Total woody vegetation			Decrease in cover 1970s to 1990s
			1970s	1980s	1990s	
St George	Darling riverine plains, Brigalow belt south	347 369.ha	212 733.ha	105 433.ha	98 349.ha	53.8%
Goondiwindi	Darling riverine plains, Brigalow belt south	313 931.ha	186 703.ha	61 635.ha	57 735.ha	69.1%
Inverell	Brigalow belt south	235 573.ha	141 816.ha	21 623.ha	19 642.ha	86.1%

derived from Environmental Protection Authority (1997)

Recent clearing figures for the bioregion derived from NPWS clearing applications data, are outlined below:

Clearance figures from October 1995 – January 2000 (NPWS, unpublished)

77 applications received
14 402 ha in total applied for clearance
6 081 ha granted
5 055 ha awaiting determination

Map 23 – Granted Clearing Applications in the Bioregion between October 1995 and January 2000 displays the areas for which clearing applications have been granted.

Fragmentation

`Fragmented vegetation often occurs as single trees or small groups of mature or senescent trees. These stands typically have little, if any, of the original understorey

structure and species diversity, and may have little or no regeneration (Howling, 1997), although there may still be understory species present as a seed bank in some remnants.

Past clearing has restricted native vegetation cover to a large number of isolated or semi-isolated remnants on varying land tenures. Most clearing is concentrated in agricultural or urban areas. Clearance increases the pressures on remaining habitats and causes fragmentation of native vegetation communities. These fragments can occur in a variety of forms, of which two have been described by Howling (1997):

1. **clumped remnants** are patches of native vegetation that exist in a semi intact form, and
2. **scattered vegetation** refers to the small remnants of native systems which have been fragmented.

Plate 6 – Example of remnant vegetation on private property
(Photo Murphy, NSW NPWS Natural Heritage Unit library)

Many fragmented remnant vegetation patches are unable to provide sufficient habitat to ensure the survival of many plant and animal species. The small size of many remnants means that their sustainability is governed by external elements, such as exposure to weather, weed invasion, and feral animal invasion and possible concentration (Howling, 1997). Fragmentation may also reduce the capacity of remnants to recover from environmental catastrophes such as fire and drought.

Fire

Much of Australia's native flora and fauna has evolved with fire and requires suitable fire regimes for its continued survival. Howling (1997) suggests that with European settlement, the timing, frequency and intensity of fires has changed, particularly where fire was used by Aboriginal people.

Increases or decreases to fire frequency, and changes to the level of fire intensity can jeopardise the viability and survival of some native species, communities and ecosystems. This can also have a marked effect on vegetation structure and composition. Fire sensitive species can be lost from an area that is subjected to too frequent burning. High frequency fire has a preliminary determination as a key threatening process under the *Threatened Species Conservation Act, 1995*.

Although many ecosystems rely on fire to ensure their survival, and particular vegetation types may have adapted to certain types of fire regimes, inappropriate fire regimes can also promote the invasion of native vegetation by weeds. While many native species show a high degree of fire resilience and an ability to regenerate relatively quickly after a fire event, some weed species regenerate even more quickly or find the conditions more favourable than many native species.

Weed Competition

Human activity can facilitate the spread of weeds, as weeds generally exploit disturbance and thrive within heavily disturbed areas such as roadsides.

The Environment Protection Authority (1997) suggests that introduced animals such as rabbits, cattle, horses and goats create favourable environments for the establishment of weeds by changing the structure of ecosystems via soil disturbance, the loss of plant cover and soil compaction.

Human activity has also directly facilitated the establishment of weeds in the bioregion's remnant vegetation through deliberate and accidental introduction of seeds, and also through modification of remnant habitats to the benefit of introduced species. Serious infestations of weeds can have a detrimental effect on the natural diversity and ecological balance within remnant communities (Howling, 1997).

Some weed species of concern from an agricultural and environmental perspective are outlined below in Table 9.

Table 9 - Some Major Weeds of Concern

Common Name	Botanical Name
Parthenium weed	*Parthenium hysterophorus*
St John's wort	*Hypericum perforatum* var. *angustifolium*
Golden dodder	*Cuscutta spp.*
Serrated tussock	*Nasella trichotoma*
Willow	*Salix spp.*
Noogoora burr	*Xanthium occidentale*
Spiny burr grass	*Cenchrus incertus*
Coolatai grass	*Hypharrhenia hirta*

4. CONCLUSIONS

It is difficult to get a consistent representation of the overall dominance of community types due to the variability in how data is represented in some of the mapping. There is both internal variation in datasets and little consistency between datasets.

4.1 NATIVE VEGETATION REMAINING IN THE BIOREGION

- Approximately 24% of woody vegetation still exists in the bioregion and occurs mostly on Crown land. Of this 40.5% is State Forest.

- Only 2.6% of native vegetation is protected within conservation reserves.

- The Pilliga Nature Reserve and Pilliga and Goonoo State Forests contain a significant amount of the bioregion's remaining ironbark communities, and the communities considered to exhibit the best condition and health. These communities have been greatly modified by selective logging.

Clearing remains a key threat to the biological diversity across the bioregion. Again, little information is available about the remaining remnant vegetation communities on freehold land. These freehold remnants are a diminishing resource due to selective logging, firewood collection and extraction of timber for fencing materials. Many of these activities are presently exempt under the *Native Vegetation Conservation Act, 1999*.

- Serious flaws exist in the quality and quantity of data about vegetation for the bioregion. This includes information about dominant community types, and the amount and types of vegetation remaining in the bioregion.

- Existing vegetation mapping shows that vegetation outside larger reserves or State Forests is highly fragmented. This level of fragmentation would suggest that these communities are in moderate to poor condition.

- There is an urgent need for the vegetation of the eastern side of the bioregion to be mapped.

- Pre 1750 vegetation mapping has only been undertaken for the Coonabarabran Shire.

4.2 FLORISTIC AND STRUCTURAL DIVERSITY OF VEGETATION COMMUNITIES

- Comprehensive mapping of the vegetation in the bioregion is needed in order to determine the floristic and structural diversity of vegetation communities.

4.3 CONSERVATION MANAGEMENT

- Assessment of the condition of understorey and ground cover vegetation is needed in order for decisions to be made about conservation management. Existing data does not contain adequate information about understorey vegetation and grasslands.

Endangered Ecological Communities

- Information about Ooline communities needs to be digitised, and verified from recent aerial photos.

- Semi evergreen vine thickets need to be mapped onto aerial photos, ground truthed, and captured into GIS.

- There needs to be further quadrat data collected about Carbeen communities in the eastern part of the bioregion to determine the full extent of the community, particularly in State Forest.

- Information from the preliminary survey (Stage 1) suggests that previously unrecorded Endangered Ecological Communities are likely to exist. These need to be defined and mapped across the bioregion.

4.4 DATA GAPS

A range of gaps in data exist for this bioregion and they include:

- a lack of comprehensive, consistently collected and analysed data covering the bioregion.

- a particular lack of data about the eastern side of the bioregion to enable realistic bioregional assessment.

- a lack of data about remnant vegetation on private land. Mapping of remnant vegetation on private land and travelling stock routes is required to determine its extent, condition and floristic and structural composition. This is particularly important for species such as ironbark, considering the comments made by Somerville about use of ironbark by landholders for firewood and fencing.

- most vegetation data relating to the bioregion exists in datasets which do not complement each other. Datasets differed in the scale of mapping, and the level of information captured.

- within the M305 layer, communities of shrubland, grassland, wetland and heathland with less than 20% crown cover and less than 2m in height, need to be mapped.

- detailed mapping (1:25 000) of regionally significant communities and endangered ecological communities is required.

5. RECOMMENDATIONS

Stage 1 of the Preliminary Bioregional Vegetation Project found that the high levels of historical and recent clearing have left relatively little native vegetation in place. The report makes the following recommendations:

5.1 CONSERVATION

- that a full assessment of vegetation in the bioregion be undertaken to identify plant communities and to determine the status of those communities;

- Plant Community Profiles be prepared as part of stage 2 to assist land managers identify and manage each plant community;

- that a comprehensive, adequate and representative (CAR) reserve system be established in the bioregion;

- that plant communities be nominated for listing under the *Threatened Species Conservation Act, 1995* where appropriate;

- that regionally significant plant communities be identified and protected through regional vegetation management plans, and appropriate on-ground management is recommended.

Endangered Ecological Communities

Ooline

- that populations of Ooline be conserved in dedicated reserves where the NSW NPWS reserve acquisition program identifies this to be a priority;
- that joint management agreements be sought with local government, Rural Lands Protection Boards, and the NSW Roads and Traffic Authority aiming to protect roadside remnants; and
- that education programs be established by natural resource management agencies to encourage landholders to protect unreserved Ooline communities, where possible using Voluntary Conservation Agreements.

Funding has been set aside for the development of a Recovery Plan for Ooline.

Semi-evergreen vine thickets

- that these communities be mapped and the results digitised; and

- that these communities be protected from disturbance factors such as clearing, logging, grazing and mining/quarrying by using initiatives such as joint management agreements, education programs and Voluntary Conservation Agreements.

Carbeen

- that quadrat data be collected for these communities, particularly in the eastern part of the bioregion; and
- that these communities be protected from disturbance factors such as clearing, logging, grazing and mining using initiatives such as joint management agreements, education programs and Voluntary Conservation Agreements.

5.2 FURTHER ASSESSMENT

- that data analysis and the description of vegetation communities and their distribution and conservation status across the bioregion be carried out; and

- that data collation be completed to ensure that currency and lineage of datasets is correctly determined.

5.3 BIOREGIONAL VEGETATION MAPPING AT 1:100 000 SCALE

- that a bioregional map at 1:100 000 scale be produced, covering all land tenure, and using agreed statewide standards. Priorities for regional vegetation mapping are:

    1. floristic classification of regional plant communities, based on quadrat-based sampling; and
    2. mapping of the eastern portion at 1:100 000 scale using a structural and floristic method. Grassland and shrubland are to be included.

5.4 REMNANT VEGETATION MAPPING

- that a map of remnant vegetation be created indicating extent, health and condition of remnants particularly on freehold land. This is required urgently.

5.5 UPGRADING OF SOME EXISTING DATASETS

- that a uniform classification of the plant communities of the bioregion be carried out using the methods of the Native Vegetation of the Northern Wheatbelt survey. Additional floristic quadrats across the bioregion are needed to complete this work.

5.6 CONDITION OF EXISTING VEGETATION

- that methods be developed to assess the condition of vegetation across the bioregion;

- that assessment of the condition of vegetation communities, including understorey, be carried out, particularly on freehold land; and

- that a map indicating the condition of vegetation communities be produced.

5.7 REVEGETATION AND RESTORATION

- that revegetation and restoration be carried out to protect existing remnants, maintain ecological processes and biodiversity, and link remnant areas and reserves.

- that revegetation and restoration planning aims to incorporate ecological, social and economic values.

