National Estate Identification and Assessment in the North East Region of Victoria

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Prepared by officials to support the North East Regional Forest Agreement Process

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Foreword

This report provides information on the results of the assessment of national estate values related to forest environments. The information contributed to the comprehensive regional assessment of the North East Region of Victoria. Places with national estate value are components of the natural or cultural environment that have aesthetic, historic, scientific or social significance, or other special value for future generations as well as the present community.

The comprehensive regional assessment of the North East Region has examined environment and heritage, and social and economic values. Information on the range of these values with the exception of national estate values, is contained in the report, *North East Victoria Comprehensive Regional Assessment*, published August 1998.

The information gathered in the comprehensive regional assessment projects including the national estate studies will be used in the development of a Regional Forest Agreement for North East Victoria. Further information on the approaches to the development of the Regional Forest Agreement is provided in the public consultation paper *North East Victoria Regional Forest Agreement Directions Report,* published April 1999.

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Summary

This report presents the outcomes of the national estate component of the Comprehensive Regional Assessment of Victoria's North East native forests. It will contribute to the development of a jointly agreed Victorian - Commonwealth North East Regional Forest Agreement.

Areas identified in this report as having potential national estate value are indicative only and are not necessarily the delineated forest areas that will be listed in the Register of the National Estate. The report documents the natural and cultural values that need to be taken into account in determining national estate places; with the data in the report forming the basis of that determination by the Australian Heritage Commission. The data layers and indicative areas will remain indicative until they have been considered by the Australian Heritage Commission.

Over 156 sites and areas were identified as indicative national estate areas of social, aesthetic, and historic value. Indicative national estate areas of natural value are identified in value maps covering natural landscapes, undisturbed catchments, old-growth, wilderness, flora, fauna and natural history.

The national estate component of the Comprehensive Regional Assessment has greatly enhanced the knowledge of the occurrence of national estate values in Victoria's north east forests.

It is expected that the Regional Forest Agreement between the Victorian and Commonwealth Governments will include specifications for a jointly agreed national estate outcome in terms of both the listing of places, including a review of places currently listed or interim-listed in the Register of the National Estate, and the long-term management of national estate values in forests.

Chapter 1: Introduction

There are a number of stages in the development of the North East Regional Forest Agreement (RFA) between the Victorian and Commonwealth Governments. The first stage, which follows the signing of the Scoping Agreement, is the Comprehensive Regional Assessment (CRA). Both Governments, in collaboration with experts, have been involved in a wide range of projects designed to provide the information necessary for the analysis and identification of values and the determination of possible approaches for the North East RFA. Subsequent stages include the integration of environment, heritage, social and economic values in the Region, the development of a public consultation paper, and the drafting of the RFA.

This report presents the results of the assessment of natural and cultural national estate values, carried out as part of the CRA, and identifies indicative areas of national estate value in the Region. The values documented in this report will be taken into account in delineating national estate places. Areas endorsed by the Australian Heritage Commission (AHC) will be interim listed in the Register of the National Estate. The interim listing of areas will then be advertised and subject to the statutory period of three months allowed for objections and public comment. It is anticipated that interim listing of areas identified through this process will occur after the Victorian - Commonwealth North East RFA is signed.

There are five RFA study areas in Victoria; East Gippsland, Central Highlands, North East, Gippsland and West. The North East RFA will be the third Victorian RFA to be completed.

1.1 The National Estate

The national estate is defined in the *Australian Heritage Commission Act* 1975 as:

> *those places, being components of the natural environment of Australia, or the cultural environment of Australia, that have aesthetic, historic, scientific or social significance or other special value for future generations as well as for the present community.*

The Australian Heritage Commission's responsibility is to identify the national estate and, under section 30 of the Act, to advise the Commonwealth Government on the protection of national estate places and the potential impact on national estate values of Commonwealth decisions relating to those places. The Act also requires the establishment of the Register of the National Estate. The Register includes places of importance at a local, regional or national level. The identification and assessment of places for listing in the Register is guided by the national estate criteria (Appendix B). There are eight criteria in the Australian Heritage Commission Act. These are referred to by letter codes A - H. Sub-criteria are written for all of the criteria and referred to by number such as A1, A2, D1, D2.

When making decisions about the use of forests that contain places of national estate significance, for example decisions on whether to grant woodchip export licences, the Commonwealth must consider any potential adverse effects on the national estate.

In the past, the lack of detailed information in a regional context about the national estate values of forests has made it difficult for the Australian Heritage Commission to identify and register places of national estate significance and to provide the Commonwealth Government with detailed advice about the protection of those places. The lack of information has also contributed to uncertainty for forest-based industries and for State governments about which places will be listed in the Register of the National Estate, and what advice the Commission would give on the protection of those places.

In recognition of these problems, the Commission has developed a methodology for the regional assessment of national estate values which focuses on systematic surveys to identify areas of national estate significance coupled with appropriate management to protect identified values, using a regional framework as the basis for decision-making. A systematic regional approach to the assessment of national estate values ensures that information on the distribution and regional protection of values is available to provide an appropriate context for the Commission to develop its advice to the Commonwealth Government, and that all stakeholders and the general community are aware of the places of national estate significance in the Region.

In providing advice on the protection of national estate values identified through CRAs undertaken for the development of RFAs, the Commission has developed a policy which recognises the implementation, through the RFA process, of the nationally agreed criteria for a comprehensive, adequate and representative (CAR) reserve system for forests (the JANIS criteria). In summary, the Commission's current policy on the listing and protection of national estate values in a CAR reserve system is that where a RFA has substantially met the various attributes and expectations of the Commission, then it is appropriate to list all places identified through the RFA as containing national estate values which are protected by reservation, by reserve management prescription, by site exclusion, by consultation processes or other measures appropriate to the value, or places that are robust and not affected by timber harvesting or other off-reserve management activities.

Some of the areas identified in this assessment occur within places already listed or interim-listed in the Register of the National Estate (Appendix A and Map1). In addition to the identification of new indicative areas of national estate significance, some places previously listed in the Register may not have retained their national estate values. Places already listed or interim-listed in the Register of the National Estate will be updated in the light of the information gathered during the CRA.

1.2 The National Estate Assessment

The RFA process is designed to comply with a range of Commonwealth and State statutory obligations in relation to the management of forests, including the identification of and provision of advice on the protection of national estate values required under the *Australian Heritage Commission Act* 1975. A regional assessment model for identifying the National Estate was developed in 1991-92 by the Australian Heritage Commission (AHC), in cooperation with the Western Australian Department of Conservation and Land Management (CALM), for the southern forest region of south-west Western Australia (AHC and CALM, 1992). The model was refined in 1993 for regional assessments in Victoria's East Gippsland and Central Highlands forest regions, with similar assessments later completed for Tasmania and Western Australia CRAs.

The North East national estate assessment research was undertaken in 1997 - 1999. The cultural assessments were directed by a technical advisory committee consisting of Victorian Department of Natural Resources and Environment (NRE), the Commonwealth Department of the Environment, and observers from the Environment Conservation Council (ECC) (formerly Land Conservation Council), Heritage Victoria and Aboriginal Affairs Victoria (AAV). The natural assessments were undertaken jointly by NRE and Environment Australia officers.

Copies of consultancy reports which have contributed to the national estate assessment are available for inspection in Melbourne and Canberra:

Department of Natural Resources
and Environment
8 Nicholson Street
East Melbourne Victoria
Ph: 03 9637 8405

Environment Australia
Nature Conservation House
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This report has been prepared by the CRA project team including officers of the Commonwealth Department of the Environment and Heritage and Victorian Department of Natural Resources and Environment, with the assistance of a number of other agencies, organisations and individuals.

Chapter 2: National Estate Cultural Values

2.1 Introduction

Cultural heritage refers to qualities and attributes possessed by places that have Aboriginal, social, aesthetic, historic or scientific value for past, present or future generations. These values may be seen in a place's physical features, but can also be associated with intangible qualities such as people's associations with or feelings for a place. Documentary and community-centred research reveals a wide range of cultural places within or related to the North East forests, indicative of the history of human interaction with these forests.

The national estate cultural studies component of the CRA has considered forest and forest-related cultural places within the study area across all land tenures. Cultural heritage places have mainly been identified on public lands. In the instances where places of indicative national estate heritage value are located on private land, it is the policy of the Australian Heritage Commission to undertake detailed consultation with all relevant land owners and other parties to verify the significance of the place prior to any action being taken in relation to its listing in the Register of the National Estate. No action towards national estate listing for any places on private land identified in this report will be taken until such consultation has occurred.

As the Victorian Government had commenced a study of the Box-Ironbark area which overlapped part of both the North East and West RFA regions, cultural heritage projects were commenced in the Box Ironbark area to provide data for that study on the understanding that the research and assessments would also be used for the RFA projects.

Within the CRA process for the North East RFA Region, the cultural heritage studies assessed social, aesthetic, and historic heritage values. The cultural projects were structured in a way that built on the work undertaken in 1993 for the East Gippsland and Central Highlands RFA regions. The methods are outlined in *Method Papers: East Gippsland and Central Highlands Joint Forest Projects, Volume two - Cultural Values* (AHC and CNR 1994b). The exception is Aboriginal cultural heritage and a new approach has been developed for the North East region. This approach is described in Section 2.2.

Victoria's North East region is defined to the south and east by the Great Dividing Range in a series of foothills and ridges culminating in a scattered belt of highland peaks, to the north by the Murray River and to the west, for most of its extent, by the Hume Highway. Human prehistory and histories relating to the region are limited but NRE (1998), Flood (1980), Gardner (1992), Wesson (1994) and Environment Conservation Council (1997, for the Box-Ironbark area) have documented information.

For the North East region a range of forest themes and place types could be determined from the 1993 studies and refined from the North East disturbance history (NRE 1998). The national estate cultural places sought were described as forest-related places which are those places located within forests, be they on private or public land, distinct places that continue through forested areas such as a route, or places with a strong forest theme such as a timber mill, that may be located outside forest areas.

A cultural heritage data audit and analysis was commissioned (Marshall, B and Jones, R 1997) to provide a preliminary appraisal of the quality of available data in the region, the representation of place types and historic themes, and the geographic extent of existing data for Aboriginal and non-Aboriginal places and archaeological site types. Recent studies by Bannear (1994, 1995, 1997) on gold mining sites, and Graeme Butler & Associates (1996) on alpine huts provided adequate assessment information. A few places, formerly identified and assessed for the Central Highlands regional assessment, are now located in the North East region and these have been noted in the lists of places (Appendix J).

A range of cultural heritage projects were designed and undertaken to fulfil the requirements for the National Estate component of the CRA. The cultural heritage value assessments involved preliminary identification of places from research, or from community heritage workshops; classification of known historic places according to themes and types; preliminary selection of places of potential national estate significance using significance indicators and field checking and site recording of selected places. This was followed by assessment of places against thresholds developed from both the Australian Heritage Commission Criteria and the collected data leading to the final preparation of place assessments in a data base format.

An overview of the themes of human history associated with North East forests follows. The themes, developed from published histories and consultants' studies (undertaken for the North East CRA) have been used to direct research for the national estate historic values studies.

2.1.1 Themes of human history

Aboriginal Occupation
Early use and occupation of the region by Aboriginal people is evidenced by artefact scatters, quarry sites, burials, rock shelters, scarred trees, rock arrangements, and art sites. At the time of European contact, Victoria's North East was occupied by a number of Aboriginal language groups who utilised extensive forest resources and forested landscapes for their subsistence; their spiritual life, food, shelter, and artwork. A major extent of the northern and eastern area of the North East region is identified as traditional land of the Ya-idt Midtung language group (Warriwee'a 1999) with the traditional lands of other groups, particularly the Taungurrong and Way Wurru, extending across the southern section of the region, while the Brabiralung and Braiakaulung overlap to a small extent. There are a few different interpretations of the names of the groups and the extent of their traditional lands. Sources such as Gardner (1992), Wesson (1994) and Clark (1996) identify groups from historical documents and variations or overlaps of group names are as follows; Ya-idt Midtung (Jaithamathang, Dhudhoroa), Way Wurru (Waveroo, Minjambuta), and Taungarong (Daung Wurrung).

Contact with Aboriginal people, surveying and early settlement
European explorers passed through the North East region in the 1820's and soon after squatters followed selecting pastoral runs in the river valleys of the Kiewa, Mitta Mitta, Ovens and King River valleys. Local Aboriginal people guided some early explorers into the high country and Aboriginal people worked on a number of sheep runs. However a number of severe battles occurred and many Aboriginal people who resisted the invasion of their homelands were shot. Massacres such as the Faithfull massacre occurred in the region in the 1830's and early 1840's (Wesson 1994). The impact of European settlement devastated Aboriginal communities. Contagious European diseases spread rapidly amongst Aboriginal people and by the 1840's the Aboriginal population had markedly declined.

Alpine grazing
Alpine grazing commenced in the North East in the aftermath of the bushfires of Black Thursday 1851 which denuded the countryside of grass, forcing many squatters, to search for forage for their cattle. By the 1870s a regular pattern of high country grazing had developed around the Dargo High Plains, the Bogong High Plains, and Gibbo-Pinnibar. Associated with the mountain cattle grazing is a wealth of folklore associated romantically with pioneering hardships and the famed Jack Riley (the Man from Snowy River).

Mining for gold
Large numbers of people flocked to the region in the early 1850s searching for alluvial gold found in the heavily forested areas below the snow line. Three forms of gold mining activity were practised in the region: shallow alluvial mining; deep lead mining; and quartz reefing. Gold mining, particularly using hydraulic sluicing, had a profound effect on the landscape in terms of severe erosion and widespread environmental damage. Forestation programs on old mining sites, particularly around Bright and Myrtleford, were carried out in order to ameliorate erosion.

Engaging in agricultural production
Agricultural production commenced in response to the growth of mining towns and developed along the valleys of the region's major river systems, the Kiewa, Mitta Mitta, Ovens, Buckland, Buffalo, King and along the flat eastern edge of the Murray River Basin. Although the best land was settled during the 1860s and 1870s, the Land Act of 1884 encouraged the selection of land in remote areas of marginal quality. Many selections were abandoned after only three or four years and were reclaimed by the Crown, mostly by the Forests Commission of Victoria after 1911.

People and settlements
Alongside the gold workings, rough settlements were established but many were probably never surveyed. Some settlements, such as at the Sassafrass Creek gold diggings, now only exist as ledges in the side of hills while other modest gold-related settlements, such as Glen Wills, are still located in the forest. New villages were established to service the large goldfields population in the North East. Beechworth became the regional capital of north-eastern Victoria three years after it was surveyed. Other townships were established at Yackandandah, Chiltern, Myrtleford, Bright and Harrietville while settlements such as Black Springs, Woolshed, Cornishtown, Wooragee and Christmastown, did not survive after the gold boom.

Adding to the richness of the region's human history is its strong association with bushranging. The forests around the rich gold and pastoral areas of Beechworth, Chiltern and Wangaratta sheltered many bush rangers over time including Ned Kelly and his gang, Morgan and Harry Power.

Chinese people came to the region to work on the goldfields, and remains of their early occupation in the area include major conflict sites such as in the Buckland River valley and distinctive memorials in local cemeteries. During the mid 20th century other immigrants came into the region. From 1949-1952 the Bright Boys Camp was utilised as a camp for immigrants from the Baltic countries, Whorouly East Camp was used for Italian prisoners of war. Bonegilla, on the edge of the region, was also used for Italian prisoners of war and was the first post war Australian migrant centre, receiving 320,000 migrants during 1947-1971.

Other forest settlements were created as refuges from urban life and customs, for people seeking a new lifestyle such as at Whitlands Catholic Settlement, set up during World War Two as a break-away religious community in the remote forest.

Aboriginal people remained in the area. In the late nineteenth century, camping reserves were established where, until the early twentieth century, supplies and rations were distributed by the local honorary guardians for the Board for the Protection of Aborigines. Aboriginal people worked in the district, on pastoral holdings and local industries. Aboriginal people continue to live in the region and are cohesive groups. Many continue to participate in traditional cultural activities such as the annual trek to the bogong moth grounds and integrate these traditional activities in their modern living.

Utilising and managing forest resources
In the North East, sawlogging was small in comparison to the Central Highlands and East Gippsland regions. Spot mills shifted to new cutting areas at frequent intervals. Following the 1907 Forest Act, the State Forests Department was established and effective forest conservation commenced. A Forests Commission was established in 1919 and in the North East, Forest Districts were established at Benalla, Beechworth, Tallangatta, Mansfield, Myrtleford, Corryong and Bright.

Alpine ash forests began to be harvested in the 1930s and mills were established in Mansfield and other locations. In the red gum forests along the Murray River and its tributaries, timber harvesting commenced after the Second World War and milled red gum was used for heavy construction. After the Second World War, bulldozers with winches, and chainsaws led to a dramatic increase in the volume of timber harvested, while powered saws at the mills increased output and efficiency.

Wildfire
Controlled fires were part of traditional Aboriginal land management. Since European settlement wildfires have occurred frequently in the North East. The first notorious and, perhaps, most devastating fire event documented was the 'Black Thursday' fires of 1851. Major wildfires also occurred in 1898 and 1911. After the 'Black Friday' bushfires of 1939, the Forests Commission upgraded its fire suppression facilities. Fuel reduction burning programs were started but major wildfires occurred in 1944, 1952, 1968, 1972, 1978, and 1985 and many other damaging wildfires occurred in the intervening years.

Moving goods by rail
Linked to the timber industry was the North East railway established in 1873 which provided a trunk route to take timber freight from a number of feeder railways. The Wodonga/Cudgewa line was opened providing a direct link to Melbourne for goods and livestock. Prior to this, the upper Murray had been closely linked to Adelaide, due to it having been serviced by river steamers.

Conserving Australian resources
Impacts on the environment resulting from mining and stock grazing were of concern to authorities and the Forestry Department undertook extensive planting to combat erosion caused by mining and clearing. During the 1950s, the Soil Conservation Authority instigated research projects such as exclosure plots to study soil erosion and ecology, particularly to determine the impact of stock grazing on run-off for the Kiewa Hydroelectric Scheme.

Providing electricity
The Kiewa Hydroelectric Scheme was a large scale engineering undertaking, proposed in 1911, commenced in 1938 and began operating in 1944. It included three power stations and five pondages as well as a network of aqueducts, roads and settlements in the high mountain country between Mt Bogong and Falls Creek.

Recreation and tourism
The highest montane areas in the State are located in the North East region centred on Mt Feathertop, Mt Hotham and Mt Bogong. Once the miners and pastoralists had established

access routes, tourism and recreation followed. The ski industry developed distinctive structures in the mountains and the recreation groups compiled some of the more detailed early touring guides and plans of the alpine forest areas. The mountain landscapes developed a rich network of foot or pack tracks through forests and across mountains and snow pole lines were erected across the alps to assist in saving lives. Scattered memorials proclaim some of the lives lost in this dangerous environment.