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PRELIMINARY BIOREGIONAL VEGETATION PROJECT

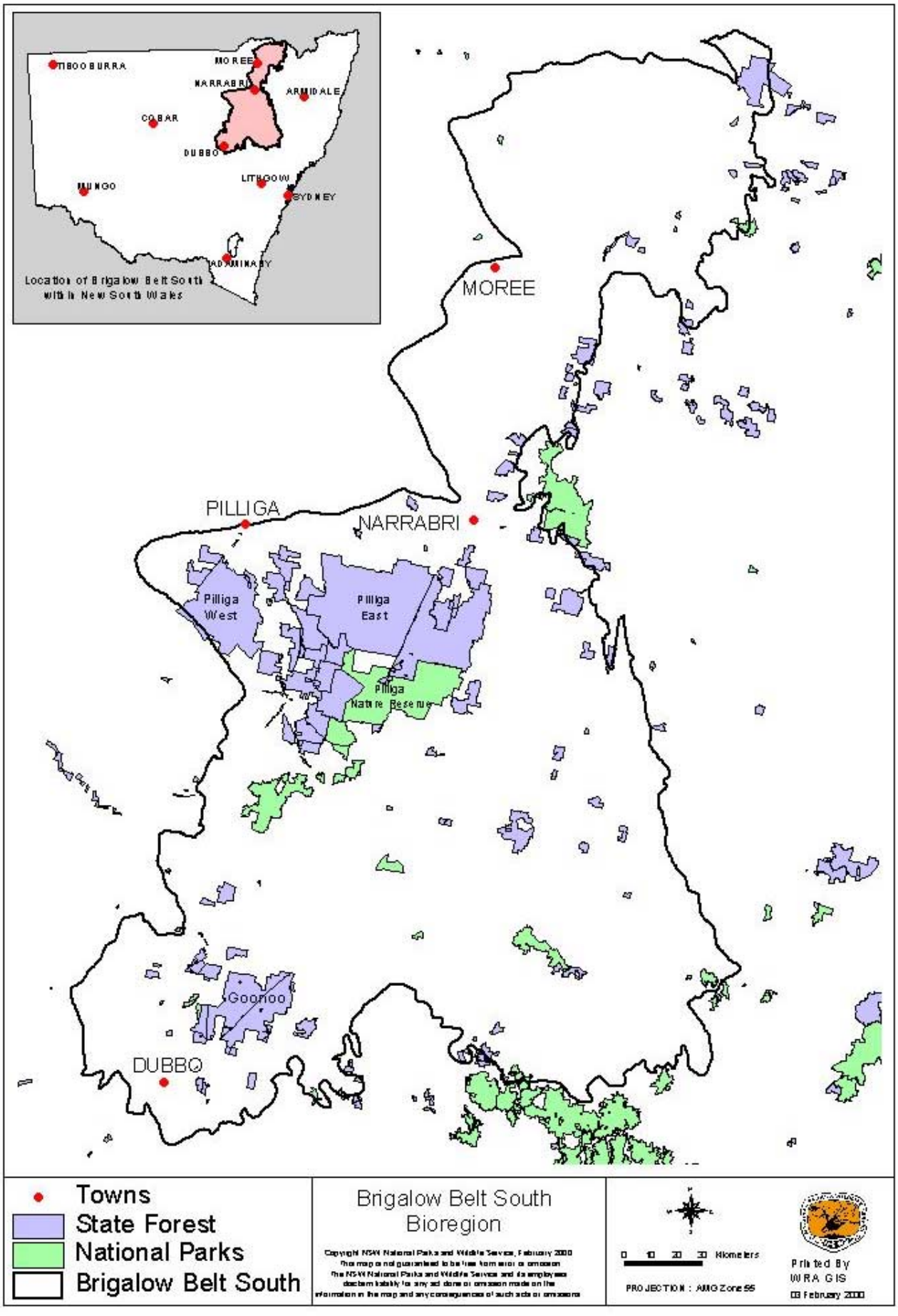
BRIGALOW BELT SOUTH

Western Regional Assessments (STAGE 1)

APPENDICES

Appendix A – Map 2 –
National Park and State Forest Tenure across Brigalow Belt South bioregion.

Map 2 – National Park and State Forest tenure



Appendix B

Table 1 - Available Vegetation Mapping Datasets – Brigalow Belt South (NSW portion)

**Note: table is complete as at January 2000

Dataset	Data Custodian	Form Data Supplied In	Currency and Lineage of Data *Date of Imagery(DOI): *Date of Mapping(DOM):	Scale of Mapping (available at)	Description of Data
Murray Darling Basin Commission – Structural Vegetation Dataset (M305 Mapping)	Murray Darling Basin Commission	LAN	Landsat Imagery/Ground Survey DOI:1990s DOM:1990-1994	1: 100 000	Woody and Non-woody vegetation across the entire Murray Darling Basin. Structural vegetation data including type, density, growth form.
Coonabarabran Shire Vegetation (Whitehead)	John Whitehead	LAN	Aerial photos Field survey Based on RN17(Research Notes No 17 revised 1989)and M305 mapping classifications DOI: 1994&1997 DOM:1998-2000	1: 50 000 Transects in 100 m sections	Vegetation Community name (eg White Cypress Ironbark) associations (eg Bloodwood, Stringybark, Red Gum, Oak) and Locations (eg sandy and Rocky Ridges).
State Forest Vegetation Mapping					
Coolah Forest Types	SF	Email			Forest typing (eg swamp, mountain/manna gum).
Coolah Logging History		Email			SF name and number and if logged, the year in which logged.

Dataset	Data Custodian	Form Data Supplied In	Currency and Lineage of Data *Date of Imagery(DOI): *Date of Mapping(DOM):	Scale of Mapping (available at)	Description of Data
AMG Zone 55 State Forest Typing: Baradine Beni Bibblewindi Biddon Breelong Breeza Campbell Coomore Creek Courallie Cubbo Culgoora Cumbil Denobollie Doona Drillwarrina Etoo Euligal Eumungerie Eura Garrawilla Goonoo Goran Irrigappa Jacks Creek Kerringle Killarney Leard Lincoln Merriwindi Minnon Mission Moema Mogriguy Montrose Orr Pilliga East Pilliga West Plagyan Quegobla Ruttley Spring Ridge Terry Hie Hie Timmallallie Trinkey Vickery Warung Waubebunga Wittenbra Yalcogrin Yaminba Yarindury Yarrigan Yearinan **NSW NPWS Vegetation Mapping**	NPWS	Email	Aerial Photos, Lindsay types;(report compiled in 1961 by A.D. Lindsay) RN17 (Research Notes No. 17 revised 1989) estimated completion by 1996.	RN17, 1: 25 000 Lindsay Types.	Type (eg: Be;Belah), Vegetation League (eg Western Box-Ironbark league) Description (Bimble Box-White Cypress Pine).
Eastern Bushlands Database	NPWS	LAN	Landsat Imagery	1: 250 000 1: 100 000	Broad vegetation systems for the eastern coast, ranges and tablelands.

Dataset	Data Custodian	Form Data Supplied In	Currency and Lineage of Data *Date of Imagery(DOI): *Date of Mapping(DOM):	Scale of Mapping (available at)	Description of Data
Native Vegetation of the Northern Wheatbelt (Sivertsen)	NPWS	LAN	Aerial Photos, Satellite imagery ,DOI: 1970s, 1980s 1990s DOM: 1970s – 1990s.	1: 50 000 (1970s/80s mapping)	Vegetation names and communities (eg Western Poplar Box Woodlands, with a map code of P4 West out of series 5).
Towarri Vegetation Community. Profiles	NPWS	Email	Aerial Photos DOI: 1994 Limited Ground Truthing	1: 25 000	Vegetation labels (eg OF1 = Open Forest 1).
Manobalai NR Vegetation Communities.	NPWS	CD	Aerial Photos DOI: 1993 Limited Ground Truthing DOM:	1: 25 000	Vegetation community name (eg Narrabeen Sheltered Dry Forest) with label (eg Q6) and fire regime.
Wollemi NP Vegetation Communities.	NPWS	CD	Aerial Photos, DOI: DOM: 1993	1: 25 000 1: 250 000	Community name (eg Upper Cudgegong Alluvial Reedland) with code (eg RL1) and fire regime.
Goulburn River NP Vegetation Communities.	NPWS	CD	Aerial Photographs Ground Survey DOI: 1992 &1993 DOM:1998/1999	1: 25 000	Vegetation community name (eg Box Woodland on Basalt) with code (eg WL2), fire community name (eg Basalt Woodland and Herbfield) and fire regime.
Munghorn Gap NR Vegetation Communities.	NPWS	CD	Aerial Photographs Ground Survey DOI: 1992 &1993 DOM:1998/1999	1: 25 000	Vegetation community name (eg Box Woodland on Basalt) with code (eg WL2), fire community name (eg Basalt Woodland and Herbfield) and fire regime.
Weetalibah Nature Reserve	NPWS	LAN	Field Survey, Aerial Photos. Data collected continuously since 1985	1: 50 000 1: 25 000- 1: 100 000	Label/Vegetation community(eg Red stringybark with Narrow-leaved Ironbark and Black Cypress, with an attribute of 3)
Binnaway Nature Reserve	NPWS	LAN	Field Survey, Aerial Photos. Data collected continuously since 1985	1: 50 000 1: 25 000- 1: 100 000	Label/vegetation community (eg E.sideroxylon, with an attribute label of 5).
Kirramingly Nature Reserve	NPWS	LAN	Field Survey, Aerial Photos. Data collected continuously since 1985	1: 10 000 1: 25 000- 1: 100 000	Broad classification of vegetation types (eg Astrebla Mixed grassland with an attribute label of 44). Also cultivation and land use classifications.
Goobang National Park	NPWS	LAN	Field Survey, Aerial Photos. Data collected continuously since 1985	1: 50 000 1: 25 000- 1: 100 000	Vegetation Community (eg E.fibrosa with an attribute of 6/3b).
Mt Kaputar National Park	NPWS	LAN	Field Survey, Aerial Photos. Data collected continuously since 1985	1: 25 000 1: 100 000	Label/Vegetation community (eg. Narrow-leaved Ironbark. Cypress & Accac with an attribute label of 9.
Pilliga Nature Reserve NPWS Mapping	NPWS	LAN	Field Survey, Aerial Photos. Data collected continuously since 1985	1: 25 000- 1: 100 000	Label/Vegetation community name (eg Ironbark complex, with an attribute of 1).

Dataset	Data Custodian	Form Data Supplied In	Currency and Lineage of Data *Date of Imagery(DOI): *Date of Mapping(DOM):	Scale of Mapping (available at)	Description of Data
DLWC Barwon Region Vegetation Mapping					
Bunna Bunna Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and ending date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof).	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.
Burren Junction Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and ending date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof).	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.
Caloona Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and ending date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof)	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.
Comeby Chance Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and ending date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof)	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.
Gradule Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and end date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof)	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.
Gwabegar Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and end date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof)	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.

Dataset	Data Custodian	Form Data Supplied In	Currency and Lineage of Data *Date of Imagery(DOI): *Date of Mapping(DOM):	Scale of Mapping (available at)	Description of Data
Pilliga Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and end date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof)	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.
Rowena Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and end date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof)	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.
Telleraga Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and end date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof)	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.
Walgett Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and end date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof)	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.
Wee Waa Vegetation Mapping Data	DLWC	Email	Aerial Photographs, Satellite Imagery, Ground Survey DOI: DOM: (Data currency-1998/1999, beginning and end date)	Area of Walgett Shire East of the Barwon River covered by 1: 50 000 topographic mapsheets (or part thereof)	North west Vegetation Communities with species associations (eg Narrow-leaved Ironbark with a code of E37 and the botanical name *E. crebra*.). Also associated landcover and landuse descriptors.
DLWC Hunter Region Vegetation Mapping					
Elderslie Vegetation Mapping Data	DLWC	CD	Aerial Photos, field checking DOM: Mapping completed since 1994	1: 25 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.

Dataset	Data Custodian	Form Data Supplied In	Currency and Lineage of Data *Date of Imagery(DOI): *Date of Mapping(DOM):	Scale of Mapping (available at)	Description of Data
Ingar Vegetation Mapping Data	DLWC	CD	Aerial Photos, field checking DOM: Mapping completed since 1994	1: 25 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.
Camberwell Vegetation Mapping Data	DLWC	CD	Aerial Photos with reconnaissance ground truthing DOI: (source information) 1993 DOM:	1: 25 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.
Rouchel Brook Vegetation Mapping Data	DLWC	CD	Aerial Photos, field checking. DOM: Mapping completed since 1994	1: 25 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.
Glenrock Vegetation Mapping Data	DLWC	CD	Aerial Photos, field checking. DOM: Mapping completed since 1994	1: 25 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.
Isis River Vegetation Mapping Data	DLWC	CD	Aerial Photos, field Checking. DOM: Mapping completed since 1994	1: 25 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.
Muswellbrook Vegetation Mapping Data	DLWC	CD	Aerial Photos, with reconnaissance ground truthing DOI: (source information) 1993 DOM:	1: 25 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.
Jerrys Plains Vegetation Mapping Data	DLWC	CD	Aerial Photos, field checking. DOM: Mapping completed since 1994	1: 25 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.
Towarri Vegetation Mapping Data	DLWC	CD	Aerial Photos, field checking. DOM: Mapping completed since 1994	1: 25 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.
Kars Springs Vegetation Mapping Data	DLWC	CD	Aerial Photos, field checking. DOM: Mapping completed since 1994	1:25 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.

Dataset	Data Custodian	Form Data Supplied In	Currency and Lineage of Data *Date of Imagery(DOI): *Date of Mapping(DOM):	Scale of Mapping (available at)	Description of Data
Singleton Vegetation Mapping Data	DLWC	CD	Landsat DOI: 1992 DOM:	1: 25 000 1: 100 000	Vegetation Communities (eg code-01, tree and shrub community-dry sclerophyll forest.), including regrowth and understory. Also descriptors of landuse and terrain.

APPENDIX C

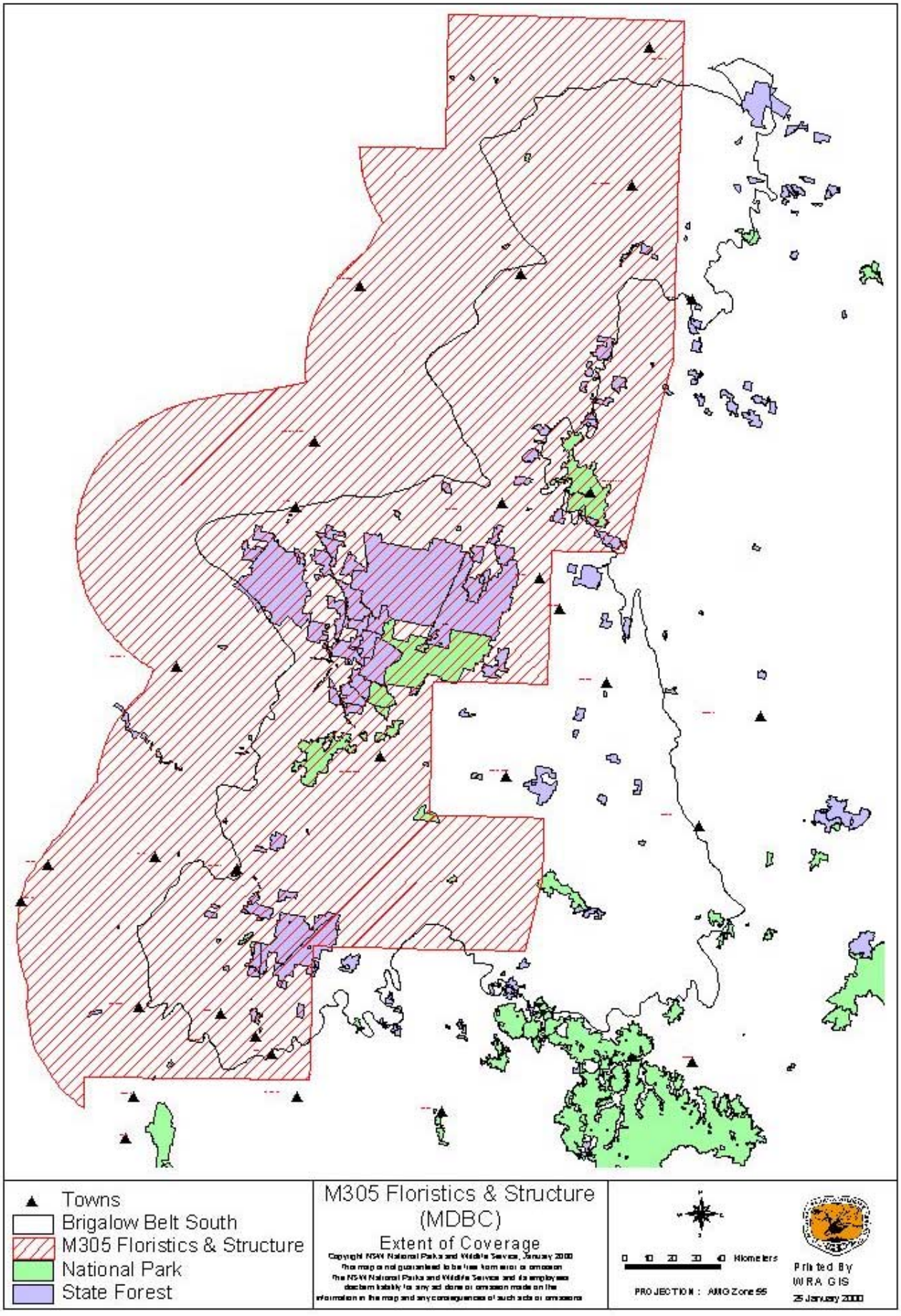
Table 2 - Key Contacts for Data Collation (as at January 2000)

Key Contact	Organisation	Information
Peter Hesp, Manager, GIS Division, CRA Unit	NSW NPWS	Managed inter-agency and intra-agency data acquisition, State Forest typing data
Steve Naven, GIS Officer, Western Directorate	NSW NPWS	Land Information Centre and Local Area Network data
Peter Lezaich, Resources Officer, Western Region, Dubbo	NSW State Forests	Hard copy forest typing maps, general information on available forest typing data for the bioregion
David Crust, Sub District Manager, Mudgee Sub District	NSW NPWS	Goulburn River National Park and Munghorn Gap Nature Reserve reports
Daniel Connolly, Manager, CRA Unit, Sydney Zone	NSW NPWS	Goulburn River National Park vegetation mapping data
Will Dorrington, Barwon Resource Information Unit, Gunnedah	DLWC	Vegetation mapping data for the Barwon Region
Simon McKee, GIS Coordinator, Resource Information Unit, Hunter Region	DLWC	Vegetation mapping data for the Hunter Region
Bev Morcombe, Acting Regional Information Manager, Central West Region	DLWC	Advice on availability of data for Central West region, other useful datasets or contacts
Rachel-Ann Robertson, Fire Technical Officer, Upper Hunter District	NSW NPWS	Vegetation mapping data for Coolah Tops National Park, Towarri National Park, Manobalai Nature Reserve, Goulburn River National Park, Munghorn Gap Nature Reserve,
Travis Peake, Remnant Vegetation Project Officer	Hunter Catchment Management Trust	Hunter Remnant Vegetation Project report
Alison Nowland, Environmental Coordinator	Rural Lands Protection Board	Advice on useful datasets or contacts
Dave Freckleton	Department of Agriculture	Location data for NSW Apiary Industry Flora Resource Database

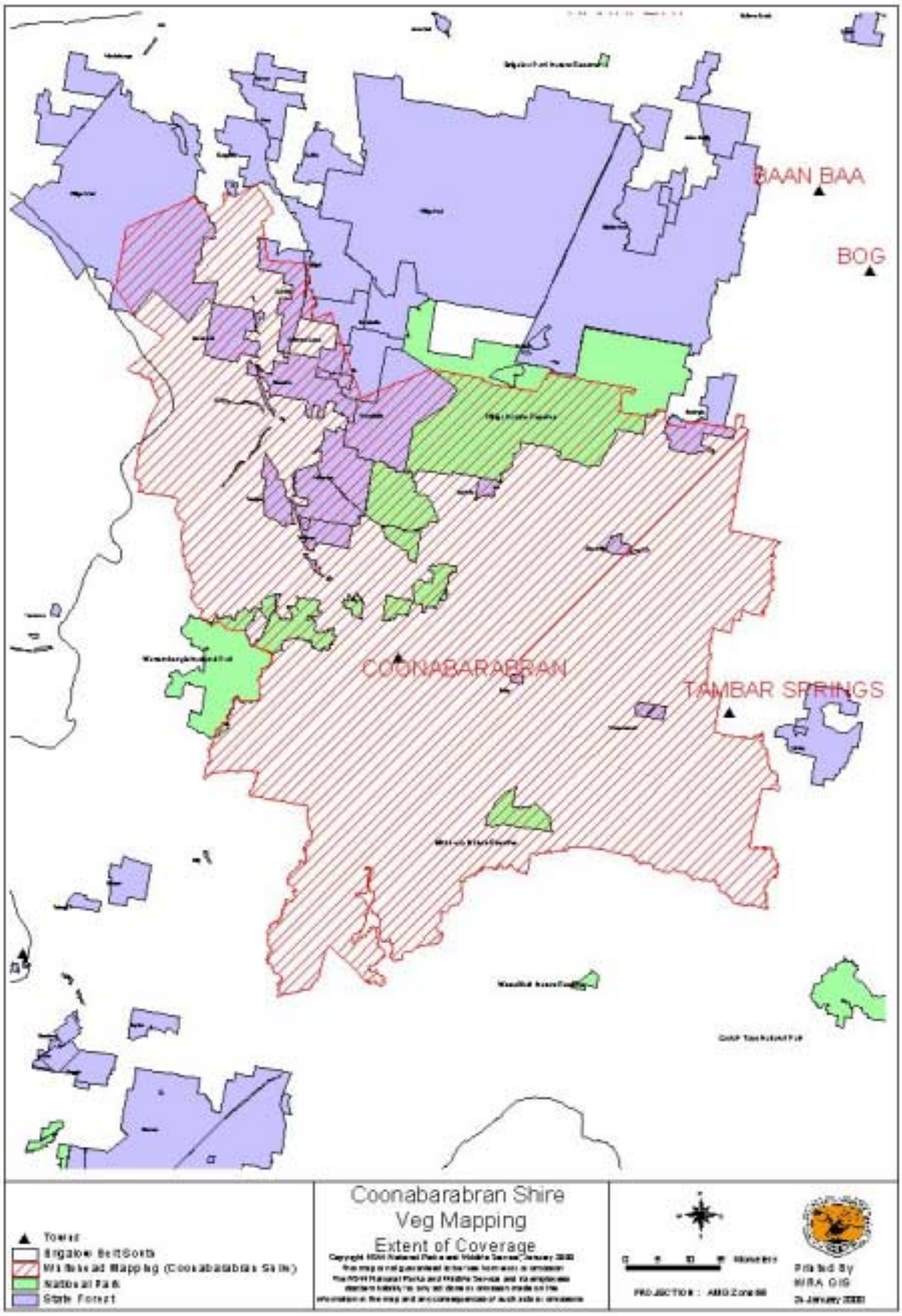
		Note: This dataset has now become available, but is not used in the report
Doug Somerville	Department of Agriculture	Information on ironbark usage by apiarists, consent to use Apiary Industry Flora Resource Database