Apart from the high country recreation, natural environments with pristine rivers, waterfalls, the valley landscapes in their forested foothill settings, and historic and decorative nineteenth century urban centres such as Beechworth and Yackandandah, have contributed to the popularity of the area for tourism

2.1.2 Assessment criteria for cultural values

Assessing the significance of national estate cultural heritage values in a regional context is a process that begins in the early stages of place identification and documentation. National estate values are set by the Australian Heritage Commission Criteria, specified in the *Australian Heritage Commission Act 1975* and are listed in Appendix B. The assessment of cultural heritage values involves developing significance indicators from each criterion to direct the identification of places of potential national estate value, and developing thresholds to determine if the value meets an appropriate level of significance.

By suggesting types of places that may contain national estate values, significance indicators direct research to derive lists of places for further assessment. Significance indicators may include consideration of the integrity of a place, the representativeness and distribution pattern of historic themes, the representativeness and distribution of types of places, and, the attributes and features of places likely to be strongly valued by communities. The indicators depend on knowledge of regional history and its major themes, the range of types of cultural places, and the regional storylines.

A threshold is the measure for determining if a value is of national estate significance. Thresholds are established by factors such as, the ability of the place to demonstrate the value, the strength and length of community appreciation, the strength of comparative values, and the rarity of the value expression. The level set by the threshold also involves consideration of the quality and quantity of available regional information, expert opinion, and consideration of existing national estate places.

A national estate threshold is not graded: a place will either meet the threshold or not. Places may be significant against more than one national estate criterion, although a place need only be significant against one criterion to warrant listing in the Register of the National Estate. As the RFA uses a regional perspective for its assessment, a more comprehensive knowledge base for assessing places and for applying the thresholds for national estate significance can be applied.

For Aboriginal cultural values, identification and assessment of places was not undertaken. Section 2.2. describes the Aboriginal heritage values program.

2.1.3 Community consultation

Communities provide important information for the identification of cultural heritage places. In addition, community involvement is essential for the assessment of aesthetic and social value significance because the national estate criteria (AHC Criteria E and G) used to assess these values, specify that they must be of significance to a community or cultural group. For the purpose of this study 'the community' refers to any group of people with a common ground. The cultural heritage assessments undertook consultation with the communities as follows:

- workshops for local community groups in regional locations;
- a workshop for State-wide stakeholder and user groups in Melbourne;
- workshops with forest and park officers (also referred to as forest critics);
- meetings with the North East Aboriginal communities;
- a combined Aboriginal groups workshop at Camp Jungai;
- a workshop with Aboriginal people in Wodonga;
- a meeting with Aboriginal people in Bright;
- local community based social value research; and
- a community review process of the community derived cultural value data.

The workshops provided a venue to introduce the comprehensive regional assessment process, engage local communities, major State-wide stakeholder and user groups in the identification of places with heritage value in the region. All information gathered from the community sources, other than Aboriginal communities, is to be returned to public repositories in the form of an Inventory of Community Heritage Places.

2.2 Aboriginal Heritage Values

2.2.1 Background

Aboriginal national estate values theoretically and in practice, usually refers to attachment to land, based on a wide range of traditional and contemporary land uses. Interwoven with this is the issue of Native Title land claims, which could involve values, considered to overlap with national estate heritage values. Aboriginal heritage values are generally assessed against the national estate Criterion G:

> *strong or special association with a particular community or community group for social, cultural or spiritual reasons*

A number of issues relating to the conventional place assessment of indigenous values had surfaced during the Victorian East Gippsland and Central Highlands and the Tasmanian RFA national estate assessment projects:

> • The timeframe and resources for the RFA assessments did not allow for the appropriate consultation and involvement for comprehensive identification.

• Aboriginal people are concerned about losing control of the information about places by allowing them to be identified and listed in a national register.

• Aboriginal people are also concerned about other forest issues such as their participation and involvement in forest planning and management.

• Aboriginal people have indicated that they want a greater say in how they participate in the RFA process and do not want their participation restricted to national estate identification.

As a result of these issues, conventional assessments have not been pursued and the Australian Heritage Commission has accepted the shift in focus from identification of places of archaeological, historical or traditional significance to an ongoing consultative process for Aboriginal heritage management. As part of the North East RFA, it is proposed to give greater recognition to Indigenous concepts of cultural heritage and other interests which needed to be addressed in order to develop effective consultation and conservation processes that reflect Indigenous concerns.

Cultural Data Audit
A review of the existing knowledge of Aboriginal heritage places in the North East region was undertaken as part of the cultural data audit (Marshall and Jones 1997), in the general preliminary work for the RFA. This study determined that there had been little or no systematic survey for Aboriginal sites in the forested areas. The existing record of Aboriginal sites in the North East Region as kept by Aboriginal Affairs Victoria and the Register of the National Estate was not extensive and comparatively incomplete.

The cultural data audit concluded that within the North East region no forested areas had adequate surveys to enable an assessment of their heritage values. Similarly there had been no area surveys of Aboriginal historic heritage. Only two sites in the region had radiocarbon dating undertaken. Given the inadequacy of the data record, a thematic analysis was deemed inconclusive.

Aboriginal Historic Places Program
An extensive study to establish and record the associations which Victorian Aboriginal people have or have had with places since European settlement is being undertaken by Aboriginal Affairs, Victoria (AAV). Part of that study was carried out by AAV, funded by the Australian Heritage Commission as part of the East Gippsland and Central Highlands RFAs. Due to the desires of the relevant communities, no identified places proceeded to listing in the Register of the National Estate, but the outcomes substantially contributed to the ongoing management of Aboriginal heritage places.

2.2.2 Aboriginal heritage values - the approach

The approach adopted for Aboriginal heritage assessment in the North East region is to engage in regular communication with Aboriginal communities and with their participation and agreement, involve communities in ongoing identification, assessment, conservation and management processes for Aboriginal heritage places as required.

As a starting point relevant known community groups located in or with extensive land areas in the North East region were approached in order to discuss the proposal. These communities are descendents of the original language groups who have remained in the region, retaining their association with their homelands. They involved Camp Jungai Co-op Ltd, Shepparton Aboriginal Arts Council, Wurundjeri Tribal Land Heritage Council, and Mungabareena Aboriginal Corporation. Other communities with a small amount of land overlap were informed of the program but would have had, or would be involved in consultation as part of the RFA projects more directly associated with their land.

December meetings
An initial round of meetings was held 10-12 December 1997 with the Aboriginal groups to explain the RFA and discuss a strategy. At these meetings a proposal consisting of a set of mutually reinforcing strategies designed to achieve effective identification and management of Aboriginal cultural heritage values was proposed for consideration. The strategies include developing a zoning plan to identify potential areas containing sites of Aboriginal cultural heritage. This plan will provide a framework for developing management guidelines to protect places of Aboriginal heritage importance.

Camp Jungai workshop
A workshop was held at Camp Jungai in March 1998, with representatives of Camp Jungai Co-op Ltd, Shepparton Aboriginal Arts Council, Mungabareena Aboriginal Corporation, Mirimbiak Nations Aboriginal Corporation, Natural Resources and Environment (NRE), Aboriginal Affairs Victoria (AAV), Environment Forest Taskforce (EFT) and Department of Primary Industry and Energy (DPIE) attending. The workshop refined the strategy which became known as the five point strategy (later known as the Aboriginal Heritage Management System) and provided an outline and discussion of a proposed project (encompassed in strategy 4) to produce a model for sensitivity zoning and develop this for the North East region.

It is intended that the model could apply to all Victorian forest regions to produce landscape zones of sensitivity. The model would take into account the nature of prior disturbance and the potential for future impacts from forestry activities such as roading, and establish priorities for the ongoing assessment. The zoning for the North East would have accompanying guidelines for general management and, management of sensitive areas and important known sites.

At the Camp Jungai Workshop, participants requested that the concept of the model be expanded to consider contemporary social heritage value. The consultancy brief for the model, was reviewed and agreed by the Aboriginal groups. The selected consultant was later approved by Aboriginal groups and the consultancy commenced.

Wodonga workshop
When stage one of the consultancy was completed, a workshop was held near Wodonga in February 1999 with representatives of Camp Jungai Co-op Ltd, Shepparton Aboriginal Arts Council, and Mungabareena Aboriginal Corporation, Taungurrong community and agency staff. The model and zoning for North East region was explained by the consultant, Dr Hughes, noting that high sensitivity of Aboriginal places related to the areas of Devonian Granite, Cambrian Greenstone, alpine and sub-alpine areas, and dissected plateaux landscape.

At that workshop concerns were raised about the RFA process and the Comprehensive Regional Assessment report. A paper *Statement of Ya-idt'mitung on the North East Victoria Comprehensive Regional Assessment Report* (Warrawee'a, 1999) was distributed and read, outlining the concerns held by the Mungabareena people. The Aboriginal people stressed

that envrionmental issues are of paramount importance to them. The workshop resolved a series of further meetings with Aboriginal people, agency staff and consultants, and further consideration of the original five-point strategy. Following the workshop, representatives of the Aboriginal communities undertook a week's reconnaissance survey with the consultant, Dr Hughes to review the conclusions of the sensitivity zoning plan.

Bright meeting
The meeting was held at the Bright Chalet in March 1999 with representatives of Mungabareena and Taungurrong communitities. At that meeting community representatives stated that they are unhappy with the RFA process but nevertheless expressed their desire to remain involved in the process. A statement by the workshop participants was submitted (refer Appendix D). A number of comments were made relating to the implementation of the Five Point Strategy (Aboriginal Heritage Management System). These are currently under further consideration. The theme for each strategy is as follows:

1. communication;
2. manage important known places;
3. cross cultural training;
4. protecting sensitive areas with the assistance of a predictive zoning plan;
5. guidelines for management;

2.2.3 The ongoing program for Aboriginal heritage

The project for the development of the model and predictive zoning for the North East region is nearing completion. The study and final reports should provide the Aboriginal people of the North East and the management agencies with a tool to assist in the protection of places of importance, and as well, identify areas where strategic surveys are required. The model will provide the Commonwealth and Victoria with the basis for predictive sensitivity zoning for the other RFA forest regions.

Statewide Guidelines for Cultural Heritage Management (Strategy 5) will outline procedures for staff to follow in identifying and managing Aboriginal heritage, including Aboriginal community consultation and participation in the management process. Guidelines have already been prepared for East Gippsland (NRE 1997) as part of the RFA process for that region.

The five point strategy is a system for Aboriginal heritage management in forests, parks and reserves. The senstivity zoning plan and guidelines provide additional tools to facilitate that system. Communication as strategy one, is fundamental to the management of Aboriginal heritage values and underpins all other strategies for dealing with Aboriginal cultural heritage. Successfully achieving an open dialogue will involve regular meetings where relevant forest issues can be discussed by Aboriginal communities and forests and parks management staff. A process for regular meetings is being developed.

2.3 Social Value Assessment

The identification and assessment of places of national estate significance for social value in the North-East Forest Region was based on national estate Criterion G., which recognises places that have:

> *strong or special association with a particular community or community group for social, cultural or spiritual reasons* (AHC Criteria, Appendix B).

A place significant to the community may be where a memorable event has occurred in the past, or a place associated with a significant recent event. These events could be a local disaster which affected much of the community such as a flood or bushfire, or it could be a place of community celebration. A local landmark may be a waterfall, a hill or mountain, an area of forest or a single tree. Other places of attachment may be those associated with local history or folklore such as a mountain hut or track. Such places are considered important because they form a part of the community's identity.

Very few places having national estate *social* significance had been previously identified in the region. The information gathered during the CRA process, which enhances our understanding of the importance of this value, will be amalgamated with existing information on places already in the Register of the National Estate.

2.3.1 Data sources

The communities of the North East Forest Region provided the primary source of data for identifying and assessing places of indicative national estate social value during the CRA. Individuals and representatives from a range of organisations attended community workshops to nominate places important to them, to provide information on why those places were important, and to map the locations of each place. Eight community workshops were held throughout the Region and one in Melbourne. The workshops were designed, organised and facilitated by consultants Context Pty Ltd (1997 a,b,c,) in collaboration with Commonwealth and State Government RFA project officers.

Information obtained through the social values community workshop process was also used as a primary source of data for assessing places of aesthetic and historic value in the Region (see Sections 2.4 and 2.5).

2.3.2 Methodology

Identifying the range and extent of places of social value in the Region required a group-based social research method that would draw together a wide range of people willing to share their knowledge, opinions and feelings. From the range of community consultation methodologies available, the workshop method was selected as the most efficient because it could achieve a number of goals. It could:

- involve a large number of people and maximise their input;
- cater for a wide range of community interests and perspectives;
- engage participants in identifying and expressing shared values;
- facilitate comparison between the range of places valued by a community;
- enable a regional and a local focus concurrently;
- be applied in a consistent manner across the Region;
- provide results within the available timeframe;
- allow for the broad dissemination of information about the RFA generally and provide an opportunity for public question time with government officials, and
- provide consistency with methodologies used in the assessment of social value in RFA regions in other States.

Workshop locations
The choice of locations for workshops was based on a range of demographic, geographic and social information. Factors included the accessibility of workshop locations to major community catchment areas and the distance participants would be required to travel. Eight workshops were held in six locations; Mount Beauty, Bright, Mansfield, Tallangatta, Corryong and Wodonga; in day and night sessions to enable as many people as possible to attend. One workshop was held in Melbourne to enable state-wide stakeholder and user groups to participate. Workshop locations and some community groups were identified with the assistance of local coordinators.

Identifying potential workshop participants
A local coordinator was appointed for each sub-regional area to provide a local focus, to identify and encourage organisations and individuals to attend the workshops. Invitations with background information on the aims and context of the workshop, were sent to people with interests in local government, business, timber industry, mining, primary industries, community service, conservation, history, tourism and recreation (refer Appendix E). A total of 417 potential participants were identified, from which 142 attended the workshops (refer Appendix F).

Workshop design and process
Each workshop lasted approximately four hours and was structured into four phases. The first phase, involving all participants, provided information about the RFA process, the aims of the workshop, the meaning of cultural heritage value to each participant, and the types of places that might have those values. The second phase involved smaller groups of participants in compiling lists of places of possible cultural heritage value through discussion and sharing of ideas. In the third phase participants provided detailed information (including a description of the place, its history, location and boundaries, and its importance) by filling in data forms. In the fourth phase participants located and marked on 1:100 000 topographic maps places they had described, where known.

A total of 652 places were identified through the workshop process. All workshop participants were sent a summary report of their workshop and a list of the places identified.

Identifying places of indicative national estate social value
After the workshops were held, places were then assessed for national estate social value (Context 1997b) according to the following six steps:

Step 1 - Classification and preliminary sieve. The consultants reviewed the workshop data for evidence of social value using three significance indicators:

- importance to a community as a landmark, marker or signature;

- importance as a reference point in a community's identity or sense of itself; and
- strong or special community attachment developed from use and/or association.

Step 2 - Research. The consultants went to each workshop area and conducted community research to further examine the social value of each place. This information was considered along with the community association noted at the workshops, the number of workshop locations in which the place was identified, and the votes recorded at workshops for particular places.

Step 3 - Preliminary Assessment. The consultants examined the adequacy and completeness of the data to enable an assessment to be made against the criterion. This resulted in a list of potential national estate places. In particular, the examination looked at whether there was:

- an identifiable community that is associated with the place;
- sufficient data to determine the location and boundary of the place; and
- sufficient data available to assess its significance.

Step 4 - Completeness and Site Validation. The consultants then established indicative boundaries, through field work and other research.

Step 5 - Final Assessment and Documentation. The thresholds were refined and applied to identify the nature of a place's social significance and to gauge the strength and endurance of this value. The table (table 2.1) shows the relationship between significance indicators, the threshold indicators and the thresholds. Following the final assessment the national estate database documentation was completed.

In assessing a place against the G criterion, a place reaching the threshold required the following:

- to be identified by a community which is in continued existence today as a definable entity;
- a continuity of use or association, meanings, or symbolic importance over a period of 25 years or more (representing transition of values beyond one generation); and
- an existence of an attachment or association with a place by a defined community, including evidence of use developing into deeper attachment that goes beyond utility value.

Step 6 - Return Data to Community. All the data about places identified at the community heritage workshops was reassembled, combining the original data with the consultants assessments into a single inventory of places. The inventory was released as a draft for public comment, following the amendments and inclusions resulting from the consultation, a final inventory of places will be lodged in selected public repositories.

2.3.3 Results

Of the 652 places identified through the workshops, 173 were deemed to be of predominantly social value, 65 of these places were assessed in detail, with 48 judged to be above threshold for social value significance and worthy of consideration for the Register of the National Estate. Places identified with indicative national estate social value are listed at Appendix H and their location shown on Map 2. Another 17 were significant at the local level.

Table 2.1: Thresholds for National Estate Social Value Significance

Significance indicator	Threshold Indicators			
	Threshold	**Relative strength of association**	**Length of association**	**Relative importance to the identified community**
Important to the community as a landmark, marker or signature	Above threshold	Key marker or signature used by a *regional* or *district* community to define itself and/or the locality[1]	*Longevity* and *continuity* of recognition from past to present	Singular defining landmark, feature or icon for a community
		A well known feature within a *defined* or *local* community[2]	Long association, but some discontinuity.	Well-known landmark, marker or signature
	Below threshold	Key marker not widely known beyond the bounds of a small community Little known feature within defined community	Recent association	One of many landmarks; not outstanding to the associated community
Important as a reference point in a community's identity or sense of itself	Above threshold	Represents fundamental community meanings widely recognised throughout a *regional* or *district* community	Longevity and continuity of association	Singular or outstanding place Profound meanings Seminal in shaping community identity
		Represents important community meanings widely recognised throughout a *defined* or *local* community	Long association, but some discontinuity	Important
	Below threshold	Represents other meanings of lesser/minor importance or less widely recognised Little known feature within defined community	Recent association	Minor importance One of many places providing same connection to identity
Strong or special community attachment developed from use and/or association	Above threshold	Places representing fundamental community attachments developed from long use or association widely recognised throughout a *regional* or *district* community:	Longevity and continuity of community use and/or access	Strong attachment shared across community
		Places representing important community attachments developed from long use or association for a *defined* or *local community.*	Long association, but some discontinuity	
	Below threshold	As above but not widely known beyond the bounds of a small community. Functional association without demonstrated attachment Little known or used	Recent association Lack of any continuity to the present	Places representing attachment of minor importance to community One of many similar places with equal and minor attachment

[1] *Regional community* means the North East Forest Region; *District community* means a workshop catchment.
[2] *Defined community* means a community defined by its shared culture, beliefs, ethnicity, activity, experience (rather than locality); *Local community* means the community of a town or rural area.