Appendix D - Maps 3 – 18 – Dataset Coverage Maps

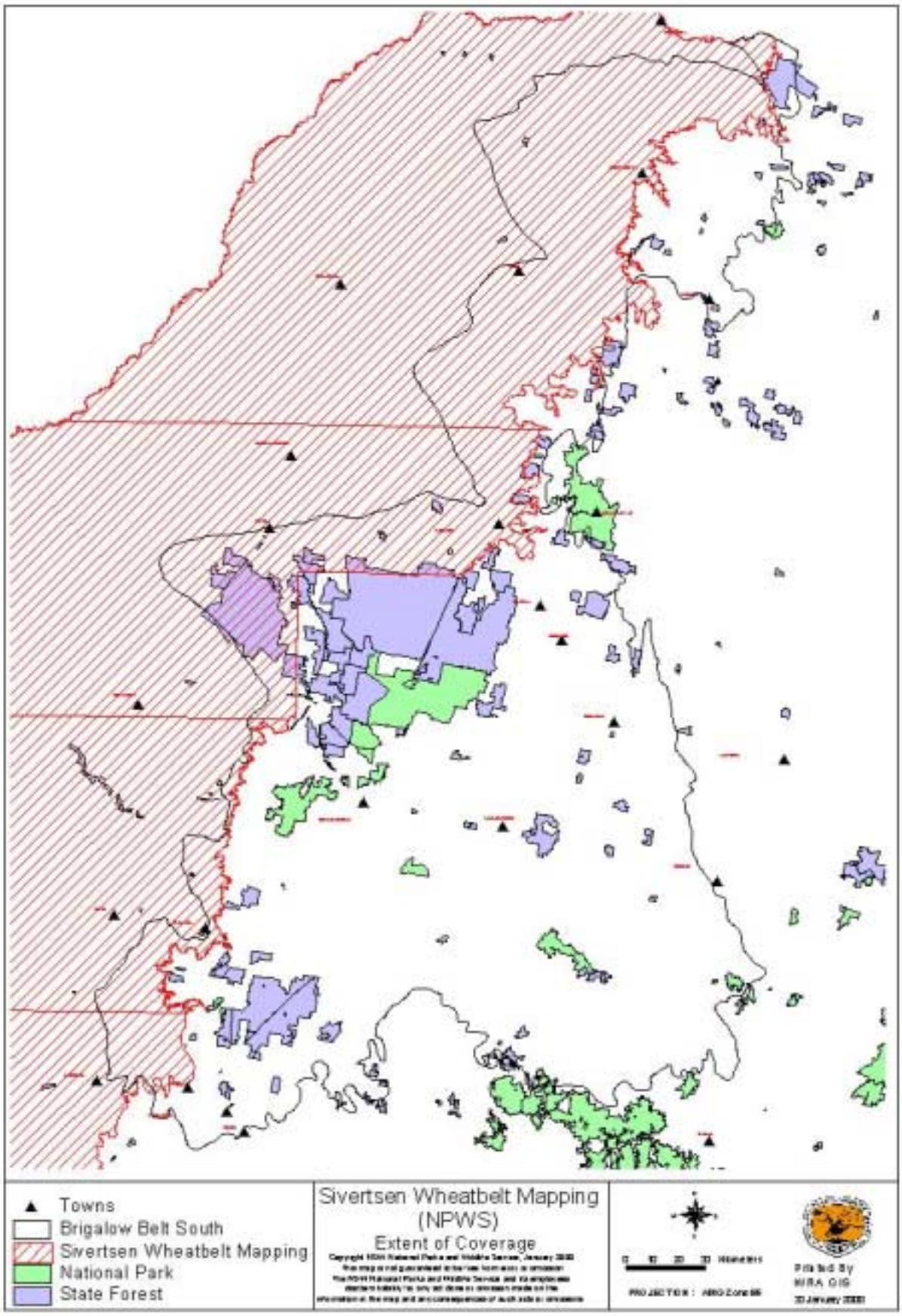
3. Extent of coverage for M305 Floristics and Structure (MDBC)



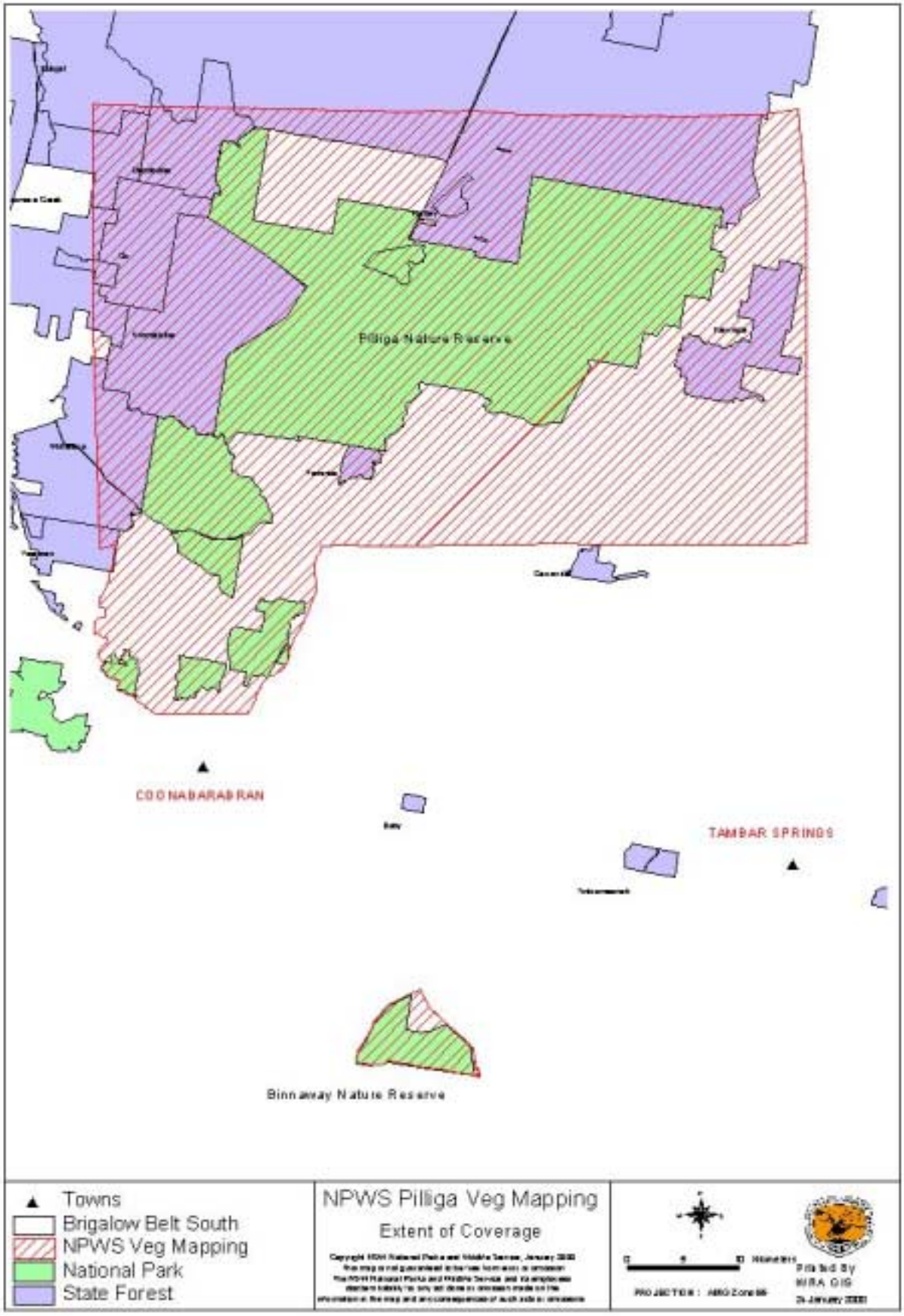
4. Extent of coverage for Coonabarabran Shire Vegetation Mapping



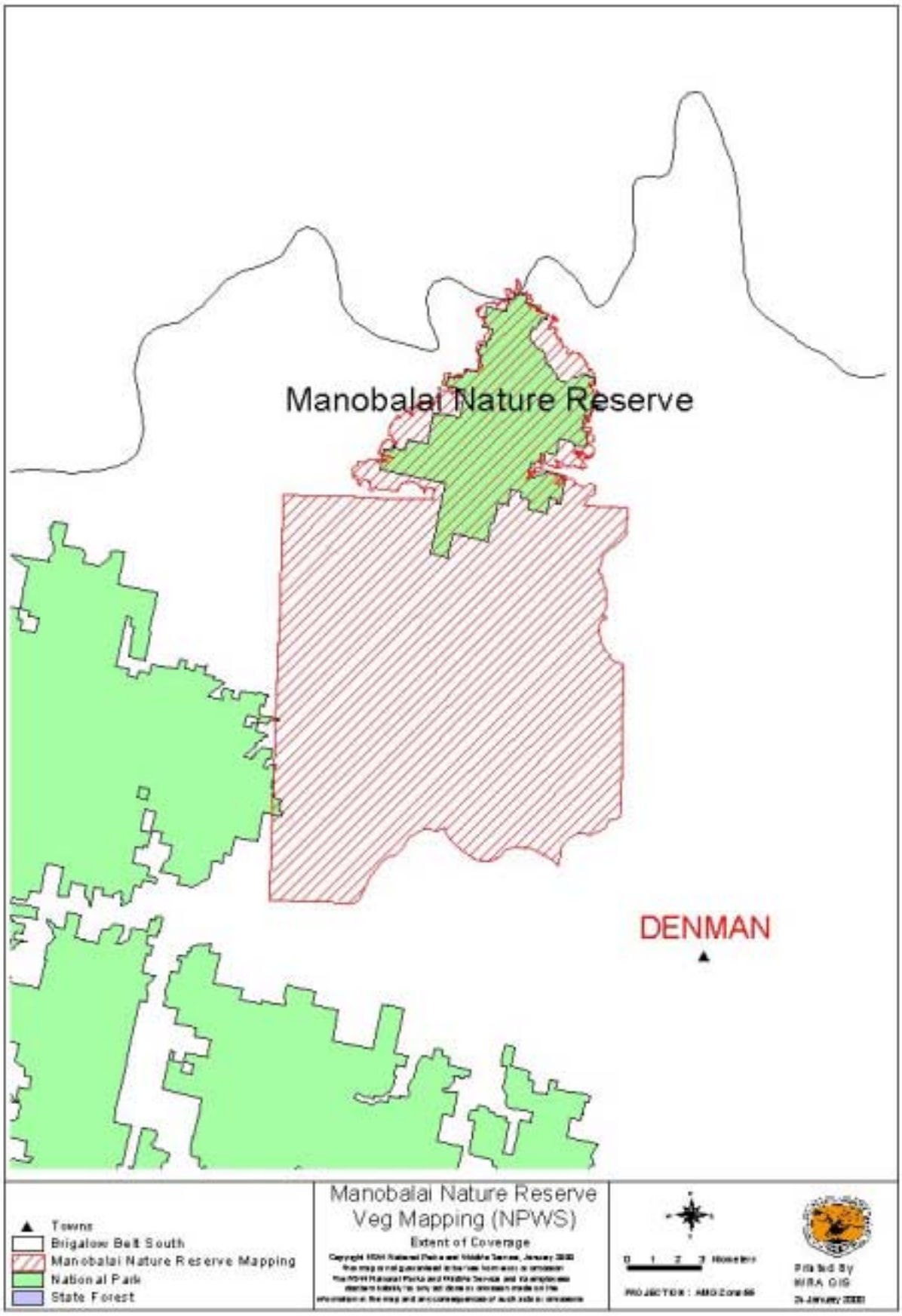
5. Extent of coverage for Sivertsen Wheatbelt Mapping (NPWS)



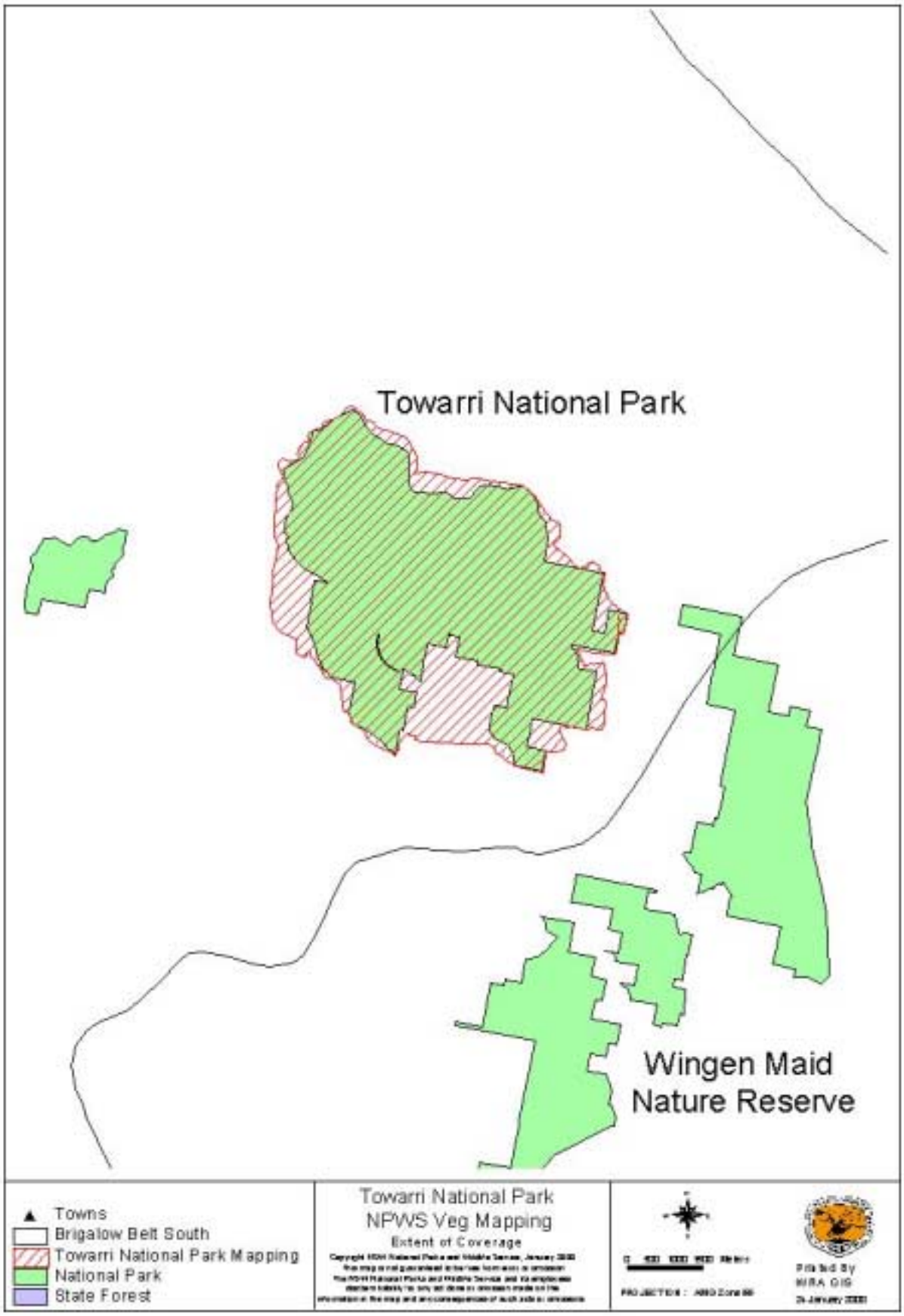
6. Extent of coverage for NPWS Pilliga Vegetation Mapping



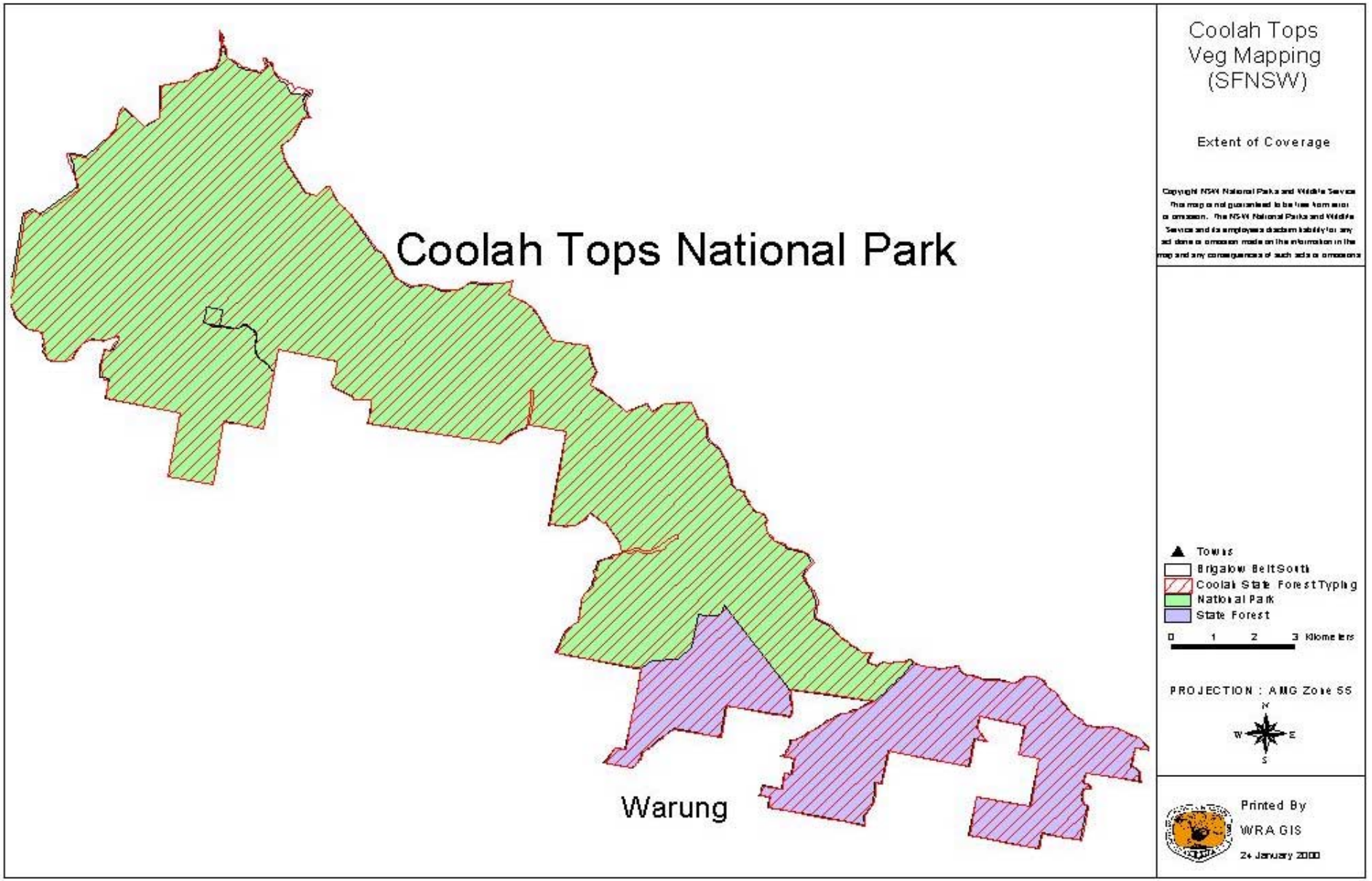
7. Extent of coverage for Manobalai Nature Reserve Vegetation Mapping (NPWS).



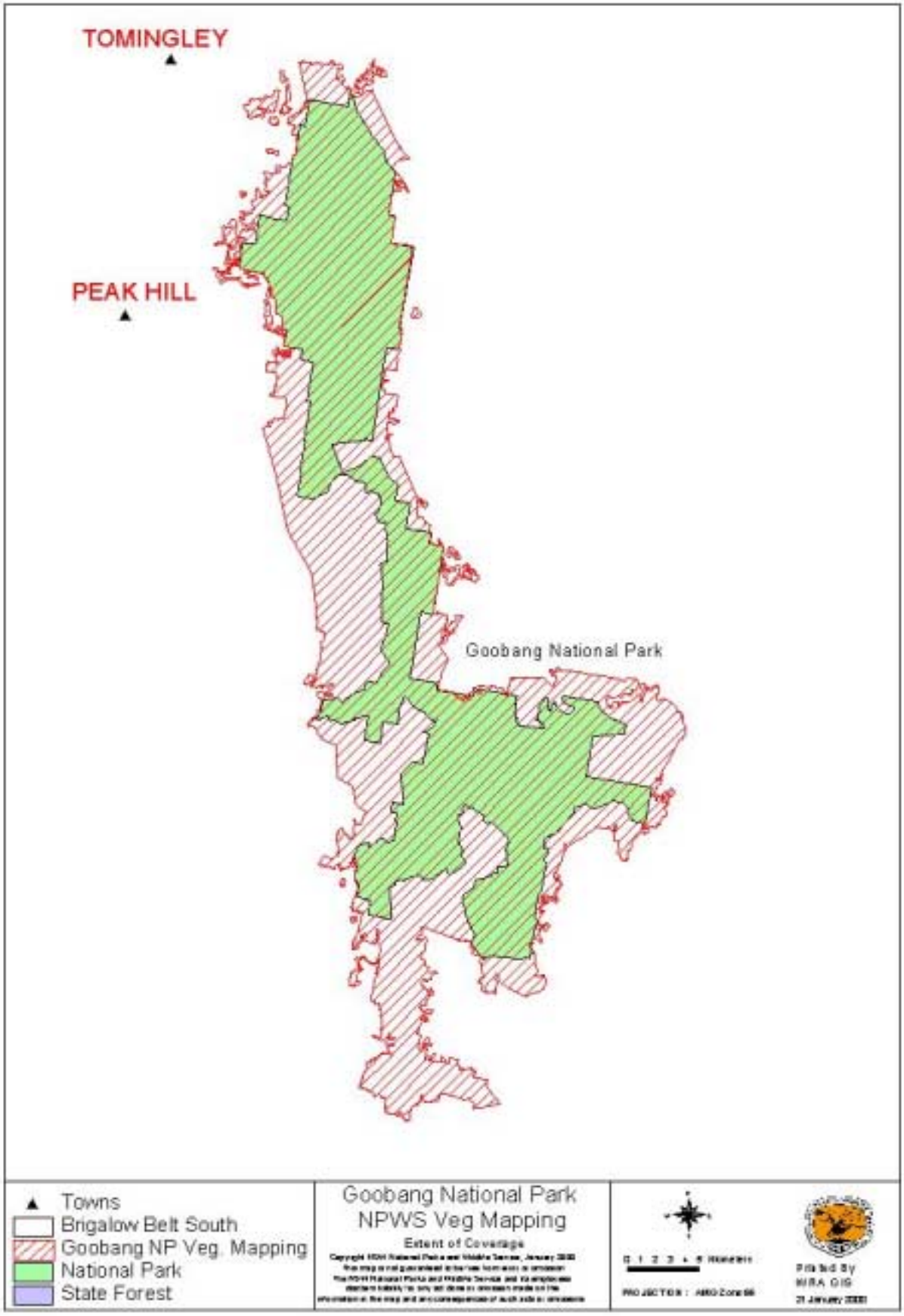
8. Extent of coverage for Towarri National Park NPWS vegetation Mapping.



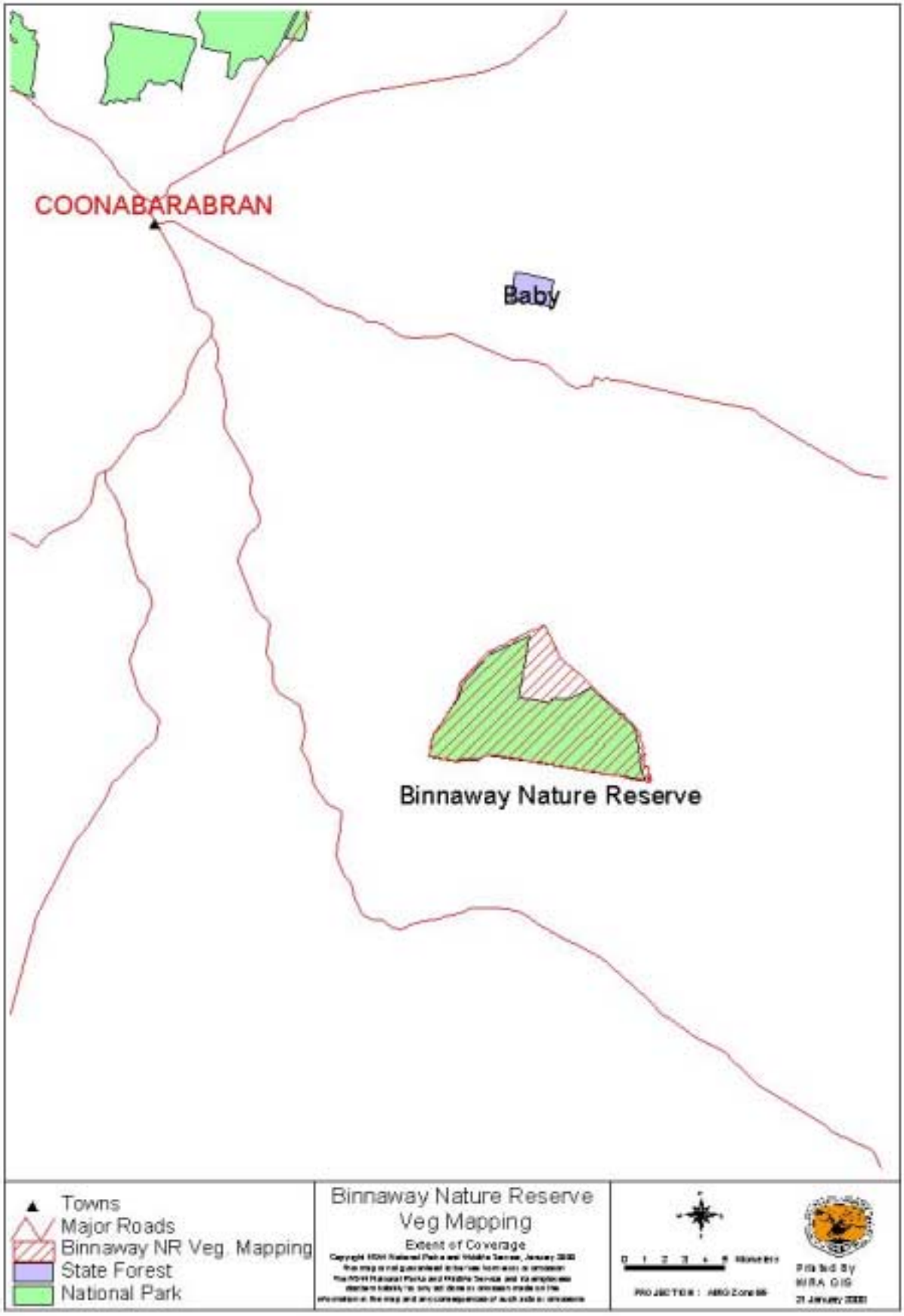
9. Extent of coverage for Coolah Tops Vegetation Mapping. (SFNSW).