The range of places above threshold reflects the types of places to which communities are attached. Included in the group are thirteen mountain huts, six historic mining sites, and six waterfalls. Other places; Back Creek School Environment Site, Osbournes Flat Community Hall, Towong Racecourse and Nariel Creek Festival Ground reflect community attachment to places used for community purposes. A few places are valued for their association with folklore such as Polly McQuins Reserve, Powers Lookout and The Rocky.

2.4 Aesthetic Value Assessment

The identification and assessment of aesthetic value in the North East Forest Region was based on national estate Criterion E, which recognises places that have:

> *importance for a community for aesthetic characteristics held in high esteem or otherwise valued by the community.*

The working definition for 'aesthetic value' used for the regional assessments in Victoria is:

> *Aesthetic value is the response derived from the experience of the environment or particular natural or cultural attributes within it. This response can be to either visual or non-visual elements and can embrace emotional response, sense of place, sound, smell and any other factors having strong impact on human thought, feelings and attitudes* (AHC Technical Workshop Series No 7, 1993)

The types of places falling into the criteria for aesthetic places include mountain tops, viewing points, scenic drives, mountains, hills, recreation areas, stands of trees, rivers and waterfalls.

2.4.1 Data sources

Scenic value assessments had been undertaken by NRE as part of the Visual Management System, by LCC in a number of studies particularly of rivers and streams, and by the National Trust of Australia (Victoria) in several heritage landscape assessments in the region. Although these data sources contributed to the research they could not provide an adequate assessment of national estate aesthetic value across the region.

2.4.2 Methodology

The complex nature of aesthetic value, as shown by its definition above, prompts the need for a multifaceted approach to its assessment. Using Criteria E and the definition (described above) a set of significance indicators were used to assist in identifying places with potential national estate aesthetic value as follows:

- natural features and landscapes recognised by experts (forest critics) or community groups as having outstanding scenic and evocative qualities;
- cultural features or landscape with outstanding scenic, evocative or other meaning;

- places having aesthetic attributes or quality that has inspired art, poetry , literature, or tourism promotion;
- aesthetic quality that promotes popularity of a place;
- unusual or rare landform phenomena;
- prominent distinctive landform feature; and
- a place having community recognition as a landmark.

A consultant, Robin Crocker & Associates (1997) undertook the project that consisted of researching and compiling datasets from workshops (primary sources) and focused surveys (secondary sources), combining the data and assessing the value. The datasets are described as follows.

Community heritage workshop dataset
Community heritage workshops as described in the previous section (Section 2.3.2) were held across the region to collect information for both the social, historic and aesthetic value assessments. Around 57% of the places identified at the workshops were recorded as having aesthetic value.

Forest critics workshop dataset
The term 'forest critics' is used for forest officers and parks officers who had a sound knowledge of forest systems and particular forest areas and who could critically evaluate the aesthetic qualities of the landscape. Officers from the region, particularly from the more remote areas, participated in order to provide coverage of the whole study area. Forest Critics Workshops were held at Mansfield, Tallangatta and Bright (refer Appendix G). The workshops involved each officer nominating potential aesthetic places, then the group identifying gaps and overlaps, sieving places to eliminate minor sites, completing place questionnaires, and marking places on 1:100:000 map sheets.

Art and literature survey
The aesthetic importance of places is often depicted in art and literature, giving a place both popularity and a role in understanding the aesthetic value of societies. A specialist research consultant (David Young with Robin Crocker & Associates) undertook a survey of literature, fine art, film and photography related to the North East region. Relevant experts were consulted and primary and secondary sources reviewed. Material obtained from the survey was combined and ranked for significance based on:

- frequency of association, that is the number of times a place has been recorded in any art media;
- public recognition of the artists depicting the forest place;
- public recognition of the individual artworks; and
- public recognition of the place depicted.

A total of 44 places in the region were identified in the research with varying degrees of recognition. Well known Victorian artists and photographers such as Eugene Von Guerard, Arthur Streeton, Henry Nankin and Nicholas Caire painted and photographed popular landmarks and landform phenomena, and captured the colours and textures of the region, while a number of writers such as Henry Kingsley and Elyne Mitchell used the landscape as the setting for their novels.

Tourist publications survey
Literature generated by the tourism industry both reflects and generates public knowledge and place recognition by encouraging visitation. The availability of information on forests and natural areas was discussed with staff from tourism and conservation organisations, and tourist information outlets, and publications reviewed. Assessments concentrated on high quality, full colour publications with moderate to large print runs and broad distribution based on the understanding that they have the greatest impact on existing and potential visitors to

the forested areas. The categories of publications were state, regional and local tourism brochures, statewide and regional park and forest brochures, guidebooks and directories, posters and a selection of periodicals and large format heritage books. Sites in forested settings were recorded and a scoring system used to measure the level of community exposure to the image (based on print run and distribution) and the number of times a place was depicted.

Other published sources survey
Information concerning previously identified places of aesthetic value within the North-East Forest Region was reviewed and considered in the compilation of data for the assessment of national estate aesthetic value. Sources accessed included government and non-government-generated reports, such as the National Trust of Australia (Victoria), lists and databases together with any other relevant publications.

The methodology for the CRA aesthetic value assessment was designed to achieve the best practicable understanding of the range and distribution of aesthetic places in the North-East Forest Region within the available timeframe. The assessment process was organised in the following steps:

Step 1 Preliminary Assessment. Information from the datasets was combined into a matrix table and examined for adequacy and completeness of place data. Places were selected for further assessment using the following selection criteria:

- identified at two or more community workshops; or
- identified at one community workshop and in at least one other source; or
- identified at a forest critics workshop and in at least one other source; and
- located in a forest setting.

Step 2 Review and site verification. Places meeting the criteria for preliminary assessment were subject to more rigorous assessment as follows:

- quantitative and qualitative review of all information with an emphasis on community and forest critic derived places;
- field reconnaissance surveys which involved consideration of the extent of selected places and their comparative landscape-character-type scenic quality;
- consideration of the remoteness of places; and
- consideration of the values weighting from the secondary source information

Step 3 Final Assessment. To finalise the assessment, places had to meet one of the following thresholds:

- strongly identified by a number of primary community sources for having aesthetic value;
- identified by community sources and supported by information from forest critics, scenic landscape-character-type comparisons or secondary aesthetic value sources; or
- remote places strongly identified by forest critics as having high aesthetic value in the region and supported by secondary aesthetic value source, or by expert corroboration.

Final documentation for the national estate database was then completed.

2.4.3 Results

In the North-East Forest Region 42 places were considered to meet an appropriate threshold of national estate aesthetic significance as a result of studies carried out for the CRA. These places incorporated 67 individual places identified in the original data sets, with some places amalgamated where appropriate with larger places, such as national and state parks. The assessment process showed that the majority of places were below the national estate aesthetic threshold, in some cases because of the lack of supporting data. Places identified with indicative national estate aesthetic value are listed at Appendix I and their location shown on Map 3. The 42 aesthetic places above threshold were drawn from:

- 178 places identified with aesthetic value from the community heritage workshops;
- 133 places from the forest critics workshops;
- 43 places from the art and literature survey;
- 45 sites from the tourism literature review; and
- 113 places from other published sources.

The aesthetic value research undertaken for the CRA stressed that communities greatly value the aesthetic quality of the local national parks, identifying numerous features within the parks as well as the full extent of the park landscapes. The Alpine National Park, Mount Buffalo National Park, Burrowa-Pine Mountain National Park, Chiltern Box-Ironbark National Park and Mount Samaria State Park, were identified. Mountains are also of great aesthetic importance, valued not only for the aesthetic experience but also as local landmarks. Apart from features in parks, eleven mountains, six rivers, seven valleys, lookouts and routes were identified for their aesthetic importance. Cultural features were comparatively not highly valued for aesthetic importance, with only two huts and a firetower in their mountain settings, reaching a level of aesthetic significance.

2.5 Historic Value Assessment

Historic value reflects how a place reveals information about past events, practices and people. Australian forests have a long human history with the North East region revealing a rich historic heritage arising from a diverse colonial and post-colonial history. Settlement and goldrush histories are dominant, but there are many historical themes, including the more recent theme of recreation and tourism described in *Section 2.1.1* strongly represented in its forested areas.

Places with historic value in the North East region were assessed for national estate significance against the Australian Heritage Commission Criteria A3, A4, B2, C2 D2, F, and H. (refer Appendix B). Aspects of heritage significance covered by these criteria are:

- richness and diversity of cultural features (A3)
- important in the course and pattern of history (A4)
- rarity of historic features (B2)
- research potential relating to human history (C2)
- important example of a type of place (D2)
- technical or creative achievement (F)
- association with the life or works of an important person or group (H)

2.5.1 Data sources and data audit

The data audit provided a bibliography of the main sources of heritage place information, an assessment of existing site databases and reports based on minimum data requirements, a list of historic themes and site types, an indicative list of heritage places within forests, and a geographical and thematic data gap analysis. Data bases with useful place records in the region were the Register of the National Estate, the NRE Historic Places Section database, Heritage Victoria Register, Heritage Victoria Archaeology Database and the National Trust of Australia (Victoria).

The audit included all sites which fell within forested areas on both public and private land, and revealed that the majority of forested land was publicly owned. Limitations were found to exist in accurately locating whether places were in forested areas or not because no GIS material was available for any of the historical datasets.

In comparison with other Victorian RFA regions, the audit found only a small number of forest sites identified in the North East, despite the study area containing large areas of forested land. The audit noted that sites identified by the NRE and Heritage Victoria Archaeology Databases, and the report by G. Butler (1984) of the Mt Buffalo Plateau and the Howqua River area had been adequately documented. Recent heritage assessments of Victorian gold mining sites (Bannear, 1994, 1995, 1997) and alpine huts (Graeme Butler & Associates, 1996) were substantial and available for consideration for the National Estate. The gold mining sites have been considered for the Victorian Heritage Register and are documented in the NRE database.

With the exception of the NRE database, all other heritage databases provide inadequate coverage of forested areas. Also, there had been no comprehensive coverage of the range of forest themes, there was a lack of regional heritage studies, with a notable absence of places in the forests along the Murray River.

2.5.2 Historic places research

An assessment by Natural Resources and Environment, and Environment Australia of the North East Cultural Heritage Data Audit recognised the need for the following historic studies to be undertaken to provide adequate information for a comprehensive regional assessment of cultural values.

- Sawmill and Tramway Sites, for places directly associated with timber harvesting such as sawmills, tramways, mill settlements, and kilns.

- Historic Forest Activity Sites, to cover places associated with minor forest production such as silviculture, fire protection, charcoal production, eucalyptus distillation, wattle barking, and firewood provision, as well as sites associated with forest management such as arboreta, camps, fire towers.

- Selected Historic Themes, to cover places associated with all other historic themes other than those listed above including places related to pastoralism, agriculture, settlement and people, hydroelectricity, moving goods and people, mining other than gold, recreation and tourism.

The studies were undertaken by Peter Evans (1997), David Bannear (1997) and Graeme Butler & Associates (1997) respectively.

2.5.3 Methodology

The methodology of the three historic studies varied due to the focus of each study and the information resources available but the general approach taken by the studies is as follows.

The first stage of the assessment was a comprehensive investigation of primary and secondary historical sources. This was necessary because previous heritage assessments carried out in Victoria's North East have not covered historic forest sites, a significant proportion of project time was spent on historical research in order to produce a comprehensive regional perspective of the historic and existing resource.

As a regional assessment covers a vast area, it requires a methodological selection process. The selection may be based on the representativeness of the themes or types of place, the availability of data, or the condition and integrity of the place. Both the *sawmill and tramways study* and the *forest activities study* were specific theme studies therefore selections of places were based on typologies and condition and integrity. These typology studies were able to analyse substantial government records to research places and augment that information with consultation with forest officers to ascertain condition and integrity.

The *selected historic themes study* covered an array of themes and types of places and required a thematic and geographic gap analysis using the cultural data audit and community workshop data as a first step to direct priorities for research. The selected themes study also, as part of its preliminary selection considered historic storylines such as bushranging, the influences of gold on settlement by Chinese, and the lost forest settlement places. Those analyses recommended the rationale for the selection of places for assessment which included routes of human movement, the Murray River sites, places associated with recreation and tourism, hydro-electricity generation, water and fire management, science and research sites, and places associated with prominent people such as Ned Kelly.

Each of the historic studies developed sets of significance indicators to determine the lists of places to be surveyed. For the final assessment they established thresholds to determine which places met the AHC criteria.

Sawmills and tramway places
A record of 385 Sawmills and Tramways sites was identified from research information, and to a small degree from the community heritage workshops. If places had the potential to meet the threshold for two criteria they were listed for field checking.

After field surveys, places were comparatively assessed against the national estate criteria in terms of their ability to represent any of the following:

- development of sawmilling, sawmills and transportation networks;
- economic importance of the industry;

- community development ;
- discovery of new seasoning techniques;
- demonstration of a range of occupations and skills in sawmilling;
- demonstration of methods for harnessing landforms;
- distinctive mill layout;
- demonstration of change of technology and engineering achievement; and
- range of products produced.

In each instance the place needed to amply demonstrate one or more of the features above, and be one of the best of its type in the study area in order to meet the threshold level for a place of potential national estate value.

Forest activities places
A detailed analysis of historic records identified 70 potential forest activity sites on public land and following community consultation it was found that most of these no longer existed. The remaining sites were assessed against the following significance indicators to determine those of potential national estate value:

- the role the place played in respect to the Forests Commission's strategic priorities, and the historical development of the region and State's timber industry;
- the scientific importance of the data represented in the features of a place and the degree upon which the place may contribute further substantial information;
- the degree to which the place can be demonstrated as having historical integrity and /or rareness in its intactness or condition better than any other similar place;
- the measure of the awareness in the local community of the site and its role in the history of the locality; and
- the degree to which the setting of the place had been modified.

Site inspections revealed that only a few sites had any meaningful site expression and thresholds were based on the integrity of the sites in their ability to meet the criteria. Seven places were assessed as above threshold as indicative places for the national estate.

Selected forest theme places
The research stage of the forest themes study identified over 1217 sites which were listed and classified according to type, theme and potential significance. From that list, 169 places were considered to indicate potential national estate significance if they had:

- a heritage value (provided by previous studies) where the place has an identified value to the locality, region, State or nation;
- no known statutory heritage status; and
- no known statement of significance.

Of the 1217 places, some came from the thematic and geographic gaps analysis (Marshall & Jones 1997), 60 places from the community heritage workshops, 124 were gold mining places and outside the scope of the study, while others were under investigation in other cultural studies such as the National Trust of Australia (Victoria) study of timber bridges.

Places were assessed for national estate significance using thresholds based on:

- exceptional richness or diversity of features relating to the theme, or theme/storyline combination;
- regional comparisons with other places in the region relating to the representation on theme type, or a particular event;
- known as a research or teaching place or with exceptional regional potential for public education;
- integrity for demonstrating a type of place; and
- the importance of association with a person or group of regional or state importance.

2.5.4 Results

For the sawmills and tramways, five places were considered to meet the threshold for national estate significance and these included mills, tramways and seasoning works. Compared with the Central Highlands region, the North East has approximately a quarter of the number of mills and considerably less distance of tramways. This is ascribed to the smaller market for the timber and the use of spot mills which were moved on to new cutting areas after approximately 6 - 12 months.

Of the forest activity places, seven were considered to meet the threshold for national estate significance and included fire towers and lookouts, a distilling site, two boys camp sites and a prisoners of war camp site. Generally speaking the bulk of the surviving physical evidence at these places dates from the Second World War. The recent age of the surviving evidence is a reflection of the temporary and basic nature of the activities undertaken and the technologies employed.

Within the group of selected forest themes, a total of 57 of the assessed places met the threshold of national estate significance. A number of these places are linked thematically and geographically such as the Wodonga - Cudgewa railway line sites which includes rail line routes and former station, while the Kiewa Hydroelectricity group includes reservoirs, aqueducts, settlement sites, power stations and an arboretum. Places linked by the bushranging storyline include Ellen Kelly's homestead ruin, Powers Lookout and the Police Memorial. A number of other places assessed cover themes of mountain grazing, science and research, mountaineering and recreation.

Places identified with indicative national estate historic value are listed at Appendix J and their location shown on Map 4.

Chapter 3: National Estate Natural Values

3.1 Introduction

Natural values for the North East RFA Region were assessed against the relevant national estate criteria. They range from values covering some thousands of hectares to values confined to single small sites. Identification and treatment of natural values follows three broad subdivisions:

- extensive natural values;
- localised natural values (flora, fauna); and
- other natural values, including those relating to geology and geomorphology.

As was done for the cultural values assessment, the natural values assessment considered places within the study area across all land tenures. It did not, however, limit itself to forest and forest-related species or places, largely because the distinctions are often not clear. The policy of the Australian Heritage Commission regarding places of indicative national estate heritage value located on private land is described in Section 2.1.

3.1.1 Assessment criteria for natural values

In the regional context, assessment of national estate values requires a comparative appraisal of the significance of places having one or more attributes or values. The values are derived from the national estate criteria listed in Appendix B.

Indicators of significance vary across the national estate natural values and include:

- rarity or threat;
- distribution pattern;
- condition and integrity;
- diversity or richness;
- outstanding example.

The development of thresholds for national estate significance will vary depending on the level of current knowledge about the nature and extent of natural values and their distribution in the landscape at a local, regional or national level. A regional evaluation involves building and interpreting a more comprehensive and integrated knowledge base for assessment of significance than would be possible in considering a place, or places, in isolation.

As with national estate cultural values, a threshold is set in relation to the significance indicators and this threshold is specific to each national estate value. Thresholds of significance for each value were largely based on those developed and used for the Central Highlands Joint Forests Project (AHC & CNR 1994a) and the East Gippsland National Estate Assessment (AHC & NRE 1996). Some thresholds, however, were modified, based on outcomes of a workshop of experts and on methods used in recent national estate assessments for RFAs in other states.

The resultant products are indicative national estate value layers. Individual sub-units within each layer are not graded in significance as they either reach the threshold or they do not. Boundaries of some indicative layers have been rationalised in an ecological or topographic sense, while others have not.

All mapped indicative national estate natural areas have been digitised and are held in ARC/INFO format on a GIS platform held by both Environment Australia and NRE.

3.1.2 Major biophysical characteristics of the region

Detailed biophysical characteristics of the North East RFA Region are provided in the CRA Report for the Region (VicRFASC 1998a). A brief summary is presented here.

Biogeography
The Region covers over two million hectares in the north east of Victoria. The two main IBRA Regions (*An Interim Biogeographic Regionalisation of Australia*, Thackway and Cresswell 1995) represented are the Australian Alps and the South Eastern Highlands, with small areas of the New South Wales South West Slopes, Riverina and Victorian Midlands occurring along the boundary with the Victorian West RFA Region.

Landscape
The Great Dividing Range is the dominant landform feature in the Region. It includes the Victorian Alps (generally above 1500 m), consisting of a series of disjunct high altitude plateaus of which the Bogong High Plains is by far the largest. At slightly lower elevations are the Victorian Highlands, composed of dissected uplands with moderate to steep slopes. Other areas consist of foothill slopes, minor ranges and flat to gently undulating lands.

Climate
The Great Dividing Range has a significant influence on weather patterns in the Region. The alpine area is characterised by high annual precipitation (generally greater than 1200 mm), with much of this falling as snow. At the other extreme, some areas at lower elevations may receive only 600 mm per annum. Location and topography also influence temperatures. Average summer temperatures on the plains and mountains are about 30°C and 15°C respectively. In winter, the average maximum temperatures range between 10°C and 16°C in the flatter country but are closer to zero in the mountains.

Water Resources
The North East RFA Region is almost entirely within the Australian Water Resources Commission Murray-Darling Drainage Division, covering sections of seven river basins. Only the Kiewa River basin is entirely within the Region, with the others represented by the Upper Murray, Ovens, Broken, Goulburn, Mitchell and Thomson River basins. The forested slopes of the Great Dividing Range are an important source of water for use both within and outside the Region.

Vegetation
Ecological Vegetation Classes (EVCs) are the basic mapping unit used for forest ecosystem assessments, biodiversity planning and conservation management at the regional scale in Victoria. A total of 58 EVCs (including a number of mosaics and complexes) have been identified as currently occurring in the North East. Forty-six of these are classified as rare, vulnerable or endangered according to the National Reserve criteria (JANIS 1997). Those

which were most widespread prior to European settlement include Herb-rich Foothill Forest, Grassy Dry Forest, Shrubby Dry Forest, Valley Grassy Forest, Plains Grassy Woodland and Montane Dry Woodland. A total of approximately 2,000 species of vascular plants have been recorded for the Region, including 166 species of conservation significance.

Fauna
The faunal assemblage of the North East is also diverse, reflecting the range of environments and habitats represented. A number of species, including the Long-footed Potoroo (*Potorous longipes*), Mountain Pygmy-possum (*Burramys parvus*), frogs, skinks, fish and significant invertebrates, have important populations in the Region, particularly in the smaller fragmented alpine environments.

3.2 Extensive Natural Values

The two sub-criteria of relevance to the assessment of extensive natural values are:

Sub-criterion A2: **Importance in maintaining existing processes or natural systems at the regional or national scale; and**

Sub-criterion B1: **Importance for rare, endangered or uncommon flora, fauna, communities, ecosystems, natural landscapes or phenomena, or as a wilderness.**

These are inclusive values, extending broadly across the landscape rather than being confined to single vegetation types, landforms or localities. The values considered in this aspect of the North East assessment are:

- natural landscapes;
- undisturbed catchments;
- wilderness; and
- old-growth forest.

Assessment of these values resulted in the identification of indicative places of importance for the maintenance of natural processes (such as hydrological processes) at regional and national scales, and places that are of regional importance for maintaining specific natural systems (such as remnant vegetation).

Biophysical Naturalness
Biophysical Naturalness is one of the indicators developed for the assessment of wilderness values, using the National Wilderness Inventory (NWI) criteria (Lesslie and Maslen 1995). It is also integral to national estate assessments for natural landscapes and undisturbed catchments. Biophysical Naturalness (BN) is based on the assumption that the degree of change sustained by an ecosystem is directly related to the intensity and duration of interference.

The types of disturbance information used to derive the BN layer are dependent on the available range of reliable data sets. Information used to derive the BN layer for the North East RFA Region included old-growth coverage and records of timber harvesting, grazing leases and agricultural clearing. In the BN rating scheme, wildfire is considered a natural process and the effects of wildfire did not influence BN rating.

The BN index provides a six-class rating from a value of 0 (most disturbed) to 5 (most natural). A description of the rules used to derive each of the classes is given in Table 3.1.

Table 3.1: Biophysical naturalness rating scheme.

Class	Class description for North East Victoria RFA
5	No evidence of logging or grazing. Natural vegetation cover free from disturbance; Old-growth forests.
4	Pre 1950 grazing; Pre 1950 selective logging; Negligible natural disturbance.
3	Areas which were intensively logged before 1950; Pre 1950 selectively logged areas which have been recently grazed*.
2	Recent grazing; Recent selective logging; Pre 1950 intensive logging with recent grazing*.
1	Pre 1950 agricultural clearing*; Recent intensive logging; Recent selective logging in association with recent grazing.
0	Non natural land; Recent agricultural clearing.

* Event does not occur in current dataset.

3.2.1 Natural Landscapes

Natural landscapes are large, relatively undisturbed areas with topographic and catchment integrity where natural processes continue largely unmodified by human intervention. Natural processes include:

- energy flows;
- nutrient cycling;
- hydrological processes;
- ecological processes such as succession; and
- evolutionary processes such as speciation and extinction.

At a national level, 'natural landscapes' are considered rare, and in national estate assessments for Regional Forest Agreement regions they have generally been assessed under sub-criterion B1.

Method
The following measures were used to identify areas of potential natural landscape value:

- naturalness (or level of disturbance indicated by the BN index);
- size; and
- integrity in the landscape.

Boundaries were drawn around contiguous areas of high biophysical naturalness. They were largely delineated using BN class boundaries. Highly irregular boundaries and small narrow fingers were smoothed off or clipped to reduce edge to area ratios and increase overall integrity. Rivers, ridge lines and roads were used to guide manual delineation of some boundaries. In order to rationalise the identification of areas, identified areas could contain fragmented but not significant areas of disturbance.

Threshold
Only areas with BN classes of mainly 4 or 5 and an area greater than 3,000 ha were considered above threshold. Three thousand hectares was considered to be an appropriate threshold after reviewing the representation of potential natural landscapes across the Region while at the same time ensuring viability within the landscape.

Results
Fourteen natural landscape areas of indicative national estate significance were identified. These areas cover a total of 195,218 ha and range in size from 3,549 ha (Eildon) to 63,665 ha (Dartmouth). Delineated areas of natural landscapes are listed in Table 3.2 and shown in Map 5. Sixty-seven percent of natural landscape areas are within the proposed Comprehensive, Adequate and Representative (CAR) reserve system (see *Directions Report*, VicRFASC 1999).

Table 3.2: Indicative natural landscape areas.

Natural Landscape	Area (ha)
Dartmouth	63,665
Wongungarra	26,503
Mt Lawson	15,057
Wabba	11,841
Catherine	10,636
Matlock	10,500
Buffalo	9,423
Mt Cudgewa	8,692
Hermit	8,636
Burrowa-Pine	7,812
Howqua	7,297
Mt Samaria	6,826
Mt View	4,781
Eildon	3,549
Total	**195,218**

3.2.2 Undisturbed Catchments

'Undisturbed catchments' are catchments where natural hydrological processes remain essentially unmodified and unimpeded.

Method
The identification of undisturbed catchments was based on an analysis of river flow impediments and the naturalness of the area within the catchment. The assessment is derived using the River Disturbance Index database that was developed for the Australian Heritage Commission's Wild Rivers project (Stein et al. 1998).

The River Disturbance Index (RDI) is a measure of river/stream quality across sub-catchment areas and is based on calculating scores for sub-catchment condition and flow regime indicators. An RDI database has been constructed by establishing a grid across a primary database containing geographical data and information on watercourses, settlement and

infrastructure features (such as built-up areas, reservoirs and canals), the extent of non-natural land cover and an index of biophysical naturalness. The database delineates a separate modelled sub-catchment for each stream segment, as defined on the AUSLIG 1:250,000-scale hydrography theme database. The RDI rates sub-catchment areas on a scale from undisturbed (0) to disturbed (1).

Threshold
Highly undisturbed catchments occur in the RDI range less than or equal to 0.01 and all sub-catchments falling within these parameters were deemed to be above threshold for this value. Maintaining consistency with similar processes carried out for other CRAs, the threshold was further set to areas of high biophysical naturalness (BN equals 4 or 5) and with an area of 1,000 ha or greater.

Undisturbed catchments that were below 1,000 ha along the boundary of the RFA Region were investigated to see whether such units were part of a larger undisturbed catchment that extended beyond the Region. No such units were evident.

Results
Eight undisturbed catchments were identified – these are listed in Table 3.3 and shown on Map 6. Of the total area represented, 81% is within the proposed CAR reserve system.

Table 3.3: Indicative undisturbed catchment areas.

Place	**Area (ha)**
Wabba	4,140
Mt Lawson	2,796
Wongungarra	2,144
Dartmouth	1,720
Cravensville	1,513
Mt Cudgewa	1,227
Howqua	1,226
Elliot Ridge	1,057
Total	**15,823**

3.2.3 Wilderness

Wilderness quality is essentially a measure of the extent to which a location is remote from and undisturbed by the influence of modern technological society (Lesslie and Maslen 1995). This assessment of wilderness quality is considered under sub-criterion B1 as the value is held to be rare when viewed from a continental perspective.

An assessment of wilderness covering the North East Region was undertaken in 1996 in the wider regional context of the forests of Eastern Victoria, given their broad similarity. The report *Wilderness of the Eastern Victorian Forests* (VicRFASC 1996) satisfied the analysis of wilderness quality for the purposes of JANIS requirements across four RFA regions, namely East Gippsland, Central Highlands, North East and Gippsland. For the North East, the best available systematic disturbance data at the time of the analysis was updated in 1986 and this should be taken into account when interpreting the outputs.

The 1996 study identified four areas of high wilderness quality within the North East Region (not five as incorrectly stated in the North East CRA Report - the Indi Addition to Pilot and Davies Plain is in fact in the Gippsland RFA Region) - these were Dartmouth (26,950 ha), Wabba (19,700 ha), Razor/Viking (15,700 ha) and Yarrarabulla Creek (13,000 ha). These areas satisfy the National Forest Reserve Criteria for wilderness protection.

Because more recent and detailed disturbance information compiled by NRE is now available, it was decided to re-assess wilderness quality in the Region for national estate purposes.

Method
The National Wilderness Inventory (NWI) methodology, developed by the Australian Heritage Commission, has been adopted as the standard approach to the assessment of wilderness in RFAs throughout Australia. The current national estate assessment of wilderness quality in the North East uses this methodology, which is identical to that applied in the earlier work for areas in the Region.

The NWI methodology produces a database of 'wilderness quality' across the Region. This is achieved by measuring the variation in wilderness quality across the landscape using wilderness quality 'indicators' that represent the two essential attributes of wilderness: remoteness and naturalness. The indicators are:

- **Remoteness from Settlement** - remoteness from places of permanent occupation;
- **Remoteness from Access** - remoteness from established access routes;
- **Apparent Naturalness** - the degree to which the landscape is free from the presence of permanent structures associated with modern technological society; and
- **Biophysical Naturalness** - the degree to which the natural environment is free from biophysical disturbance caused by the influence of modern technological society.

The data used in the analysis were those used in the NWI and come from many sources. The distance-related indicators (settlement, access and apparent naturalness) are essentially current AUSLIG digital mapping data updates.

The index of wilderness quality derives from a summing of the component indices (each ranging from 0 to 5) and is represented by a range from zero to 20. To identify areas with high wilderness quality, the criteria used in this assessment were areas with a NWI wilderness quality of at least 12. Although wilderness areas are not identified in this assessment, they are most commonly defined as being areas of high wilderness quality (12 and above) occupying at least 8,000 ha (JANIS 1997, VicRFASC 1996).

Results
Based on the most currently available information, the distribution of wilderness quality in the North East RFA Region is shown in Map 7. Much of the area shown with high wilderness quality is either too small or too fragmented to justify consideration as potential wilderness areas.

The major differences between the 1996 and current analyses of wilderness quality in the Region relate to slight increases in the amounts of high wilderness quality in the area around the southern parts of Lake Dartmouth and in areas around the Wongungarra and Humffray River catchments. These differences relate largely to the refined interpretations of disturbance information for this part of Victoria, resulting in higher levels of biophysical naturalness than previously identified.

3.2.4 Old-growth forest

Old-growth is considered important for maintaining existing natural processes. The formal definition used, based on the two previous Old-growth Forest Projects for the Central Highlands and East Gippsland, was:

Old-growth forest is forest which contains significant amounts of its oldest growth stage in the upper stratum – usually senescing trees – and has been subjected to any disturbance, the effect of which is now negligible (Woodgate et al., 1994).

Method
The methods, definitions and databases employed for the two previous Old-growth Forest Projects (Central Highlands and East Gippsland) were employed for this national estate assessment.

Threshold
The context in which the old-growth areas were located was seen as important in determining minimum size. Old-growth within large areas of high biophysical naturalness functions ecologically within a larger, relatively undisturbed landscape framework. For areas within natural landscapes containing at least 95% BN 4 or 5, a minimum patch size of 10 ha was selected as the threshold.

Old-growth outside large areas of high biophysical naturalness is more susceptible to unnatural disturbances such as land clearance and timber harvesting, and effects related to this disturbance, particularly edge effects. The minimum area for old-growth forest in these areas was therefore set at a minimum of 100 ha to allow for potential edge effects.

Results
A total of 184,000 ha of old-growth was identified as above threshold (see Map 8). Of this, 62% falls within the proposed CAR reserve sytem.

3.3 Flora

Flora values in the North East Region were assessed against national estate sub-criteria A1, A2, A3, B1 and D1 (Appendix B).

Sub-criterion A1: Places demonstrating evidence of past processes

The assessment of flora values under this sub-criterion involved the identification of places where the present distribution and ecology of the North East RFA Region flora reflect the influence of evolutionary, climatic and environmental processes. Key indicators of places important in demonstrating these processes on native flora in the Region were identified as places containing:

- endemic flora;
- flora at the limit of their range;
- flora with disjunct distributions;
- relictual Ecological Vegetation Classes;

- refugia from climatic change; and
- relictual and primitive flora.

Methods for the assessment of endemics, limit-of-range flora and disjunct populations were based on the methods used for national estate assessments for the Central Highlands (AHC & CNR 1994a) and East Gippsland (AHC & NRE 1996) and involved the following steps:

- selection of taxa relevant to each national estate value;
- selection of appropriate points using Geographic Information System (GIS) coverages based on the Department of Natural Resources and Environment's (NRE) Flora Information System (FIS) data; and
- delineation on GIS coverages of places where major concentrations of relevant records occur.

The perceived geographic distribution for each species was used to identify disjunct and limit-of-range populations. This nominal distribution was based on data from the FIS and the Flora of New South Wales (Harden 1990-93). As with earlier assessments, concentrations of endemic, disjunct and limit-of-range species were initially identified visually, rather than quantitatively, due to an uneven sampling distribution and its associated difficulties.

3.3.1 Endemic flora

Endemic flora were defined as all those taxa whose natural distribution is wholly or mainly (>50%) in the North East.

Method
Endemic taxa were identified using the NRE FIS, Flora of Victoria (Walsh & Entwisle 1993-96) and the Flora of South Wales. All occurrences of these taxa within the North East were plotted using NRE's GIS.

Concentrations of individual point records (quadrats[3]) were identified and polygons demarcated around those areas where three or more taxa were recorded within five kilometres of each other. The boundaries of these areas were defined using topographical features such as roads, ridgelines and streams. Contour lines were generally avoided given the practical difficulties of locating these in the field. Tenure boundaries were also used in areas where topographical features were limited. Ecological Vegetation Classes (EVCs) were used as a guide.

FIS grid[4] records were not used for this process, as actual sites could be anywhere within the 10' grid (approximately 15 by 18 km).

Threshold
Each individual point record for all taxa identified as endemic was considered to be above threshold, as were all concentrations of endemic taxa.

Results
Thirty-one taxa were identified as either totally or mostly endemic to the North East (see Table 3.4). Three areas of concentration were identified, these being Mt Buffalo,

[3] Quadrat refers to a sampling site identified on the FIS. These records are assumed to have +/- 100 m accuracy

[4] Grid refers to the centre point of a 10 minute grid cell which is approximately 15 km east-west by 18 km north-south

Mt Buller/Mt Stirling and the Bogong High Plains (from Mt Hotham to Mt Bogong) (see Map 9). Sixty-three percent of the point records and 88% of the areas represented on Map 9 are within the proposed CAR reserve system.

Table 3.4: Flora taxa exhibiting endemism.

Scientific Name	Level of Endemism
Acacia phlebophylla	E1
Baeckea crenatifolia	E1
Bursaria lasiophylla var. atriplicina	E1
Craspedia crocata	E1
Craspedia maxgrayi	E1
Eucalyptus alligatrix ssp. limaensis	E1
Eucalyptus cinerea ssp. cinerea	E1
Eucalyptus mitchelliana	E1
Eucalyptus pauciflora ssp. hedraia	E1
Eucalyptus rubida ssp. septemflora	E1
Euphrasia crassiuscula ssp. eglandulosa	E1
Euphrasia crassiuscula ssp. glandulifera	E1
Grevillea jephcottii	E1
Grevillea ramosissima ssp. hypargyrea	E1
Kelleria laxa	E1
Luzula 'B'	E1
Luzula 'C'	E1
Olearia frostii	E1
Phebalium squamulosum ssp. alpinum	E1
Pomaderris subplicata	E1
Asperula aff. euryphylla	E2
Billardiera scandens var. brachyantha	E2
Celmisia sericophylla	E2
Eucalyptus cadens	E2
Euphrasia crassiuscula ssp. crassiuscula	E2
Euphrasia eichleri	E2
Euphrasia lasianthera	E2
Hibbertia humifusa ssp. erigens	E2
Olearia argophylla x erubescens	E2
Poa hothamensis var. hothamensis	E2
Prostanthera monticola	E2
Pultenaea williamsonii	E2

E1 Wholly endemic to North East area.
E2 Mostly endemic to North East area (greater than 50% of nominal distribution).

3.3.2 Flora at the limit of their range

Places where a species occurs at the edge of its natural geographic range are considered important as these locations reflect one or more environmental / biophysical features which limit the further expansion of the species' range. These features may indicate past environmental change and/or evolutionary processes, but they may also reflect past human activities such as land clearance, introduction of competitors, etc.

Taxa at the limit of their geographic range were defined as those whose distributions contained a geographic limit within the RFA Region *ie* where there is an extreme northern, eastern, southern or western 'limit' of a taxa's national range within the North East.

It is recognised that limits of range are defined by a much greater complexity of environmental factors other than geographic limits. Clearly further modelling incorporating data such as topography, climatic bands, and soils/geology would enhance the simple model produced here.

Method
Limit-of-range taxa were identified using the NRE FIS, Flora of Victoria and the Flora of New South Wales. All occurrences of these taxa within the North East were plotted using the GIS.

All records for these taxa were spatially examined on the GIS where quadrats at each limit of range were identified.