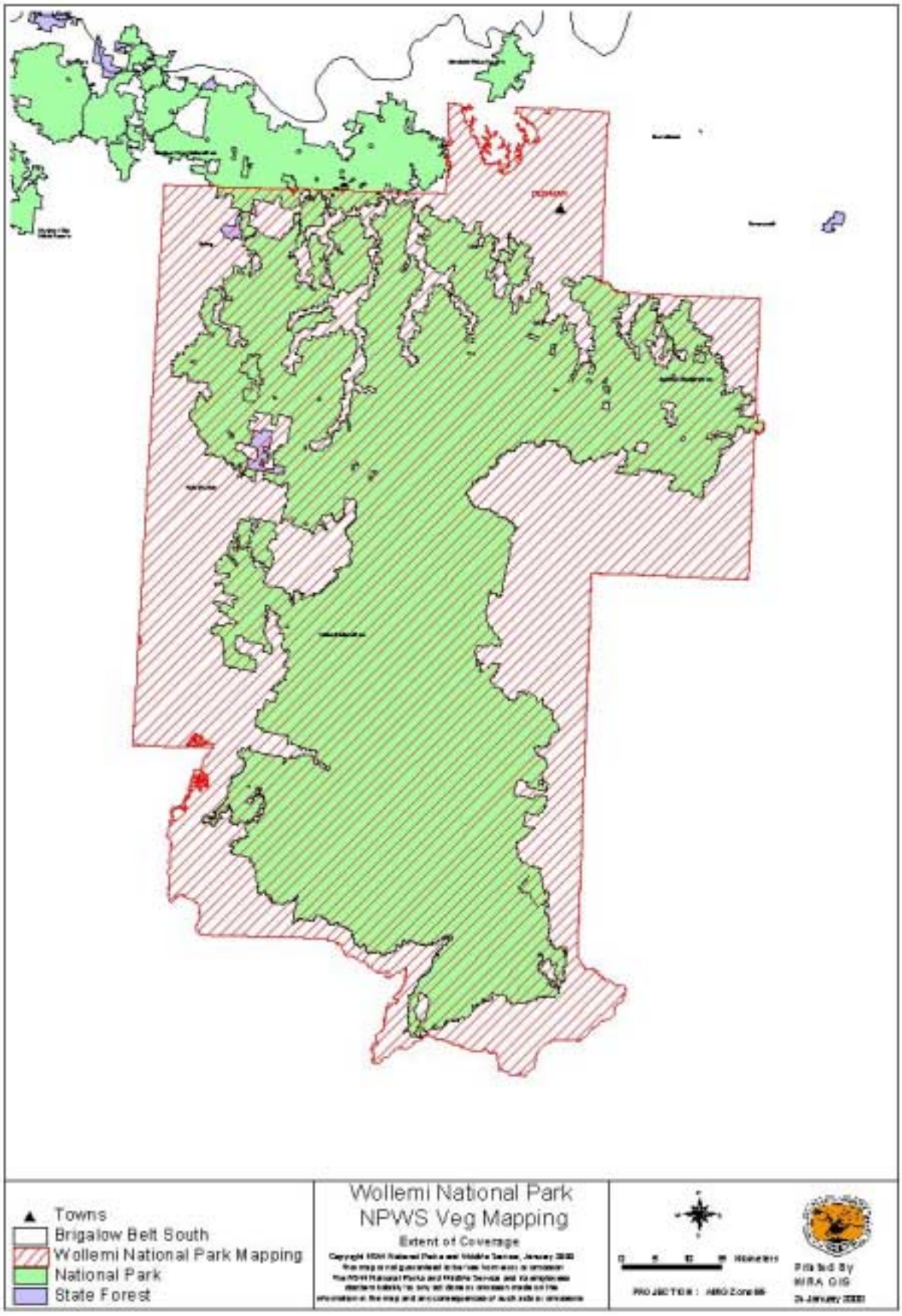
10. Extent of coverage for Goobang National Park NPWS Vegetation Mapping.



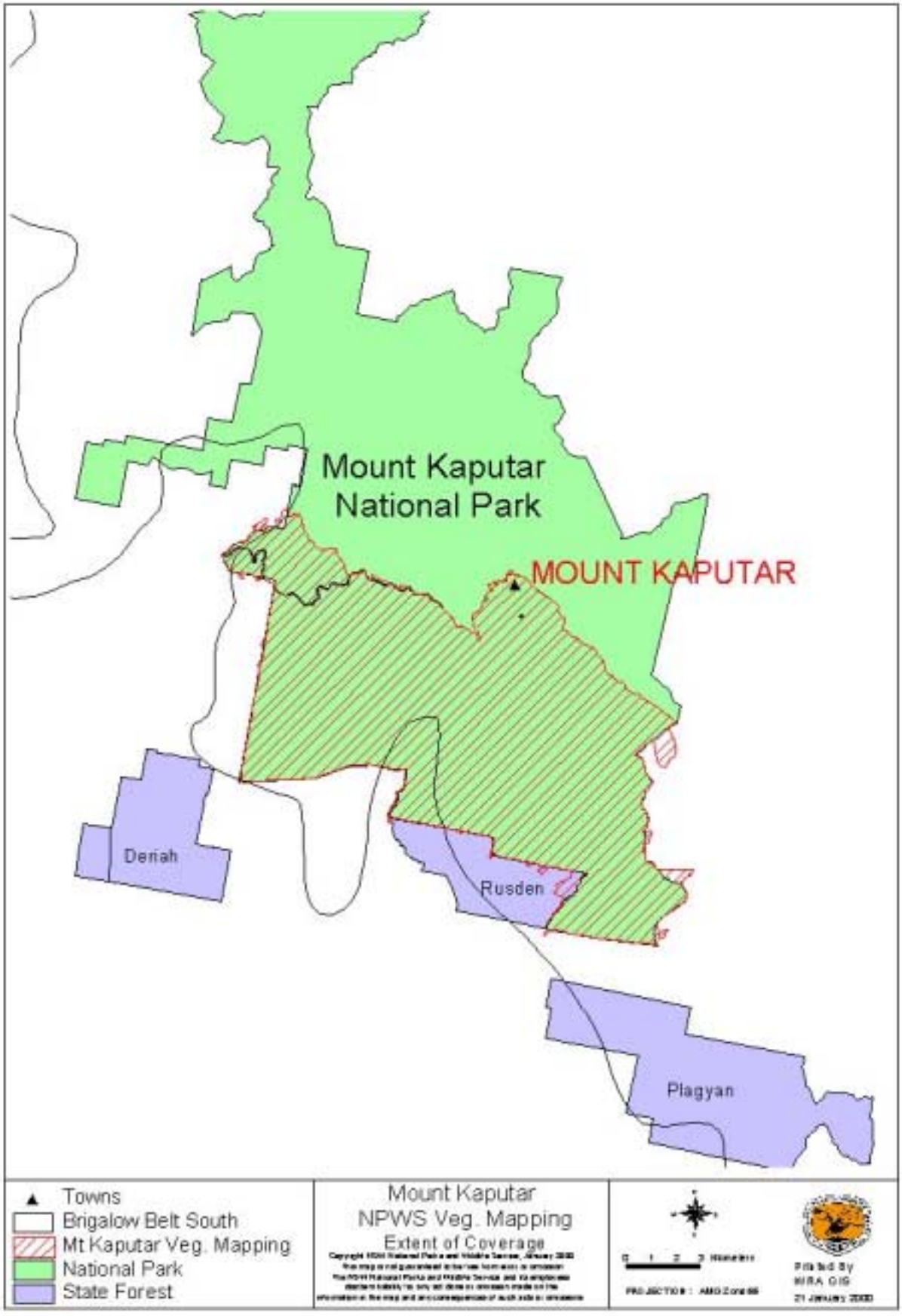
11. Extent of coverage for Binnaway Nature Reserve Vegetation Mapping.



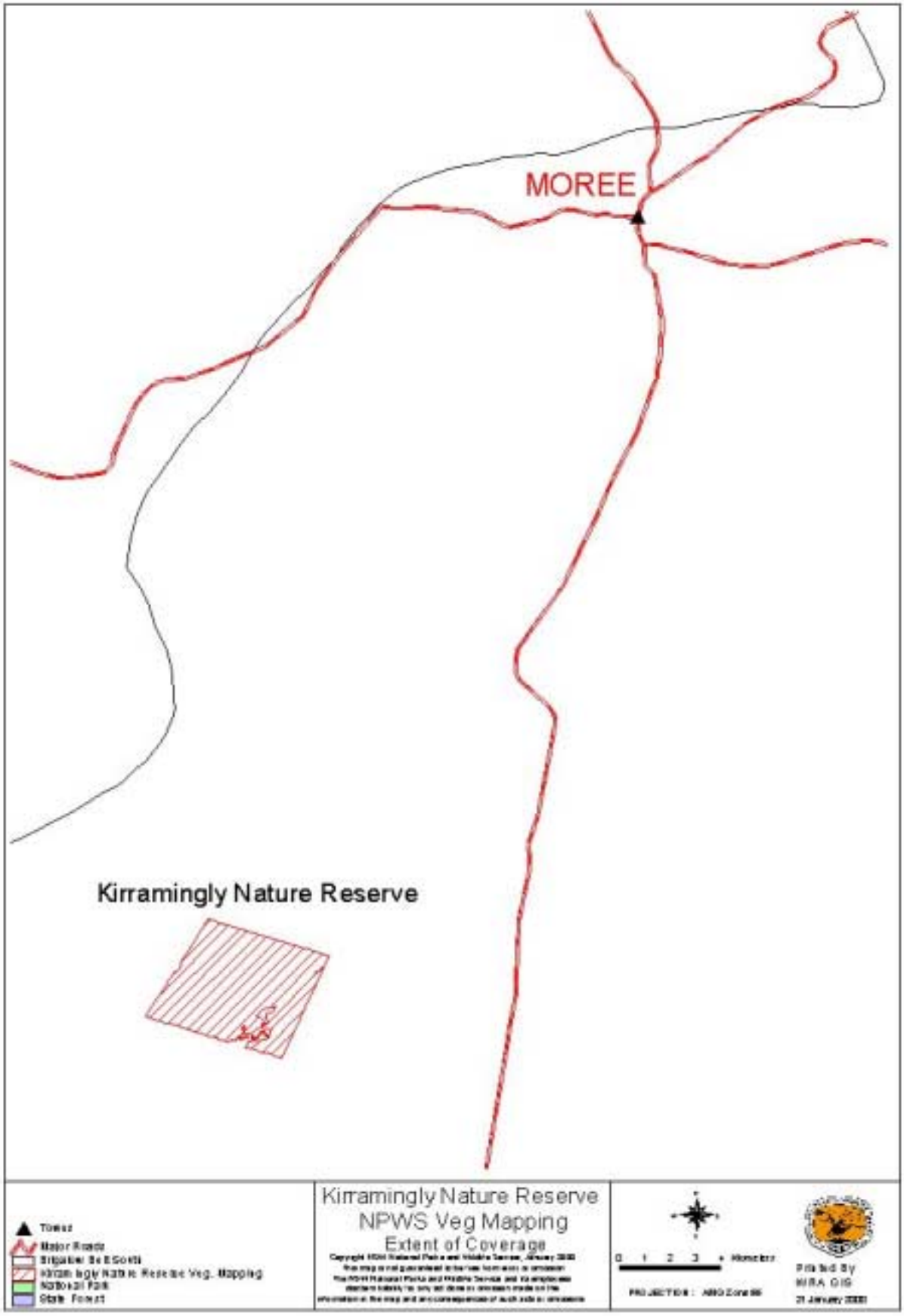
12. Extent of coverage for Wollemi National Park NPWS Vegetation Mapping.