The number of quadrats at each 'limit' varied, depending on spatial pattern and proximity, but was usually between one and four. For example, if a species occurs at its southern edge of range in the North East with three records along the Great Divide, and several more near Mt Buffalo, only those on the Divide were considered as limit of range. The Mt Buffalo records would not have been on the southern edge of the nominal species distribution. In some cases, a quadrat was at more than one 'limit', particularly the southern/western limits combination.

The boundaries of areas where three or more limit-of range-taxa were recorded within five kilometres of each other were defined by the same means as employed for endemic taxa (see above).

Threshold
Taxa were identified where they displayed a limit of range based on either quadrat or grid data. All points (quadrats or grid) considered as being at a limit of range were presented spatially, and areas containing concentrations of these points were identified. All selected points and identified concentrations were considered above threshold.

A cluster of points representing single taxa was not considered as this situation is likely to reflect sampling bias.

Results
Two hundred and six taxa were found to have edges of geographic range in the North East RFA Region from which 16 concentrations were identified (Table 3.5). These occurred at: Pine Mountain, Black Mountain, Mt Lawson, Chiltern, near Fernvale, Mt Pilot, Beechworth, Reef Hills, Mt Buffalo, near Locksley, Mt Tickatory, Mt Samaria, Alpine National Park (Mt Hotham – Mt Bogong), Mt Buller / Mt Stirling, east of the Bluff, Mt View (see Map 10). Sixty percent of point records and 84% of the areas represented on Map 10 are within the proposed CAR reserve system.

Table 3.5: North East flora taxa at the limit of their range.

Name

Abrotanella nivigena
Acacia aculeatissima
Acacia boormanii
Acacia dallachiana
Acacia deanei ssp. deanei
Acacia frigescens
Acacia howittii
Acacia kettlewelliae
Acacia lanigera var. lanigera
Acacia penninervis var. penninervis
Acacia phasmoides
Acacia phlebophylla
Acacia siculiformis
Aciphylla glacialis
Aciphylla simplicifolia
Acrotriche prostrata
Agrostis muelleriana
Almaleea capitata
Ammannia multiflora
Arrhenechthites mixta
Arthropodium sp. 2 (greenish flowers)
Arthropodium sp. 3 (aff. strictum)
Austrostipa oligostachya
Baeckea crenatifolia
Baeckea utilis
Barbarea grayi
Billardiera scandens var. brachyantha
Boronia algida
Boronia nana var. nana
Brachyscome chrysoglossa
Brachyscome debilis
Brachyscome perpusilla var. perpusilla
Brachyscome petrophila
Brachyscome ptychocarpa
Bursaria lasiophylla var. atriplicina
Caladenia menziesii
Carex archeri
Carex cephalotes
Carex echinata
Carex hypandra
Carex paupera
Celmisia asteliifolia spp.agg.
Celmisia sericophylla
Chiloglottis jeanesii
Coprosma moorei
Corybas hispidus
Craspedia alba
Craspedia coolaminica
Craspedia crocata
Craspedia haplorrhiza
Craspedia maxgrayi
Crassula closiana
Cyperus flavidus
Danthonia alpicola
Danthonia sp. (syn. Rytidosperma oreophilum)
Daviesia buxifolia
Derwentia derwentiana ssp. maideniana
Deyeuxia affinis
Diuris behrii
Diuris corymbosa
Diuris dendrobioides
Dodonaea rhombifolia
Eleocharis plana
Epacris breviflora
Epilobium sarmentaceum
Epilobium tasmanicum
Eragrostis tenellula
Eriochlamys behrii
Eucalyptus alligatrix ssp. limaensis
Eucalyptus cadens
Eucalyptus chapmaniana
Eucalyptus cinerea ssp. cinerea
Eucalyptus leucoxylon
Eucalyptus mitchelliana
Eucalyptus pauciflora ssp. hedraia
Eucalyptus pauciflora ssp. niphophila
Eucalyptus rubida ssp. septemflora
Eucalyptus sideroxylon s.s.
Eucalyptus yarraensis
Euchiton nitidulus
Euphrasia crassiuscula
Euphrasia crassiuscula ssp. crassiuscula
Euphrasia crassiuscula ssp. eglandulosa
Euphrasia crassiuscula ssp. glandulifera
Euphrasia eichleri
Euphrasia lasianthera
Ewartia nubigena
Fimbristylis dichotoma
Galium australe
Galium curvihirtum
Geranium sessiliflorum var. brevicaule
Geum urbanum var. strictum
Goodenia blackiana
Goodenia geniculata
Goodenia hederacea ssp. alpestris
Goodenia lanata
Goodenia macbarronii
Grammitis poeppigiana
Grevillea jephcottii
Grevillea polybractea
Grevillea ramosissima ssp. hypargyrea
Grevillea willisii
Hakea lissosperma
Hakea microcarpa
Hibbertia humifusa ssp. erigens
Hibbertia pedunculata
Hibbertia serpyllifolia
Hierochloe submutica
Huperzia australiana
Hyalosperma demissum
Hydrocotyle pterocarpa
Hypolepis amaurorachis
Hypoxis exilis
Indigofera adesmiifolia
Juncus brevibracteus
Kelleria laxa
Kunzea muelleri
Lagenifera huegelii
Lepidosperma laterale var. majus
Leptospermum multicaule
Leptospermum myrtifolium
Lespedeza juncea
Leucopogon montanus
Leucopogon pilifer
Lobelia simplicicaulis
Luzula acutifolia ssp. acutifolia
Luzula alpestris
Luzula 'B'
Luzula 'C'
Lycopodium scariosum
Millotia muelleri
Millotia perpusilla
Mitrasacme montana
Myriophyllum alpinum
Myriophyllum lophatum
Olearia adenophora
Olearia argophylla x erubescens
Olearia frostii
Olearia phlogopappa var. subrepanda
Olearia speciosa
Omphacomeria acerba
Oreomyrrhis brevipes
Oschatzia cuneifolia
Oxalis magellanica
Ozothamnus alpinus
Ozothamnus stirlingii
Parantennaria uniceps
Pelargonium helmsii
Persoonia confertiflora
Persoonia subvelutina
Phebalium squamulosum ssp. alpinum
Phebalium squamulosum ssp. ozothamnoides
Picris angustifolia ssp. merxmuelleri
Pimelea ligustrina ssp. ciliata
Pimelea treyvaudii
Poa gunnii
Poa hothamensis
Poa hothamensis var. hothamensis
Poa petrophila
Polyscias sambucifolia ssp. C
Pomaderris andromedifolia
Pomaderris aurea
Pomaderris subplicata
Pratia gelida
Prostanthera monticola
Pterostylis cucullata
Pterostylis laxa
Pultenaea capitellata
Pultenaea cunninghamii
Pultenaea gunnii
Pultenaea humilis
Pultenaea muelleri
Pultenaea polifolia
Pultenaea procumbens
Pultenaea prostrata
Pultenaea tenella
Pultenaea vrolandii
Pultenaea williamsonii
Ranunculus eichlerianus
Ranunculus graniticola
Ranunculus millanii
Ranunculus muelleri var. muelleri
Ranunculus pimpinellifolius
Ranunculus victoriensis
Rhynchospora brownii
Rubus rosifolius
Rulingia dasyphylla
Schizeilema fragoseum
Schoenus tesquorum
Scleranthus singuliflorus
Sclerolaena birchii
Senecio squarrosus
Stellaria caespitosa
Stylidium calcaratum
Swainsona galegifolia
Swainsona plagiotropis
Swainsona recta
Taraxacum aristum
Tetrarrhena acuminata
Thelymitra antennifera
Thelypteris confluens
Trochocarpa clarkei
Uncinia sulcata
Westringia lucida
Westringia senifolia
Wittsteinia vacciniacea
Wurmbea biglandulosa ssp. biglandulosa

3.3.3 Flora with disjunct distributions

Disjunct populations were defined as those outlying populations separated from the main core of the taxa's distribution. Places where disjunct populations occur are considered important for evolution due to their isolation from gene flow. The disjunction of populations could be due to a break in a formerly continuous distribution, or to long distance dispersal over a barrier or adaptation to disjunct environments such as mountain tops.

Method
Taxa with disjunct populations were identified using the NRE FIS, Flora of Victoria and the Flora of New South Wales.

As a general rule, a 50 km separation was used to define a disjunct population, however this was considered in light of a taxon's overall pattern of distribution, also taking into account sampling effort and environmental parameters.

All occurrences of taxa with disjunct populations within the North East were plotted using GIS. Where a number of points occurred in a tight cluster away from the main distribution, all points within the cluster were considered disjunct.

Concentrations of disjunct taxa were identified, and polygons demarcated around these areas, in a manner similar to that employed for endemics and limit-of-range species. Similarly, grid records were not used for this process, as actual sites could be anywhere within the 10' grid (approximately 15 by 18 km).

Threshold
All disjunct populations and concentrations of disjunct species identified were considered above threshold.

Results
Two hundred and thirty seven taxa demonstrated the presence of disjunct populations (see Table 3.6). From the distribution of disjunct populations, 13 concentrations were determined, as defined above. These occurred at: Mt Buffalo, Mt Samaria, Reef Hills, Chiltern, east of Wodonga, Mt Granya, Burrowa-Pine, Murray River/Cudgewa Creek confluence, Falls Creek, Mt Hotham, Mt View, near Mt Tickatory, south of Mt Pilot (see Map 11). Sixty-six percent of the point records and 75% of the areas represented on Map 11 are within the proposed CAR reserve system.

Table 3.6: Flora taxa exhibiting disjunction.

Acacia aspera
Acacia boormanii
Acacia brachybotrya
Acacia brownii
Acacia dawsonii
Acacia deanei ssp. paucijuga
Acacia flexifolia
Acacia leprosa
Acacia longifolia var. longifolia
Acacia mitchellii
Acacia omalophylla
Acacia penninervis var. penninervis
Acacia retinodes
Acacia ulicifolia
Agrostis avenacea var. perennis
Almaleea subumbellata
Ammannia multiflora
Amphibromus pithogastrus
Amyema linophylla ssp. orientale
Aristida calycina var. calycina
Asplenium hookerianum
Asterolasia asteriscophora
Astrotricha linearis
Atriplex vesicaria
Australopyrum retrofractum
Austrodanthonia monticola
Austrofestuca eriopoda
Austrofestuca hookeriana
Austrostipa nitida
Austrostipa pubinodis
Austrostipa rudis ssp. rudis
Austrostipa scabra ssp. falcata
Austrostipa semibarbata
Austrostipa setacea
Austrostipa stuposa
Azolla pinnata ssp. pinnata
Baeckea utilis var. utilis
Banksia canei
Blechnum cartilagineum
Bolboschoenus medianus
Boronia anemonifolia
Boronia nana var. nana
Bossiaea obcordata
Bossiaea riparia
Brachyscome chrysoglossa
Brachyscome multifida var. dilatata
Brachyscome obovata
Brachyscome parvula
Bulbine glauca
Bursaria spinosa var. microphylla
Caesia calliantha
Caladenia caerulea var. caerulea
Caladenia clavigera
Caladenia patersonii spp. agg.
Caladenia vulgaris
Callitriche muelleri
Calocephalus citreus
Calotis scabiosifolia var. integrifolia
Calotis scapigera
Calystegia marginata
Calystegia sepium
Chiloglottis reflexa
Chiloglottis X pescottiana
Colobanthus apetalus var. apetalus
Coprosma perpusilla ssp. perpusilla
Corybas hispidus
Craspedia haplorrhiza
Danthonia geniculata
Daviesia mimosoides ssp. mimosoides
Digitaria brownii
Digitaria ciliaris
Dillwynia glaberrima
Dipodium hamiltonianum
Discaria pubescens
Diuris behrii
Dryopoa dives
Eclipta platyglossa
Einadia nutans ssp. nutans
Eleocharis plana
Eleocharis pusilla
Enneapogon nigricans
Entolasia marginata
Eucalyptus fastigata
Eucalyptus globoidea
Eucalyptus tricarpa
Eucalyptus viridis
Eulalia aurea
Euphrasia collina ssp. collina
Eutaxia microphylla s.s.
Gahnia radula
Gastrodia procera
Genoplesium nudum
Goodenia blackiana
Goodenia lanata
Grevillea linearifolia spp. agg.
Haloragis aspera
Helichrysum adenophorum
Hibbertia calycina
Hibbertia exutiacies
Hibbertia pedunculata
Huperzia australiana
Hybanthus monopetalus
Hydrocotyle callicarpa
Hydrocotyle capillaris
Hydrocotyle geraniifolia
Hydrocotyle pterocarpa
Hymenophyllum australe
Hypolaena fastigiata
Hypolepis muelleri
Hypoxis exilis
Hypoxis hygrometrica var. villosisepala
Isolepis cernua
Juncus aridicola
Juncus pallidus
Kunzea muelleri
Kunzea parvifolia
Lastreopsis acuminata
Lemna disperma
Lepidosperma filiforme
Lepidosperma laterale var. laterale
Leptorhynchos elongatus
Leptospermum lanigerum
Leptospermum micromyrtus
Lepyrodia anarthria
Leucochrysum molle
Libertia pulchella
Lobelia pratioides
Logania albiflora
Lycopodiella lateralis
Maireana decalvans
Maireana humillima
Marsilea costulifera
Marsilea drummondii
Mazus pumilio
Micromyrtus ciliata
Mimulus gracilis
Muehlenbeckia axillaris
Myriophyllum alpinum
Myriophyllum integrifolium
Myriophyllum lophatum
Myriophyllum pedunculatum
Myriophyllum pedunculatum ssp. longibracteolatum
Myriophyllum pedunculatum ssp. pedunculatum
Myriophyllum simulans
Nertera granadensis
Notodanthonia semiannularis
Nymphoides montana
Olearia floribunda
Olearia glandulosa
Olearia iodochroa
Olearia ramulosa
Olearia speciosa
Opercularia hispida
Oreobolus oxycarpus ssp. oxycarpus
Ottelia ovalifolia
Oxalis chnoodes
Oxylobium ellipticum
Ozothamnus rosmarinifolius
Panicum obseptum
Patersonia sericea var. sericea
Pelargonium rodneyanum
Persoonia juniperina
Phebalium lamprophyllum
Phyllanthus hirtellus
Picris angustifolia ssp. merxmuelleri
Pimelea axiflora ssp. axiflora
Pittosporum phylliraeoides
Plantago gaudichaudii
Platysace lanceolata
Poa clivicola
Poa phillipsiana
Podolepis hieracioides
Podolepis jaceoides s.s.
Polygala japonica
Polyphlebium venosum
Pomaderris andromedifolia
Pomaderris discolor
Pomaderris elachophylla
Pomaderris eriocephala
Pomaderris lanigera
Pomax umbellata
Prasophyllum elatum
Prostanthera decussata
Prostanthera hirtula
Pterostylis decurva
Pterostylis fischii
Pterostylis foliata
Pterostylis laxa
Pterostylis maxima
Pterostylis plumosa s.l.
Pterostylis robusta s.l.
Pterostylis X ingens
Ptilotus exaltatus
Pultenaea capitellata
Pultenaea gunnii
Pultenaea mollis
Ranunculus collinus
Ranunculus glabrifolius
Ranunculus inundatus
Ranunculus muelleri var. muelleri
Rapanea howittiana
Rubus rosifolius
Rumex bidens
Rumohra adiantiformis
Rytidosperma australe
Schizeilema fragoseum
Scleranthus fasciculatus
Selaginella gracillima
Selaginella uliginosa
Sida corrugata var. corrugata (= broad leaf form)
Sigesbeckia australiensis
Solanum laciniatum
Swainsona murrayana
Swainsona oroboides s.l.
Swainsona plagiotropis
Tetrarrhena acuminata
Tetrarrhena juncea
Tetrarrhena turfosa
Tetratheca pilosa
Teucrium corymbosum
Thelymitra aristata
Trachymene anisocarpa
Trachymene humilis
Triglochin striatum
Tripogon loliiformis
Uncinia flaccida
Utricularia uniflora
Vallisneria spiralis s.l.
Velleia montana
Veronica gracilis
Villarsia reniformis
Viola caleyana
Wahlenbergia gymnoclada
Wahlenbergia luteola
Westringia eremicola
Wittsteinia vacciniacea
Zieria aspalathoides

3.3.4 Relictual Ecological Vegetation Classes

Relictual Ecological Vegetation Classes (EVCs) are those classes whose floristic composition carries a relatively high proportion of phylogenetically primitive taxa. Such taxa are present in relatively few EVCs.

Method
EVCs were identified as relictual on the basis of carrying a higher proportion of primitive species such as ferns, Pepper plants (*Tasmannia* sp) and other Winteraceae as well as Southern Sassafras (*Atherosperma moshatum*). These included Treeless Sub-alpine Mosaic, Montane Riparian Thicket, and Wet Forest.

Threshold
All occurrences of the EVCs Treeless Sub-alpine Mosaic and Montane Riparian Thicket are considered important for the maintenance of the relictual species that occur within them and are therefore above threshold. Neither of these EVCs are subject to regular or widespread disturbance.

As Wet Forest is restricted in the North East all occurrences have been identified as having national estate value as relictual flora.

Disturbance was not used as a threshold under this criterion. All areas of these three EVCs were mapped as they were considered capable of supporting the key relictual species, and consequently to be above threshold.

Results
The three EVCs identified as containing a high incidence of relictual flora have a relatively restricted distribution across the Region. The most extensive occurrences of the EVCs are along the Great Dividing Range (from the Bluff to the NSW border) as well as on Mt Buffalo and on the south-west edge of the Wabba Wilderness (see Map 12). These EVCs occupy a total area of 27,830 ha within the North East, 86% of which is within the proposed CAR reserve system.

3.3.5 Relictual and primitive flora

No outstanding examples of relictual or primitive flora were apparent.

3.3.6 Refugia from climatic change

The major trend in climatic change in Victoria since the last ice age (some 10,000 years ago) has been a decrease in water availability. Refuges were identified as places within the landscape with environmental conditions that have allowed the survival of vegetation characteristic of the last glacial period. Such areas in general tend to be characterised by lower average ambient temperatures and/or greater water availability and a concomitantly lower fire frequency.

Environmental change over the terminal Holocene and even Pleistocene has also been characterised by periods of dryness. It is possible that core dry areas acted as refuges for species dependent on higher fire frequencies than were typical during the mid-Holocene climatic optimum. At present, however, the environmental history of the Region is not sufficiently documented to enable the delineation of potential ‘dry refugia’, unlike the situation for identification of ‘cold’ and ‘wet’ refugia.

Method
A combination of expert knowledge of the current structure and floristics along with topographic information was used to identify refugia and the particular EVCs that typify habitat of cold and fire intolerant communities. The EVCs and mosaics identified as refugia are presented in Table 3.7.

Table 3.7: EVCs identified as refugia from climatic change.

Refuge from:	Environmental characteristic	Environment	EVCs that qualify
Increasing temperature	Cold dependant ecosystems/EVCs	Sub-alpine/alpine	• Treeless Sub-alpine Mosaic • Sub-alpine Woodland
		Montane	• Montane Damp Forest • Montane Dry Forest • Montane Riparian Thicket
Increased fire frequency	Fire refuge	Topographically and climatically protected and too wet to carry fire	• Wet Forest • Damp Forest
		Sub-alpine environments too wet to carry fire.	• Treeless Sub-alpine Mosaic
Decreasing water availability	Water availability	Riparian environments	• Wet Forest • Damp Forest • Riparian Forest • Floodplain Riparian Woodland and mosaic • Wetland Formation • Swampy Riparian Woodland • Riparian Shrubland • Riparian Forest/Swampy Riparian Woodland/Riverine Escarpment Scrub Mosaic • Spring Soak Herbland • Montane Riparian Thicket
		Water-dependant sub-alpine environments	• Treeless Sub-alpine Mosaic

Threshold
Refuges occupy, at a minimum, the entire hill or ridge top or remaining vegetation along major river systems. Disturbance has not been considered as a threshold, since the factors that create refuges relate to landscape scale features.

Results
Eighteen areas were identified as refugia from climatic change for the North East. These refuge areas and the amount of area they comprise in the North East are presented in Table 3.8 and shown in Map 13. Fifty-three percent of the total area is within the proposed CAR reserve system.

Over half of the refugia identified afford protection from all three elements, ie higher temperatures, increased fire frequency and decreasing water availability. Several of the areas affording different refugia conditions aggregate to form larger areas.

Table 3.8: Refuges from climatic change.

Name	Refuge from:			Area (approx. ha)
	increased temp.	increased fire frequency	decreased water availability	
Bogong	✓	✓	✓	105,100
Buller / Howqua	✓	✓	✓	74,600
Jamieson/Eildon	✓	✓	✓	57,500
Mt Pinnibar – Mt Sassafras	✓			36,400
Tea Tree Range / Barry Mountains	✓	✓	✓	26,500
Tawonga	✓	✓	✓	16,700
Dead Wallaby Creek	✓	✓	✓	16,400
Surveyors Creek		✓	✓	14,900
Mt Buffalo	✓	✓	✓	14,800
Dartmouth	✓	✓	✓	10,000
Burrowa-Pine Mt	✓			3,500
Whitfield		✓	✓	2,400
Black Range	✓	✓	✓	1,700
House Creek/Pinnacles	✓	✓	✓	1,500
Goulburn River			✓	1,300
Strathbogie		✓	✓	1,300
Broken River / Holland Creek			✓	500
King River			✓	400
Total				**385,500**

Sub-criterion A2: Places demonstrating existing natural systems

3.3.7 Successional stages

Methods
Both primary and secondary succession have been identified in vegetation of the North East. Those areas clearly demonstrating the dynamic relationship between EVCs were identified as representing primary succession, as well as those representing truncated transitions. The riverine ecosystems are the only ones clearly demonstrating primary succession. Truncated succession has been observed within Wet Forests.

Secondary succession was identified in those areas recovering from significant natural disturbance. Wildfire was taken as the main natural driving force for secondary succession and this is evident in areas containing a mix of old growth stages. Flood and windfall disturbances were considered for inclusion, however, these areas are generally too small to be mapped. Areas of secondary succession were identified from disturbance mapping in combination with growth stage mapping.

Threshold
Secondary succession proceeds from both natural and human induced disturbance, however, secondary succession was only considered where the phenomenon resulted from significant natural disturbance. Demarcation and the thresholding of secondary succession in the North East included all forest areas where regrowth resulting from natural disturbance was 10% or

greater of crown cover. Growth stage and disturbance data used were those described in the Study of Old-growth Forest in the North East (NRE,1998).

Results
Areas displaying primary and secondary succession in the North East are shown in Map 14. Fifty-five percent of the area represented is within the proposed CAR reserve system.

Primary Succession

Rainforest/Wet Forest
South of the Great Dividing Range in Victoria, the classic example of primary succession is the Cool Temperate Rainforest formation from Wet Forest, identifiable at their interface. Although there is no rainforest (structurally and floristically) in the North East there are sites with some Cool Temperate Rainforest elements within Wet Forest indicating that primary succession has been truncated. A combination of factors may contribute to the observed truncation. In addition to rainfall being too low and too unreliable for development and maintenance of rainforest, the climate on the continental side of the Great Dividing Range is relatively dry allowing wildfire at too frequent intervals (Cool Temperate Rainforest is vulnerable to fire).

Sites of truncated primary succession carry Southern Sassafras (*Atherosperma moschatum*) and various fern species. Sites include some gullies of the West Kiewa River (south of Mount Beauty) and the Surveyors Creek area in the far east of the study area.

Riverine
Primary succession occurs where billabongs gradually dry out and turn floristically and structurally towards the flora composition of the surrounding dryland environment.

Secondary Succession

Aggregations of areas of secondary succession occur at Mt Buffalo, Mt Lawson, Dandongadale River, the Alpine National Park (west of Mt Hotham and north of Mt Cobbler), Burrowa Pine and Mt Buller / Mt Stirling.

3.3.8 Remnant vegetation

Method
Remnant vegetation is defined as that vegetation remaining in unnatural landscapes where the vegetation has been mostly cleared. Permanent clearing is evident in most of the northern parts of the North East and has resulted mostly from agriculture. Very few parcels of remnant vegetation in such landscapes are public land.

Threshold
EVCs were identified as remnant from Table 12.3 of the North East CRA Report where 70%, or more, of the pre-1750 extent has been cleared.

Results
Of the 58 EVCs identified in the North East Region, 35 were found to have been depleted to below 30% of their pre-1750 coverage. The great majority of these remnants occur on private property within cleared lands to the north-west of the Great Dividing Range. All occurrences

of these EVCs are identified as having national estate value and are shown on Map 15. Twenty-five percent of the total area is within the proposed CAR reserve system.

There is little information about the relative quality of these remnants. Further research is warranted to clearly identify those areas whose quality, and security from external threatening processes such as rising saline ground water, justify continued recognition of their national estate value.

Sub-criterion A3: Places of unusual richness

3.3.9 Modelled richness

Method
The approach adopted for the Central Highlands and East Gippsland analysis of richness was modified. Rather than the previous focus on the character species, the analysis conducted for the North East substituted these for EVC richness per unit area. As per previous national estate studies, a Flora Richness Index (FRI) was determined based on the number of EVCs within a 2 km grid cell. The FRI allocated one unit per EVC with the exception of mosaics and complexes, which were allocated a value dependent on the EVCs contained within them. Where mosaics or complexes occurred within an area with a particular EVC already recorded in that area, that EVC was not counted twice. Non-natural EVCs (plantations, cleared areas) had no impact on the FRI.

As for the Central Highlands and East Gippsland, a 2 km grid was used as a sampling technique. This method was refined to avoid inconsistencies associated with the location of the source of the grid, by conducting 16 iterations of the sampling. Iterations involved shifts of 500 m in the source in a four by four matrix of source points. The end result was an effective cell size of 500 m x 500 m, each cell containing a mean FRI value based on all 16 iterations.

Threshold
The FRI ranged from 0 to 14.56. As for the Central Highlands assessment, the top 5% of cells (FRI >=6.75) were considered above threshold.

Results
Out of 73,648 cells in the region, a total of 4,171 of these were above threshold. Major clusters of above-threshold cells occurred throughout the Alpine National Park, in Burrowa-Pine Mountain National Park, to the south and east of Mitta Mitta, within Mt Buffalo National Park, and along the Buffalo River, south of Lake Buffalo (see Map 16). Seventy percent of the area represented by those cells above threshold is within the proposed CAR reserve system.

Sub-criterion B1: Places of rare and threatened flora

3.3.10 Rare or threatened flora

Method
Taxa were identified as rare or threatened as part of the Comprehensive Regional Assessment (CRA) process. A list of rare and threatened flora is presented in Table 3.9.

All occurrences of rare and threatened taxa within the North East were plotted using the GIS.

Concentrations of rare or threatened flora were also defined using the same methods used for endemic, limit of range and disjunct flora.

Threshold
Each individual point record for all taxa identified as rare or threatened was considered to be above threshold, as were all delineated concentrations of records for different species.

Results
One hundred and sixty one taxa have been identified as rare or threatened, and 24 concentrations were identified. These occur at or near: Mt Buffalo, Alpine National Park (Mt Hotham to Mt Bogong), Pine Mountain, Mt Granya, Chiltern, Mt Pilot, Springhurst, Boorhaman, Mt Samaria, Mt Wombat, Old Longwood, Mt Tickatory, Mt Buller / Mt Stirling, Howqua River, Jamieson River, Hotham Heights, south-west of Mt Howitt, north of Corryong and north-west of Cudgewa, The Oaks, east of Burrowye, Bonegilla, Barranduda Range, and east of Lurg Upper (see Map 17). (Note that these names are indicative only and do not provide precise localities.)

Ninety-four percent of the records and 68% of the areas represented on Map 17 are within the proposed CAR reserve system.

Table 3.9: Rare and threatened flora.

Abrotanella nivigena
Acacia boormanii
Acacia dallachiana
Acacia dawsonii
Acacia deanei ssp. deanei
Acacia deanei ssp. paucijuga
Acacia flexifolia
Acacia howittii
Acacia omalophylla
Acacia penninervis var. penninervis
Acacia phasmoides
Acacia phlebophylla
Agrostis avenacea var. perennis
Almaleea capitata
Ammannia multiflora
Amphibromus pithogastrus
Amyema linophylla ssp. orientale
Aristida calycina var. calycina
Arthropodium sp. 2 (greenish flowers)
Arthropodium sp. 3 (aff. strictum)
Asplenium hookerianum
Astrotricha linearis
Australopyrum retrofractum
Austrodanthonia monticola
Austrofestuca eriopoda
Austrostipa setacea
Baeckea crenatifolia
Barbarea grayi
Billardiera scandens var. brachyantha
Bossiaea riparia
Brachyscome chrysoglossa
Brachyscome debilis
Brachyscome obovata
Brachyscome petrophila
Brachyscome ptychocarpa
Bulbine glauca
Caladenia vulgaris
Carex archeri
Carex cephalotes
Carex echinata
Carex hypandra
Carex paupera
Celmisia sericophylla
Chiloglottis jeanesii
Chiloglottis X pescottiana
Coprosma moorei
Coprosma perpusilla ssp. perpusilla
Corybas hispidus
Craspedia alba
Cyperus flavidus
Deyeuxia affinis
Digitaria brownii
Dipodium hamiltonianum
Discaria pubescens
Diuris behrii
Diuris dendrobioides
Dodonaea rhombifolia
Eleocharis plana
Epilobium tasmanicum
Eragrostis tenellula
Eucalyptus alligatrix ssp. limaensis
Eucalyptus cadens
Eucalyptus cinerea ssp. cinerea
Eucalyptus mitchelliana
Eucalyptus pauciflora ssp. hedraia
Eucalyptus rubida ssp. septemflora
Eucalyptus sideroxylon s.s.
Eucalyptus yarraensis
Euchiton nitidulus
Euphrasia crassiuscula ssp. crassiuscula
Euphrasia crassiuscula ssp. eglandulosa
Euphrasia crassiuscula ssp. glandulifera
Euphrasia eichleri
Euphrasia lasianthera
Genoplesium nudum
Goodenia macbarronii
Grammitis poeppigiana
Grevillea jephcottii
Grevillea polybractea
Grevillea ramosissima ssp. hypargyrea
Grevillea willisii
Hibbertia humifusa ssp. erigens
Hibbertia pedunculata
Hierochloe submutica
Huperzia australiana
Hybanthus monopetalus
Hypoxis exilis
Indigofera adesmiifolia
Juncus brevibracteus
Kelleria laxa
Leptorhynchos elongatus
Leptospermum micromyrtus
Leptospermum multicaule
Lepyrodia anarthria
Leucochrysum molle
Leucopogon montanus
Leucopogon pilifer
Luzula acutifolia ssp. acutifolia
Lycopodium scariosum
Maireana humillima
Mitrasacme montana
Muehlenbeckia axillaris
Myriophyllum alpinum
Myriophyllum lophatum
Olearia adenophora
Olearia frostii
Oreobolus oxycarpus ssp. oxycarpus
Oreomyrrhis brevipes
Oschatzia cuneifolia
Oxalis magellanica
Panicum obseptum
Parantennaria uniceps
Pelargonium helmsii
Persoonia subvelutina
Pimelea treyvaudii
Poa clivicola
Poa gunnii
Poa petrophila
Polygala japonica
Pomaderris aurea
Pomaderris discolor
Pomaderris subplicata
Pratia gelida
Prostanthera decussata
Prostanthera monticola
Pterostylis cucullata
Pterostylis fischii
Pterostylis laxa
Pterostylis maxima
Pterostylis X ingens
Pultenaea capitellata
Pultenaea polifolia
Pultenaea tenella
Pultenaea vrolandii
Pultenaea williamsonii
Ranunculus collinus
Ranunculus eichlerianus
Ranunculus millanii
Ranunculus muelleri var. muelleri
Ranunculus victoriensis
Rhynchospora brownii
Rulingia dasyphylla
Rytidosperma australe
Schizeilema fragoseum
Scleranthus singuliflorus
Sclerolaena birchii
Swainsona galegifolia
Swainsona murrayana
Swainsona plagiotropis
Swainsona recta
Taraxacum aristum
Thelypteris confluens
Tripogon loliiformis
Trochocarpa clarkei
Uncinia sulcata
Viola caleyana
Westringia lucida
Wittsteinia vacciniacea
Wurmbea biglandulosa ssp. biglandulosa
Zieria aspalathoides

3.3.11 Rare Ecological Vegetation Classes

The criterion aims to identify EVCs that were rare pre-1750 or have become so through severe depletion since European settlement. Identifying rare EVCs in a national context

proved difficult for reasons as elaborated on in the Central Highlands National Estate Methods Paper (AHC & CNR 1994a). Firstly, the EVC classification system is not used nationally, and equivalents are not necessarily recognised as discrete types; and secondly, obtaining data on the extent of depletion or natural rarity of vegetation types on a continental scale is difficult. Furthermore, scale is important in determining rarity. What may be a common community within a region may be regarded as rare at larger scales.

Method
EVCs were selected on the following basis:

- whether they were largely confined to the North East RFA Region, or largely confined to Victoria; and
- whether expert opinion considered them to be nationally rare.

Threshold
All occurrences of EVCs considered as nationally rare were considered above threshold.

Results
Twenty-six EVCs within the North East RFA Region were considered to be nationally rare (see Table 3.10 and Map 18). Sixty-three percent of the area represented in Map 18 is within the proposed CAR reserve system.

Table 3.10. Nationally rare Ecological Vegetation Classes.

EVC	ha
Clay Heathland	35
Montane Riparian Thicket	1,089
Treeless Sub-alpine Complex	764
Plains Grassy Woodland	1,932
Creekline Grassy Woodland	441
Spring Soak Herbland	13
Alluvial Terraces Herb-rich Woodland/Creekline Grassy Woodland Mosaic	35
Alluvial Terraces Herb-rich Woodland/Plains Grassy Woodland Mosaic	18
Grassy Woodland	4,472
Perched Boggy Shrubland	296
Plains Grassy Woodland/Floodplain Riparian Woodland Complex	273
Plains Grassy Woodland/Rainshadow Grassy Woodland Complex	22
Plains Grassy Woodland/Valley Grassy Forest Complex	21
Plains Grassy Woodland/Valley Grassy Forest/Rainshadow Grassy Woodland Complex	109
Gilgai Plain Woodland/Wetland Mosaic	483
Plains Grassy Woodland/Creekline Grassy Woodland/Floodplain Riparian Woodland Complex	53
Plains Grassy Woodland/Creekline Grassy Woodland/Wetland Mosaic	347
Valley Grassy Forest/Plains Grassy Woodland Mosaic	2
Valley Grassy Forest/ Plains Grassy Woodland Mosaic	2
Box Ironbark Forest/Spring Soak Herbland Mosaic	7
Grassy Dry Forest/ Spring Soak Herbland Mosaic	64
Floodplain Riparian Woodland/Plains Grassy Woodland Mosaic	74
Rainshadow Grassy Woodland/Valley Grassy Forest Mosaic	52
Shrubby Granitic-outwash Grassy Woodland/Valley Grassy Forest Mosaic	18
Riverine Grassy Woodland/Riverine Sedgy Forest Mosaic	3,950
Sand Ridge Woodland	2

3.3.12 Rare old-growth forest

Old-growth forest is considered a regionally and nationally rare phenomenon. Rare old-growth is in even more need of protection.

Method
Old growth was considered rare if it met one or more of the following criteria:

- its extent was less than 10% of the total EVC extent;
- the old-growth representation of an EVC was less than 300 ha;
- it was old-growth of an EVC considered rare, vulnerable or threatened under JANIS criteria (see table 12.7 of North East CRA Report).

Threshold
Areas identified as 'rare old-growth' were all considered above threshold.

Results
Old-growth in four EVCs was considered as rare on the basis of there being less than 10% of the EVC as old-growth. Three of the four EVCs themselves were rare.

EVC	**< 10%**	**Rare EVCs**
Riparian Forest	✓	✓
Montane Riparian Thicket	✓	
Swampy Riparian Woodland	✓	✓
Riparian Mosaic – North East	✓	✓

An exception to the criteria used in identifying rare old-growth was made with Heathy Dry Forest. As for old-growth and principal characteristics of class (criterion D), Heathy Dry old-growth was not considered as rare due to total area and extent of both the EVC and the old-growth it contains (26% of the EVC).

Approximately 170 areas of rare old growth were identified, the largest being 40 ha (see Map 19). Of these, 150 were less than 10 ha, being represented by small polygons, and over half were Riparian Forest. The majority of rare old-growth is spread along the Great Dividing Range and foothills, with 91% occurring within the proposed CAR reserve system.

Criterion D: Importance in demonstrating principal characteristics of class

3.3.13 Principal characteristics of Ecological Vegetation Classes

Under this criterion EVCs were identified on the basis of their condition and integrity for the purpose of representing the principal characteristics of their class across the project area.

The principles of Comprehensiveness, Adequacy and Representativeness (the CAR principles put forward in the 1992 National Forest Policy Statement) need to be considered across the geographic range within the North East RFA Region. Within each ecosystem there is diversity of the floristic communities over the geographic range, often influenced by environmental factors such as climate and soil types.

Method
EVCs were divided into two groups on the basis of rarity; those considered as rare, vulnerable or threatened under the JANIS criteria, and other EVCs. Geographical Representation Units (GRUs) have previously been employed for the purpose of ensuring an appropriate distribution of above-threshold areas of the EVCs throughout their range. Rather than using GRUs for this purpose in the North East, it was decided to use large areas (>3,000 ha) of contiguous high biophysical naturalness (minimum 95% of BN 4,5) as the basis for representation. Their distribution across the North East was considered to cover the range of geographic features, thus meeting national estate criteria for any EVCs within them.