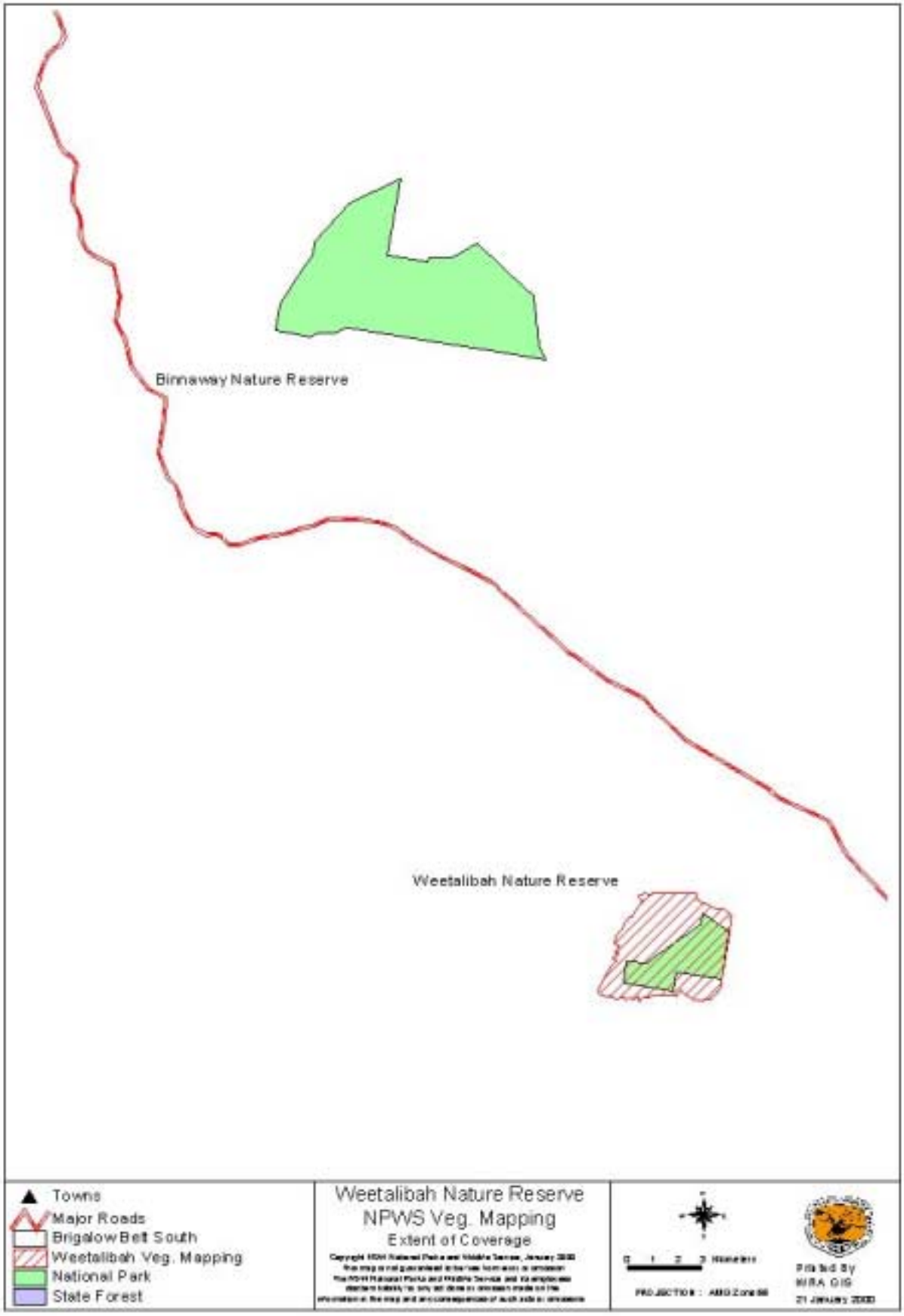
13. Extent of coverage for Mount Kaputar NPWS Vegetation Mapping.



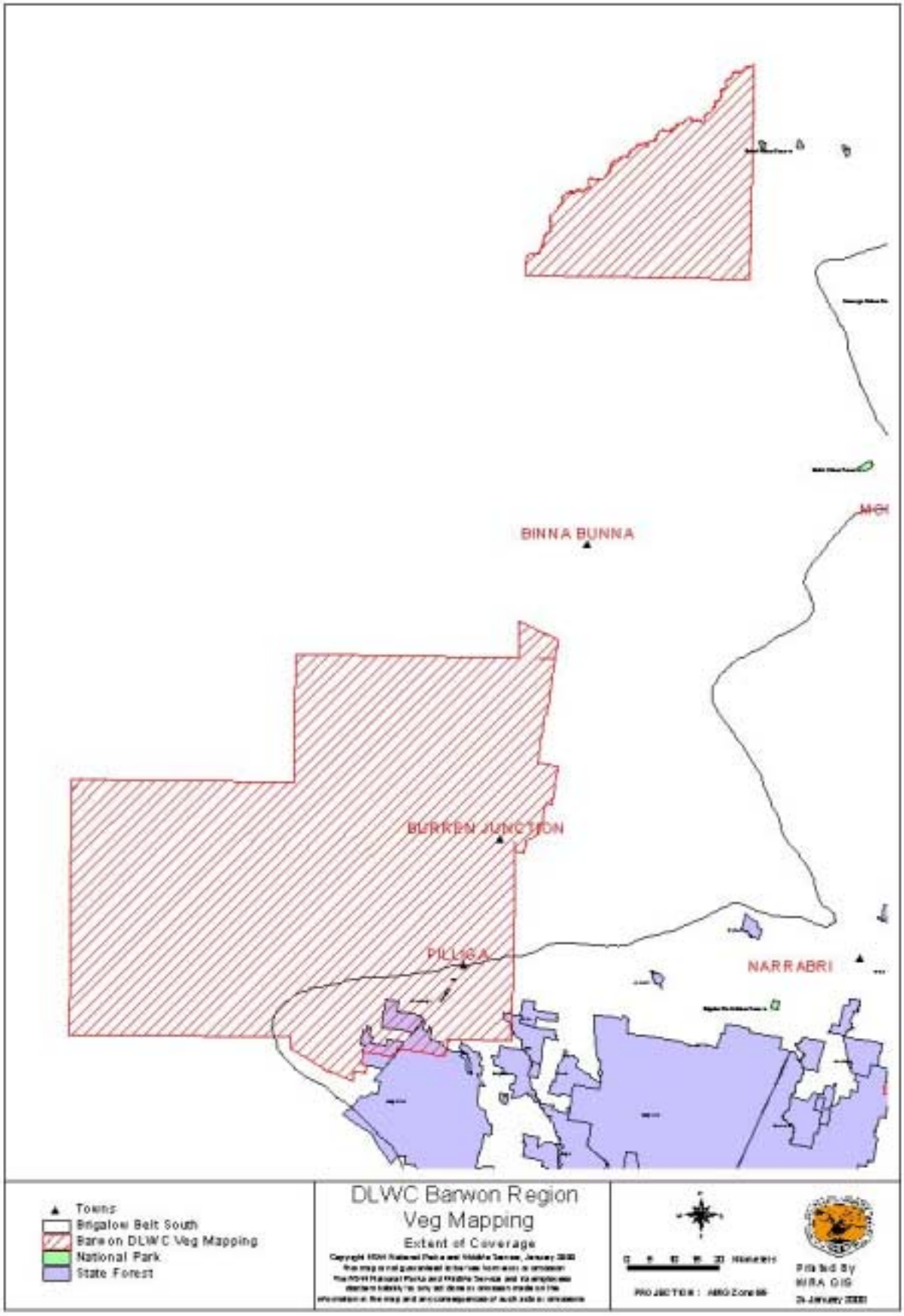
14. Extent of coverage for Kirramingly Nature Reserve NPWS Vegetation Mapping.



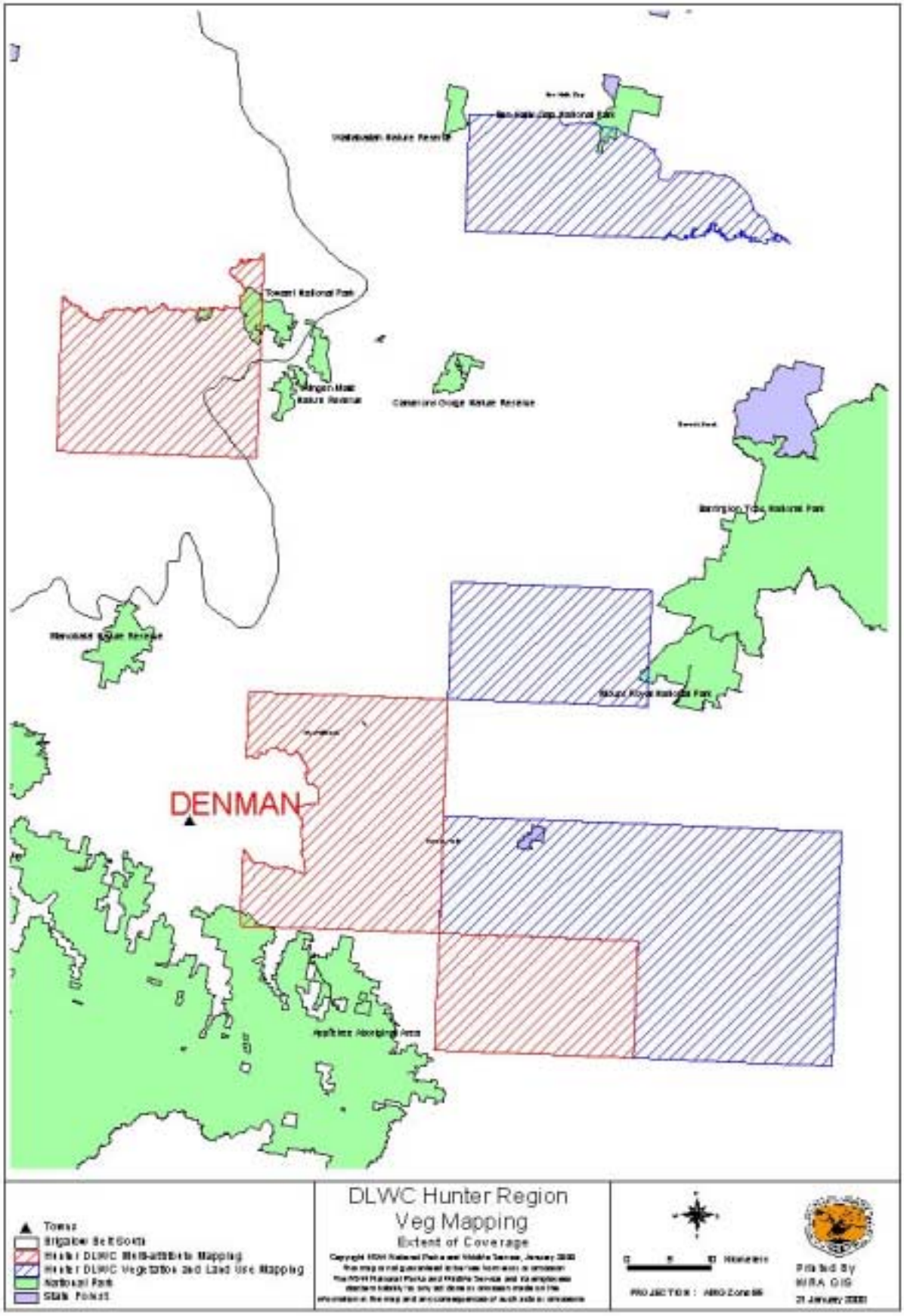
15. Extent of coverage for Weetalibah Nature Reserve NPWS Vegetation Mapping.