This methodology is not inconsistent with earlier Victorian national estate studies and follows the methods used in the, more recent, national estate assessment in Tasmania.

Threshold
Since the majority of the rare, vulnerable and endangered EVCs are very limited in their extent and/or area, it was considered that all remaining examples of these EVCs should be above threshold for this value. An exception was made for Heathy Dry Forest due to its large size and extent. As a result it was treated in the same manner as for 'other' EVCs, which were considered above threshold only where they occurred within large areas of high biophysical naturalness.

Using the above methods, two EVCs were not represented, these being Montane Riparian Thicket (MRT) and Granitic Hills Woodland/Rocky Outcrop Shrubland/Herbland Mosaic (GHM).

Due to its limited extent, MRT was afforded 100% representation. As GHM occurred in disturbed areas, the best examples (patches with least disturbance) were selected as above threshold.

Results
Of the twelve 'other' EVCs, almost all achieved at least 5% representation within large areas of high biophysical naturalness, the three exceptions being MRT, GHM, and Treeless Sub-alpine Mosaic. All of the MRT was selected as above threshold, 8% of GHM was selected as above threshold, and 4% of the Treeless Sub-alpine Mosaic was above threshold (see Map 20). Sixty percent of the areas represented in Map 20 are within the proposed CAR reserve system.

3.4 Fauna

Fauna values were assessed against national estate sub-criteria A1, A2, A3 and B1.

The methods and thresholds applied to the following fauna assessments are based largely on those used in the assessment of national estate values for the Central Highlands (AHC & CNR

1994a) and East Gippsland (AHC & NRE 1996). However, some modifications have been made on the basis of expert workshop outcomes, methodologies used for RFA national estate assessments in other states, and differences in datasets and assessment timelines.

3.4.1 Data sources

The following are the main sources of locality and distributional data used for assessing fauna values:

- Atlas of Victorian Wildlife. This is the principal fauna database maintained by NRE's Flora and Fauna Branch. It contains species and locality data for almost 2,000,000 records of mainly birds, mammals, reptiles and amphibians. Freshwater fish and threatened invertebrates are also represented but with relatively fewer records. These data are derived from:
  - fauna surveys conducted by the Flora and Fauna Branch since 1972;
  - fauna surveys conducted specifically for the RFA process;
  - fauna surveys conducted by educational institutions and field naturalists clubs;
  - Atlas of Australian Birds project records;
  - Museum of Victoria specimen records; and
  - natural history journals.

- Atlas of New South Wales Wildlife. This is the principal fauna database maintained by the NSW National Parks and Wildlife Service. It contains species and locality data for birds, mammals, reptiles and amphibians. Access to this database was necessary for analyses relating to endemicity and populations that are disjunct or at the limit of their range.

- Zoologists familiar with the project area and/or the species within it.

- Standard fauna texts and various fauna survey and assessment reports.

All species with records in the Atlas of Victorian Wildlife since 1970 and with an accuracy of 2' or better were considered in the following assessments. The full list of species is provided in Appendix L. Fish and invertebrate species were only considered where sufficient data or information was available. The absence in the New South Wales Wildlife Atlas of records for these two groups further limited the assessments that could be undertaken for them.

Sub-criterion A1: Importance in the evolution of Australian fauna

The assessment of fauna values under this sub-criterion involved the identification of places where the present distribution and ecology of the North East fauna reflect the influence of past evolutionary, climatic and environmental processes. Key indicators of places important in demonstrating these processes on native fauna in the Region were identified as places containing:

- endemic fauna;
- fauna at the limit of their range;
- fauna with disjunct distributions;
- refuges from climatic change; and
- relictual and primitive fauna.

3.4.2 Endemic fauna

Endemic fauna were defined as:

- those taxa whose natural distribution is wholly confined to the North East;
- those taxa whose natural distribution is wholly confined to Victoria and for which most records (>50%) are in the North East; and
- those taxa whose natural distribution includes the North East but is confined to one of the five biogeographic regions represented there and in neighbouring areas of Victoria and New South Wales (ref. Thackway and Cresswell 1995).

Method
All endemic taxa were identified using mainly Victorian and New South Wales Wildlife Atlas records. All occurrences of these taxa in the North East were plotted.

Areas containing concentrations of endemic taxa were also identified. This was done by assessing the number of endemic species within a 5 km radius of each endemic species point locality. For every point locality above threshold, a 2.5 km radius circle was used to delineate a boundary indicating an area with a relatively high concentration of this value. Where these boundaries overlapped, the internal boundaries were removed leaving polygons based on the external boundaries of areas identified as above threshold. It should be noted that the identified boundaries are unlikely to be ecologically meaningful and that such areas nominated for national estate listing should be delineated according to appropriate landscape features.

Threshold
Each individual point record for all species identified as endemic against any of the three levels was considered to be above threshold, as were all delineated concentrations of endemic taxa. Two or more species within a 5 km radius of a point locality was applied as the threshold used in identifying concentrations.

Results
Twelve taxa (including five invertebrate species) were identified as meeting the criteria for endemicity in the North East RFA Region (see Table 3.11). All but three of these are restricted to the Australian Alps biogeographic region (see Map 21). Fifty-four percent of all records represented in Map 21 are within the proposed CAR reserve system.

Table 3.11: Fauna taxa exhibiting endemism.

Scientific Name	Common Name	Endemicity		
		NE[1]	BR[2]	Vic[3]
Burramys parvus	Mountain Pygmy-possum		AA	
Cyclodomorphus praealtus	Alpine She-oak Skink		AA	
Pseudemoia cryodroma	Alpine Bog Skink		AA	
Litoria paraewingi	Plains Brown Tree Frog			✓
Litoria spenceri	Spotted Tree Frog		AA	
Litoria verreauxii alpina	Alpine Tree Frog		AA	
Galaxias fuscus	Barred Galaxias			✓
Euastacus woiwuru	Central Highlands Spiny Cray			✓

Scientific Name	Common Name	Endemicity		
		NE[1]	BR[2]	Vic[3]
Riekoperla intermedia	Stonefly	✓	AA	✓
Riekoperla isosceles	Stonefly	✓	AA	✓
Thaumatoperla alpina	Stonefly	✓	AA	✓
Thaumatoperla flaveola	Stonefly	✓	AA	✓

Notes:
1. Endemic to the North East RFA Region.
2. Endemic to a biogeographic region (AA = Australian Alps).
3. Endemic to Victoria and with most records of that taxon in the North East.

3.4.3 Fauna at the limit of their range

Places where species occur at the limit of their natural biogeographic range are considered important when the location reflects some past environmental change and/or evolutionary process. Species at the limit of their biogeographic range were defined as those whose accepted regular distributions terminate within the RFA Region.

Method
For each species covered by the Victorian Wildlife Atlas, all site records were plotted. For fauna, identification of limit of range was not confined to the cardinal axes of the compass, although for many species these directional limits were appropriate. Where, for example, a species is shown to have a "sausage" shaped distribution, only those points at the end of the "sausage" (as opposed to other edges) were considered to be at the species' limit of range. For birds, both their full distributions as well as just their breeding ranges (using Emison et al. 1987) were considered. Records of species whose range limits appeared to be artefacts of inadequate fauna survey were excluded. Only the specific record(s) of each species that were at, or close to, the limit of range were selected. Limit of range records for all species were combined and concentrations were identified using the same method as described in the endemic fauna analysis (see above).

Threshold
All species with a limit of range, or of breeding range, in the project area were considered to be above threshold. Only the specific record(s) of each species which were at, or close to, the limit of range were considered to be above threshold, as were all areas identifying concentrations of these records. For birds at the limit of their breeding range, only breeding records were considered. Two or more species within a 5 km radius of a point locality was applied as the threshold used in identifying concentrations.

Results
Twenty-two taxa were identified as having limits of range in the RFA Region (see Table 3.12), with half of these being reptiles and amphibians. Many of the species have their southern and/or western limits of range in the Australian Alps or South-eastern Highlands biogeographic regions (see Map 22). Twenty-seven percent of all records represented in Map 22 are within the proposed CAR reserve system.

Table 3.12: Fauna taxa at a limit of their biogeographic range.

Scientific Name	Common Name
Burramys parvus	Mountain Pygmy-possum
Potorous longipes	Long-footed Potoroo
Platycercus elegans flaveolus	Yellow Rosella
Struthidea cinerea	Apostlebird
Bassiana platynotum	Red-throated Skink
Carlia tetradactyla	Southern Rainbow Skink
Ctenotus taeniolatus	Copper-tailed Skink
Cyclodomorphus praealtus	Alpine She-oak Skink
Eulamprus kosciuskoi	Alpine Water Skink
Lialis burtonis	Burton's Legless Lizard
Varanus rosenbergi	Rosenberg's Goanna
Geocrinia victoriana	Eastern Smooth Frog
Limnodynastes fletcheri	Barking Marsh Frog
Litoria booroolongensis	Booroolong Frog
Litoria paraewingi	Plains Brown Tree Frog
Galaxias fuscus	Barred Galaxias
Euastacus crassus	Alpine Spiny Cray
Euastacus woiwuru	Central Highlands Spiny Cray
Riekoperla intermedia	Stonefly
Riekoperla isosceles	Stonefly
Thaumatoperla alpina	Stonefly
Thaumatoperla flaveola	Stonefly

3.4.4 Fauna with disjunct distributions

Species with disjunct distributions were defined as those with resident populations in the project area that are substantially separated from, and would not be expected to interbreed with, other populations of the same species. It should be noted that many species' distributions have become fragmented into disjunct populations by clearing and other activities since white settlement - these disjunctions are not relevant under Criterion A.

Method
Species were considered for analysis if they fell into one or both of the following categories:

- species whose distribution within the RFA Region is disjunct;
- species whose representatives within the RFA Region are, or comprise a part of a population which is, disjunct from a population of the same species outside the Region.

Where population disjunctions appeared to be an artefact of inadequate fauna survey, these records were excluded, as were records believed to be of vagrants. Among fish, disjunct populations are only found in non-migratory species that complete their entire life cycles in fresh water (AHC & CNR 1994a). Most native fish "disjunctions" in the Region will probably be an artefact of the impact of trout and therefore are not significant under this national estate criterion. Those records representing the disjunct populations for each species were selected and plotted and concentrations were identified using the same method as described in the endemic fauna analysis (see above).

Threshold
All species assessed as having disjunct populations in the North East were considered above threshold. Only those records making up the disjunct population(s) were considered to be above threshold, as were all areas identifying concentrations of these records. Two or more species within a 5 km radius of a point locality was applied as the threshold used in identifying concentrations.

Results
Nineteen taxa were identified as having disjunct populations in the RFA Region (see Table 3.13). Individual records and areas identified as supporting concentrations of species that are disjunct in the Region are shown on Map 23. Fifty-three percent of all records shown on Map 23 are within the proposed CAR reserve system.

The entire north-eastern Victorian sub-population of the Long-footed Potoroo was considered disjunct from East Gippsland and south-eastern New South Wales sub-populations. Genetic research action identified in the Recovery Plan for this species (Nunan et al. 1998) should help to clarify the degree of disjunction of the north-eastern sub-population.

Table 3.13: Fauna taxa with disjunct populations.

Scientific Name	Common Name
Burramys parvus	Mountain Pygmy-possum
Mastacomys fuscus	Broad-toothed Rat
Potorous longipes	Long-footed Potoroo
Sminthopsis murina	Common Dunnart
Manorina melanophrys	Bell Miner
Oreoica gutturalis	Crested Bellbird
Struthidea cinerea	Apostlebird
Cyclodomorphus praealtus	Alpine She-oak Skink
Eulamprus kosciuskoi	Alpine Water Skink
Morelia spilota variegata	Carpet Python
Pseudemoia cryodroma	Alpine Bog Skink
Pseudemoia rawlinsoni	Glossy Grass Skink
Varanus rosenbergi	Rosenberg's Goanna
Limnodynastes peronii	Striped Marsh Frog
Euastacus crassus	Alpine Spiny Cray
Euastacus woiwuru	Central Highlands Spiny Cray
Riekoperla intermedia	Stonefly
Riekoperla isosceles	Stonefly
Thaumatoperla alpina	Stonefly

3.4.5 Refuges from climate change

This value is used to identify places that are biogeographic refugia during periods of glaciation or climatic warming. Places that are refuges to climatic change for fauna are the same as those that are refuges for flora. This value has therefore been assessed for both flora and fauna as part of the flora assessment (see Section 3.3.6).

3.4.6 Relictual and primitive fauna

No outstanding examples of relictual or primitive fauna were apparent.

Sub-criterion A2: Importance in maintaining existing processes or natural systems at the regional or national scale.

This sub-criterion is used to identify places exhibiting ongoing processes that are important for the maintenance of natural systems in their present form. Such places may represent key fauna habitats or refuges from frequent fire and drought.

3.4.7 Key fauna habitats

Places that may constitute key fauna habitats include:
- important breeding and roosting sites;
- places important for migratory species;
- important wetlands;
- key remnant habitats.

It should be noted that habitats that are important with respect to species richness or for individual threatened species are addressed separately under sub-criteria A3 and B1 respectively.

Important breeding and roosting sites

For many species the availability of suitable breeding and/or roosting sites is a key factor affecting their distribution and abundance. In particular, species that come together to breed or roost as colonies or loose aggregations are the focus of this assessment.

Method
Fauna experts within Victoria were invited to identify important breeding or roosting sites about which they had some knowledge, usually related to taxa within their areas of expertise. The Atlas of Victorian Wildlife provides for the identification of roost sites (eg. bat caves) and a search of all Atlas records was undertaken for these. Printouts of colonial bird breeding records were obtained from the NRE Wetlands Database and assessed to identify important waterbird breeding sites. The database only contains information on wetlands larger than one hectare and therefore none of the natural sub-alpine wetlands, for example, are included. Literature searches were also done to verify sites identified by the above methods, and in some cases, to identify additional sites.

Threshold
All sites used by colonially roosting bats were considered above threshold, as were all North East wetlands in the *Directory of Important Wetlands in Australia* (ANCA 1996) for which breeding by waterbirds is identified in their statement of significance. Breeding and roosting sites relating to other taxa groups were considered above threshold if it was agreed by a majority of experts consulted that they were of national significance and if the areas could be clearly delineated.

Results
The Common Bent-wing Bat, *Miniopteris schreibersii*, and the Eastern Horseshoe Bat, *Rhinolophus megaphyllus*, are the only cave and mine dwelling bat species known to occur in the North East. Eight sites (mainly mines) are known to be used for roosting by these species in the RFA Region (see Map 24). No bat breeding (maternity) sites are known in the Region, although there is evidence indicating the presence of an Eastern Horseshoe Bat maternity colony near one of the above sites (L. Lumsden, pers. comm.).

Two wetlands, Ryans Lagoon and Black Swamp, are both significant as waterbird breeding sites (ANCA 1996).

One site was identified as being important for invertebrates. The Paps (near Mansfield) was assessed as an important example of a place where butterflies are attracted to isolated hill tops (Wainer & Yen 1996). This "hill-topping" behaviour is an effective means of mate location.

Places important for migratory species

Places important for migratory species include regular migration routes and/or areas regularly used by such animals for feeding, breeding or roosting.

Bird and bat migration routes in the North East Region are difficult to define, but both longitudinal and altitudinal migrations are known to occur, especially for birds. Four of the 14 native freshwater fish species recorded from the Region are known to migrate as part of their life cycle. The Bogong Moth, *Agrotis infusa*, is among the better known invertebrate migrants, migrating from its breeding grounds in New South Wales and Queensland in about November and assembling in the Australian Alps where they aestivate before returning north the following autumn.

Wetlands provide important habitat for many migratory bird species, particularly as feeding sites during the northern hemisphere winter. Australia is a signatory to international agreements to protect migratory bird species and their habitats - these include the Ramsar Convention, the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA).

Method
Fauna experts in Victoria were contacted to elicit information about the occurrence of migratory species in the North East Region and the presence of important migratory routes and habitat used by such species.

All bird species listed under JAMBA and CAMBA and recorded as occurring in the Region were identified (see Table 3.14). Records for all of these species on the Wildlife Atlas were plotted with a view to identifying concentrations of records.

Table 3.14. JAMBA and CAMBA species recorded in the North East.

Scientific Name	Common Name	JAMBA	CAMBA
Anas querquedula	Garganey	✓	✓
Apus pacificus	Fork-tailed Swift	✓	✓
Ardea alba	Great Egret	✓	✓
Ardea ibis	Cattle Egret	✓	✓
Calidris acuminata	Sharp-tailed Sandpiper	✓	✓
Gallinago hardwickii	Latham's Snipe	✓	✓
Haliaeetus leucogaster	White-bellied Sea-eagle		✓
Hirundapus caudacutus	White-throated Needletail	✓	✓
Limnodromus semipalmatus	Asian Dowditcher	✓	✓
Merops ornatus	Rainbow Bee-eater	✓	
Plegadis falcinellus	Glossy Ibis		✓
Sterna caspia	Caspian Tern	✓	✓
Tringa nebularia	Common Greenshank	✓	✓

Threshold
For migratory routes, only those that could be clearly defined were considered above threshold. Areas representing concentrations of records for migratory species listed under CAMBA and JAMBA were considered above threshold only if they included records for at least four listed species and could be associated with a defined landscape feature, such as a wetland.

Results
The areas identified as having indicative national estate significance for migratory species are shown in Map 24. They are Reef Hills Regional Park near Benalla (known to support, for example, Regent Honeyeater, Painted Honeyeater, Swift Parrot and Dollarbird) and Lake Moodemere (with records for at least four JAMBA/CAMBA species) along the Murray River in the far north-west of the Region). Other areas important for migratory species were either unable to be clearly defined, or, in the case of fish, were too difficult to separate out in terms of their importance (T. Raadik, pers. comm.)

Important wetlands

Wetlands invariably support a rich array of flora and fauna, which make them important feeding, breeding and roosting sites for waterbirds and other species. They may also offer valuable refuge during times of drought.

Method
The *Directory of Important Wetlands in Australia* (ANCA 1996) identifies wetlands of national significance. A number of these wetlands are also Ramsar sites (that is, wetlands of international importance). All wetlands occurring in the North East and listed in the Directory were identified. Information on boundaries for these wetlands was obtained from the Wetlands Database maintained by NRE at the Arthur Rylah Institute, Heidelberg. Details were also obtained of wetlands intended for inclusion in the 3rd edition of the Directory, but none occur in the RFA Region.

Threshold
All North East wetlands listed in the Directory were considered to meet the threshold of National Estate significance for this value.