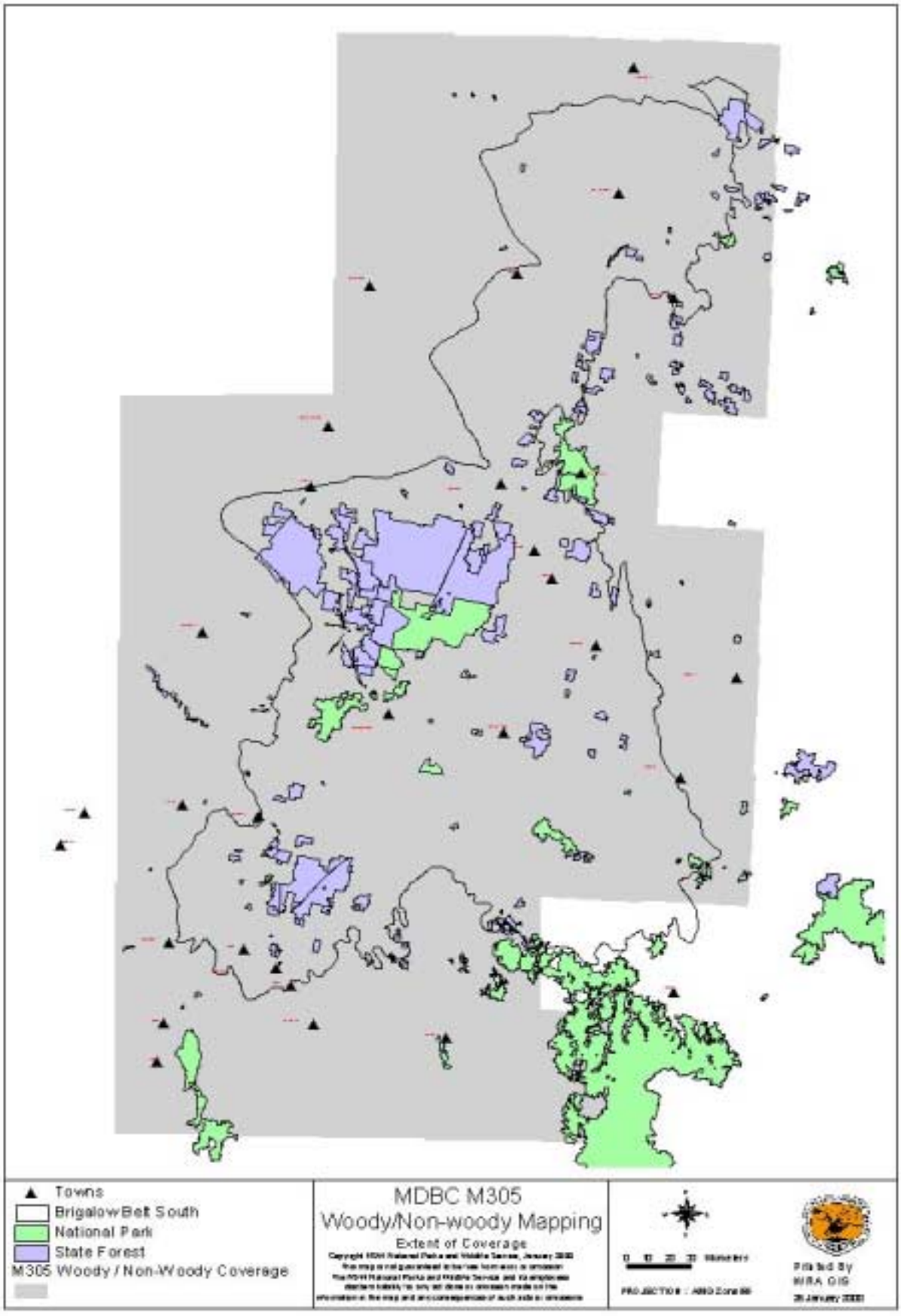
16. Extent of coverage for DLWC Barwon Region Vegetation Mapping.



17. Extent of coverage for DLWC Hunter Region Vegetation Mapping.

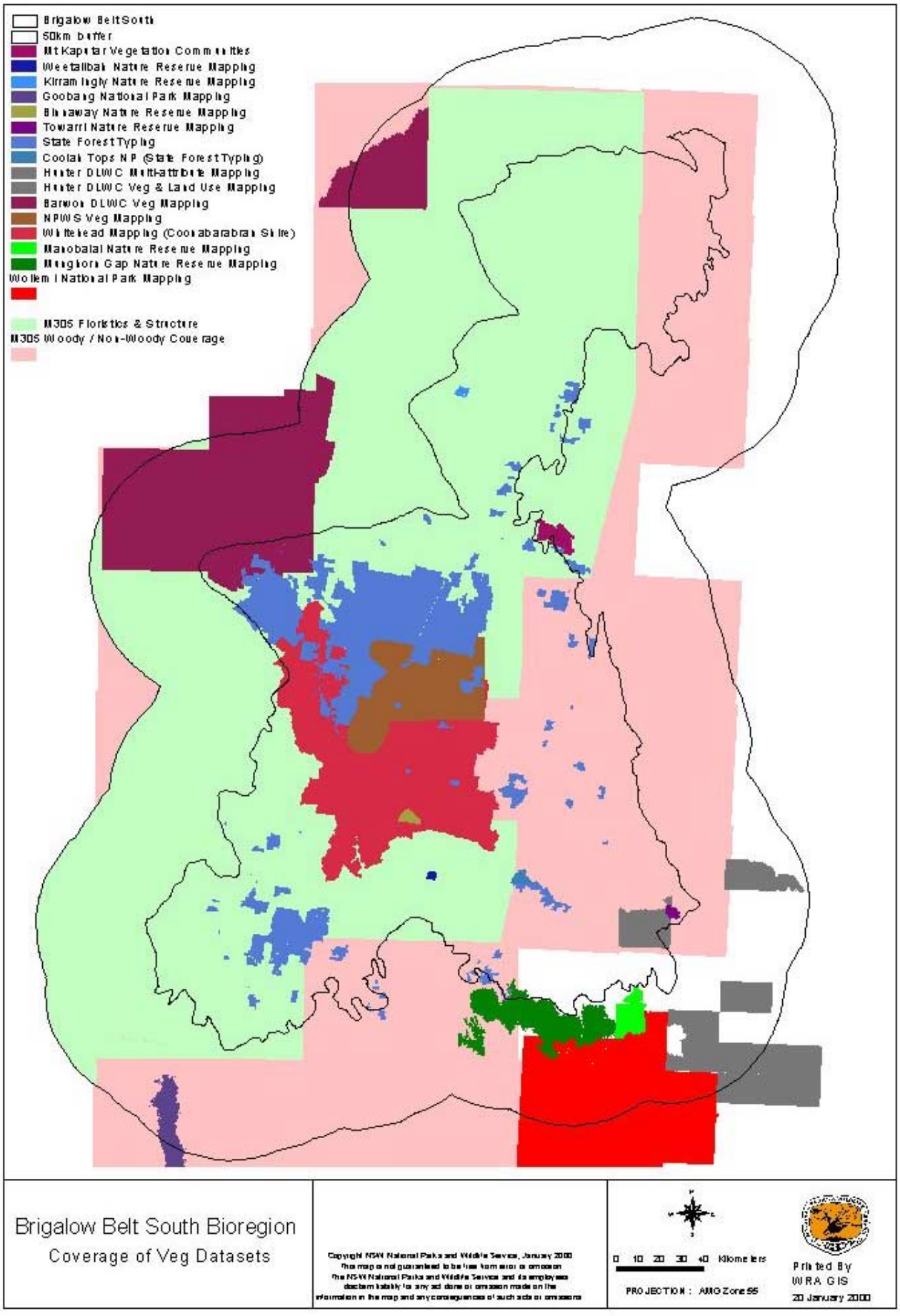


18. Extent of coverage for MDBC M305 Woody/Non-Woody Mapping.



Appendix E - Map 19 – Coverage of all Vegetation Datasets

Map 19 – Coverage of all Vegetation Datasets



Appendix F

Table 7 – Presence of Ironbark Within Each Dataset

	Column A	Column B	Column C	Column D	Column E
Dataset	**Total Hectares of Dataset Within BBS**	**% of BBS Covered by Dataset**	**Ironbark Presence within BBS (ha)**	**Ironbark Presence as % of Column A**	**No. of Ironbark polygons in BBS**
Murray Darling Basin Commission – Woody / Non-Woody Dataset (M305 Mapping)	5111940	97.45	N/A	N/A	N/A
Woody Component of above	1248956	23.81	N/A	N/A	N/A
Murray Darling Basin Commission – Structural Vegetation Dataset (M305 Mapping)	3494576	66.62	484039	13.85	1429
Coonabarabran Shire Vegetation (Whitehead)	751881	14.33	259389	34.50	197
State Forest Vegetation Mapping					
AMG Zone 55 State Forest Typing	489233	9.33	308621	63.08	1948
Note: Lindsay Forest Typing has not been included at this point, however the AMG Zone 55 dataset has both Lindsay and RN 17 typing and therefore is likely to overlap with the specific Lindsay Typing Dataset					
Coolah Forest Types	13189	0.25	0	0	0
NSW NPWS Vegetation Mapping					
Native Vegetation of the Northern Wheatbelt (Sivertsen) (woody only)	324667	6.19	201829	62.16	697
Towarri Vegetation Community Profiles	3398.6	0.06	N/A		0
Manobalai NR Vegetation Communities	18	0.00	0	0	0
*Wollemi NP Vegetation Communities.	0	0.00	0		0
*Goulburn River NP and Munghorn Gap NR Vegetation Communities	4481	0.09	670	14.95	249
Weetalibah Nature Reserve	1750	0.03	1750	100	13
Binnaway Nature Reserve	5297	0.10	4971	93.85	27
Kirramingly Nature Reserve	2261	0.04	N/A	N/A	0
*Goobang National Park	0	0.00	0	0	0
Mt Kaputar National Park	5610	0.11	225	4.01	4
Pilliga Nature Reserve NPWS Mapping	300371	5.73	148042	49.29	181
NOTE: * Within 50km buffer					

Dataset	Total Hectares of Dataset Within BBS	% of BBS Covered by Dataset	Ironbark Presence within BBS (ha)	Ironbark Presence as % of Column A	No. of Ironbark polygons in BBS
DLWC Barwon Region Vegetation Mapping Bunna Bunna Vegetation Mapping Data Burren Junction Vegetation Mapping Data Caloona Vegetation Mapping Data Comeby Chance Vegetation Mapping Data Gradule Vegetation Mapping Data Gwabegar Vegetation Mapping Data Pilliga Vegetation Mapping Data Rowena Vegetation Mapping Data Telleraga Vegetation Mapping Data Walgett Vegetation Mapping Data Wee Waa Vegetation Mapping Data	86133	1.64	0	0	0
DLWC Hunter Region Vegetation Mapping (Multi-Attribute Only) Muswellbrook Vegetation Mapping Data Jerrys Plains Vegetation Mapping Data Towarri Vegetation Mapping Data Kars Springs Vegetation Mapping Data Singleton Vegetation Mapping Data	37895	0.72	N/A	N/A	0
NOTE: The figures in this table cannot be summed to give a total area for communities containing ironbark. Similarly, percentage columns will not total 100%. This is because of spatial overlap between varying datasets. The figure for hectares of communities containing ironbark has been derived according to the steps outlined in Section 2.4.2. Data Analysis - Ironbark .					

NOTE: This method for determining extent of any given species across the bioregion will need to be replicated for other species of interest in this project. Further time and resources are required to undertake this.

NOTE: When complete, mapping as part of this bioregional assessment will provide further information on ironbark not considered here.

Appendix G – Map 24 – Distribution of Cypress Communities

Map 24 – Distribution of Cypress Communities.