Results
The following nationally significant wetlands (but not Ramsar sites) were identified as occurring within the North East study area (shown on Map 24):

Mount Buffalo Peatlands
Lake Hume
Ryans Lagoon
Black Swamp
Lake Dartmouth
Wongungarra River

Key remnant habitats

Freehold land makes up 45% of the Region, with most of this having been cleared for agriculture. Of the 55% of public land, over half has been significantly disturbed (NRE 1998). This value is used to identify the most important remnant habitats within the predominantly alienated portions of the Region.

Method
This value was not systematically assessed across the whole Region. Known areas of remnant habitat were largely identified by expert opinion. Significance was confirmed by peer review and/or reference to relevant literature.

Threshold
Key remnant habitats that are significant on a state or national scale were considered to be above threshold.

Results
One place, the Chiltern Box-Ironbark National Park area, stood out as being above threshold for this value. It is surrounded on all sides by extensive areas of private land. Although the forest in the area is classified in the Old-growth Study (NRE 1998) as being significantly disturbed, it makes up "one of the most important sites in Victoria, and in some cases Australia, for a number of plant and animal species" (ECC 1997). It contains important examples of Box-Ironbark Forest and Granitic Hills Woodland (as well as other EVCs), supporting, for example, Turquoise Parrots, Regent Honeyeaters and Squirrel Gliders (R. Loyn, pers. comm.).

3.4.8 Contemporary fauna refuges

For this assessment, a fauna refuge is defined as a place that provides protection for fauna during shorter-term climatic changes and environmental disturbances such as fire. For instance, the wetter vegetation classes may provide protection for some fauna during fire, or provide food resources for some fauna during drought. Areas that are refuges from long-term climate change (i.e., the last Ice Age) are addressed under sub-criterion A1.

Method
All EVCs occurring in the North East and having potential to act as fauna refuges (being infrequently burnt and/or protected from the effects of drought) were identified. Those for which appropriate information was available were mapped.

Threshold
The following EVCs were considered to offer potential fauna refuge habitat (C. Molnar, A. Moorrees, pers. comm.):

Wet Forest;
Riparian Forest;
Riparian Shrubland;
Swampy Riparian Woodland;
Montane Riparian Thicket;
Wetland Formation;
Spring Soak Herbland; and
Perched Boggy Shrubland.

All occurrences of these EVCs (greater than or equal to 1 ha) were considered above threshold.

Treeless Sub-alpine Mosaic is a complex of several dry and wet EVCs occurring in the Region. Component EVCs considered to offer refuge against frequent fire and drought include Fen, Snowpatch Herbland, Sub-alpine Damp Heathland, Sub-alpine Wet Heathland and Sub-alpine Wet Heathland/Fen Mosaic. Detailed mapping of these EVCs in the North East is incomplete and the information, including the vegetation descriptions, has not been reconciled with the EVC typology adopted in the EVC dataset series (S. Farrell, pers. comm.). They were therefore unable to be considered further in the analysis.

Results
All of the EVCs listed above had areas above threshold, ranging from 12 ha for Spring Soak Herbland to 11,251 ha for Riparian Forest (see Map 25). Seventy-seven percent of areas represented in Map 25 are within the proposed CAR reserve system.

Sub-criterion A3: Importance in exhibiting unusual richness or diversity of fauna

3.4.9 Fauna species richness

The analysis for places of unusual richness undertaken for the flora assessment was considered to be a good surrogate for fauna species richness and a separate analysis for fauna was therefore not done.

Sub-criterion B1: Importance for rare, endangered or uncommon fauna

This sub-criterion recognises the importance of fauna elements that are rare or uncommon as a result of either natural or unnatural processes.

3.4.10 Rare or threatened fauna

For the purposes of this assessment, all species listed in *Threatened Fauna in Victoria* (CNR 1995) were considered. "Threatened" in this context denotes fauna that are rare, endangered, vulnerable, insufficiently known or have restricted colonial breeding or roosting sites. The status categories are based on the criteria of the International Union for the Conservation of Nature. All species listed under the Commonwealth *Endangered Species Protection Act 1992* (ESP Act) and the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) which occur in the North East are also on the *Threatened Fauna in Victoria* list.

Method
All records of threatened fauna on the Victorian Wildlife Atlas reported as occurring in the study area since 1970 were plotted on a GIS. Some additional known records of colonially roosting bat sites (L. Lumsden, pers. comm.) were also included. Available resources did not permit species habitat modelling to be attempted. While previously existing habitat models, developed by ARI, were available for Powerful and Sooty Owls, these were not overlaid on this layer to avoid undue emphasis being given to particular species. Only points themselves were identified. Concentrations of records where also identified where they represented a number of species; this was done using the same methodology applied earlier for A1 fauna values (see method for assessing endemic fauna values).

Threshold
Species listed as restricted colonially breeding or roosting species, which were not also listed under the ESP or FFG Acts, were only considered above threshold if they had known colonial breeding or roosting sites in the project area - if so, only the actual colonial breeding and roost site records were included. All records identified as being of vagrants were excluded. All other species and records of sufficient accuracy were deemed to be above threshold, as were concentrations of records representing different species. Five or more species within a 5 km radius of a point locality was applied as the threshold used in identifying concentrations.

Results
Sixty-nine threatened species or sub-species, representing 1,426 records, were identified as meeting the specified threshold limits for this sub-criterion in the Region (see Map 26). The largest of the 16 concentrations shown on the map are in the drier west and north-west parts of the Region, reflecting the potentially threatening processes associated with the widespread clearing of native vegetation (VicRFASC 1998b). Forty-two percent of all records represented in Map 26 are within the proposed CAR reserve system.

3.5 Other Natural Values

3.5.1 Geological and geomorphological values

Introduction

The goal of the North East national estate assessment for geological and geomorphological values was the identification of sites demonstrating significant aspects of regional diversity for such values. Geodiversity includes evidence for the history of the earth and a range of processes currently acting on rocks, landforms and soils. It is fundamental to broader ecological processes, contributes to the richness of the natural environment, and provides opportunities for scientific study of the earth's development.

Some elements of geodiversity are relatively robust in the face of human intervention, while others are susceptible to degradation associated with a range of land use activities. An effective approach to the conservation of geodiversity needs to include the development and implementation of management principles designed specifically to protect vulnerable features and processes, and to identify all sites of significance so that their value is assessed and recorded and considered in management decisions.

The study area lies within the eastern section of the Lachlan Fold Belt, a region with a complex Palaeozoic history of deposition, deformation and igneous activity, providing excellent exposures of a varied bedrock of sedimentary, igneous and metamorphic layers. The region contains the only Victorian examples of Mesozoic intrusions and excellent exposures of Tertiary Older Volcanic lava flows in the Hotham and Bogong High Plains areas. Excellent examples of rock structure are exposed in the mountain regions and the effect of major faults, including thrust faults, is clear in the Bogong area. The area contains a variety of landforms resulting from fluvial, aeolian, and cold climate processes.

Data sources

The assessment of geodiversity was undertaken by the consultants N. Rosengren and S. White (see Rosengren and White 1997), supported by a grant from the Australian Heritage Commission (National Estate Grants Program) to the Geological Society of Australia Inc. Much of the material for the report was derived from unpublished data, especially theses held by Victorian universities and advice from earth scientists with knowledge of the region.

It should be noted that the area to which the above study relates encompasses most, but not all, of the North East RFA Region. While much of the western third of the Region is not covered, most of this area's geoheritage is addressed in an Environment Conservation Council report on Box-Ironbark forests and woodlands (ECC 1997). The ECC study does not identify any significant geoheritage sites within the North East RFA Region that are outside the area of the Rosengren and White report. The study by Rosengren and White also includes a small portion of the Gippsland RFA Region. While the following results include reference to sites in the Gippsland Region, all examples of sites given are for areas in the North East only.

It is possible that new localities will be identified over time as further geological and geomorphological research takes place.

Site selection, description and significance rating

The specific criteria used to select sites of geodiversity significance were similar to those established by Rosengren (1984) and involved an assessment of sites of geological and geomorphological value. Soils were not systematically assessed, although a limited number of sites of significance for their soil values were identified.

Attributes used to select sites of **geological significance** included:
- type locality for a geological formation or other stratigraphic subdivision;
- outcrop or artificial exposure of mineral, rock, sediment or soil;
- contact between geological formations;
- fossil location;
- geological structures such as a fold or a fault; and
- rare mineral or unusual rock type.

Attributes used to select sites of **geomorphological significance** included:
- the relationship between rock type and landform;
- the relationship between a geological structure and landform;
- the present or past action of geomorphological processes; and
- sites which are good representatives of the major landforms of the region.

An inventory of sites identified was prepared with the following information; topographic map references, location statement, municipality, land tenure, site description, significance assessment, Register of the National Estate status, and threats to the site. The sites were then assessed for their significance using the following criteria:
- the contribution the site makes to understanding the earth sciences in relation to geology and/or geomorphology on a local, regional, state, national or international basis;
- frequency of replication, i.e. the site is a unique, rare or unusual example of a geological formation and/or surface morphology;
- degree of disturbance and/or quality of display at the site;
- the value as a reference and teaching site displaying classic characteristics of a geological formation and/or a relict or active geomorphological process;
- past, present or potential use as a research site; and
- where there is doubt as to the nature or origin of the feature.

Each site was allocated a rating as to whether it was significant at the local, regional, state, national or international level, determined by the extent to which the above criteria were met.

National estate assessment

A total of 201 sites were identified as significant. While none were considered to be of international significance, three were considered to be nationally significant, 39 of State significance, 110 regionally significant, 47 locally significant, and two sites were of unknown significance.

A threshold of State significance and above was used to determine which sites were of potential national estate significance, with the result that 42 sites in the study area were assessed to be in this category. From this group, 16 places were already listed on the Register of the National Estate (RNE) or had been nominated for inclusion, leaving 26 sites to be recommended to the Australian Heritage Commission for listing on the RNE. Some areas contain multiple values that met the threshold, and many areas satisfied several national estate criteria. The Ovens Graben Permian Sites include four individually described sites and about eight other undescribed small outcrops in the area - two of the sites (Moyhu Permian glacial pavements and Wooragee Permian glacials) are individually above threshold for potential national estate significance. Twenty-nine of these 42 sites occur in the North East RFA Region (see Map 27).

The 29 sites were assessed by Environment Australia against the relevant national estate sub-criteria (A1, A2, A3, B1, C1, C2 and D1). Results of the assessment are detailed in Appendix M.

Sub-criterion A1: Importance in the evolution of Australian flora, fauna, landscapes or climate

Assessment for values under sub-criterion A1 involved identification of sites where the present geology and landform features reflect the influence of past climatic, geological, and geomorphological processes. Each terrane type identified in the study area contains features that illustrate geological and geomorphological processes operating during a particular period of geological history. For example, the presence of geomorphic features such as relict glacial formations illustrate the influence of a past colder climate, while fossil sites provide a record of the biota which previously existed in the area.

Results

While the North East's principal lithologies and structures are of Palaeozoic age, the area includes important Mesozoic and Cainozoic rocks, structures and landforms. Twenty-eight sites were identified that demonstrated relationships between geological and geomorphological units, and rock types and structures associated with these epochs. Two sites were characteristic for their geologic period: Mount Buffalo - an excellent example of a Quaternary landform environment, and Brandy Creek Quarry - for its Cainozoic geology. Six sites were identified as being important for glacial activity from an era of past colder climate, and one fossil and one cave site were identified as important for palaeontology.

Sub-criterion A2: Importance in maintaining existing processes or natural systems at the regional or national scale

The identification of areas of national estate significance under this sub-criterion involves assessment of sites important for maintaining ongoing geological or geomorphological processes. These include sites where there is clear evidence of ongoing processes related to the action of water and wind in shaping geomorphic features within the landscape.

Results

Three sites were identified in this sub-criterion with the theme of snow patch weathering, a process in which the disintegration of rocks around a patch of snow is brought about by alternate freezing and thawing. Mount Feathertop, Mount Nelse and Mount Nelse North were identified as important and represented some of the largest and longest surviving snow patches in Victoria.

Sub-criterion A3: Importance in exhibiting unusual richness or diversity of flora, fauna, landscapes or cultural features

The identification of areas of national estate significance under this sub-criterion recognises the value of sites where large numbers and/or a diversity of geological features and/or landforms are assembled within a relatively small area. Identification of such areas involved assessment of the presence in the landscape of sites with a rich array of rock types, structures or textures.

Results
Five sites were identified as showing a large number and/or a diversity of geological features. Sites showing a rich array of Permian landscape and climate features were the Bogong High Plains, Ovens-Graben Permian Sites and Mount Feathertop. Two sites were indicative of rich alluvial processes.

Sub-criterion B1: Importance for rare, endangered or uncommon flora, fauna, communities, ecosystems, natural landscapes or phenomena, or as a wilderness

This sub-criterion recognises the importance of abiotic elements within the landscape with very limited occurrences as a result of natural processes. Identification of such sites involved assessment of the presence in the landscape of areas with uncommon, rare, or outstanding geology or landforms, and rare fossil sites. Many of the sites identified under sub-criteria A1 and A2, which provide evidence of past or present processes, also illustrated rare or uncommon geological or geomorphological features.

Results
Twenty sites were identified with rare or uncommon geological or geomorphological features. A number of fluvial landforms were identified as rare geomorphological features.

Sub-criterion C1: Importance for information contributing to a wider understanding of Australian natural history, by virtue of its use as a research site, teaching site, type locality, reference or benchmark site

This sub-criterion addresses the importance to the national estate of teaching and research sites which have generally been used over a considerable period and are expected to play an important future role in education and development of a better understanding of the geological and geomorphic history of the study area. It also includes reference areas that have been used to describe particular aspects of the regional geodiversity.

Results
Five sites were identified against this sub-criterion. Wooragee Glacials is a research site used by universities studying glacial and fluvioglacial conglomerates. Four areas were recognised as reference sites; including Brandy Creek Quarry gravel deposit and Cope Creek periglacial deposits.

Sub-criterion C2: Importance for information contributing to a wider understanding of the history of human occupation of Australia

This sub-criterion applies to research sites producing research information about the cultural environment or cultural history. Its scope covers sites for which there is a strong presumption of research potential in one of a wide variety of fields (e.g. mining) which may contribute to the understanding of Australian history.

Results
One site was identified, Eldorado, important for its historical, geological and environmental context for showing pre-1954 alluvial gold mining technology and its impact on the local creek system.

Sub-criterion D1: Importance in demonstrating the principal characteristics of the range of landscapes, environments or ecosystems, the attributes of which identify them as being characteristic of their class

This sub-criterion recognises the significance of conserving 'representative examples' of geologic and geomorphic features. Sites assessed against this criterion were identified on the basis of their value in providing representation of landforms that characterise the Region. Many of the sites identified under sub-criterion A1 and sub-criterion A2 were also assessed under this sub-criterion.

Results
This value had 31 sites identified as being 'characteristic of their class'. A number of themes emerged, such sites exhibiting glacial/past climate/high country landform processes, including the Wooragee Glacials and Mount Nelse. Fluvial geomorphology is exhibited by The Niggerheads, one of the largest blockstreams in Victoria. Areas exposed because of fault activity and erosion episodes were identified and include Kiewa Valley, showing valley alignment by faulting.

3.5.2 Natural history sites

Sub-criterion C1: Importance for information contributing to a wider understanding of Australian natural history, by virtue of its use as a research site, teaching site, type locality, reference or benchmark site

The assessment against sub-criterion C1 was broken up into three sub-assessments: type localities for flora species; type localities for fauna species; and places important as research, teaching or benchmark/reference sites.

Type localities for flora species

The objective of this assessment was to provide a list of North East type localities for flora known to occur in the Region. Difficulties in obtaining information for non-vascular flora limited the assessment to vascular plants.

Method
For each species identified as having its type locality in the Region, information was gathered on the collector, locality and year of collection. Localities were given a precision code according to those used by the Tasmanian Herbarium (see Table 3.15). Of the various "types" which may exist, only holotypes and lectotypes were considered (see Glossary for definitions). Data were derived largely from the *Australian Plant Name Index* (Chapman 1991) and primary sources such as flora monographs. All vascular plant species recorded for the Region were considered in the assessment.

Table 3.15: Precision codes used in defining type localities.

Precision code	In distance, degrees or minutes	Relative to types of locality
1	Precise to within a 50 m radius (or nearest second)	A six-figure grid reference or GPS reading
2	Falling within a 1 km radius (or nearest minute)	A location able to be pinpointed accurately on a 1:250,000 map; a 'spot locality' (such as a hill or mountain summit with a small surface area, a stream, river or road junction, or an accurate distance from one)
3	Falling within a 10 km radius (or nearest 5 minutes)	A location equivalent to a small town, a hill or mountain with a large surface area, a smallish lake, and so on
4	Falling within a 25-km radius (or nearest 10 minutes)	A location equivalent to a large city, a mountain range, a river 10-50 km long, and so on
5	Greater than a 25 km radius (about 30 minutes or over)	A region such as a large national park, an area such as 'Northern Tasmania', or all of Tasmania

Source: Tasmanian Herbarium.

Threshold
All sites identified with a precision code of 3, 4 or 5 were considered not to meet the threshold: their locations could not be pinpointed with sufficient accuracy. Sites with a precision code of 1 or 2 (that is, precise to within a 50-metre or 1-kilometre radius respectively) were considered to meet the threshold unless the species no longer occurred there.

Results
Of the 29 flora type localities identified as occurring in the North East, 10 are considered to meet the threshold criteria - these are shown in Map 28.

Type localities for fauna species

The objective of this assessment was to compile a list of North East type localities for fauna species, encompassing all vertebrate and invertebrate terrestrial and aquatic species for which information was readily available.

Method
As for the flora type localities project, information was gathered on the collector, locality and year of collection for each species. Similarly, localities were given a precision code (see Table 3.15). Only holotypes and lectotypes were considered. The primary source of information for vertebrate species was the *Zoological Catalogue of Australia*, although this is currently incomplete for fish and birds. The CSIRO provided data on all invertebrate type locality records held by the Organisation and sourced from the study area.

Threshold
As for the flora type localities project, only sites identified with a precision code of 1 or 2 were considered to meet the threshold.

Results
Of those vertebrate species for which information was readily available, none was found to have its type locality in the North East. Three invertebrate sites were considered before application of the exclusion rules and the two indicative places that met the threshold are shown on Map 28.

Research, teaching and reference/benchmark sites

The objective of this assessment was to identify sites of National Estate significance based on their contribution to a wider understanding of Australian natural history through their use as research, teaching or benchmark/reference sites.

Data sources
Data sources include the following:

- Land Conservation Council (LCC) study area reports;
- details or permits for research issued by Parks Victoria under the *National Parks Act 1975* and the *Wildlife Act 1975*;
- list of State forest research sites (provided by NRE); and
- consultation with scientists, researchers, academics and other staff attached to universities, museums, NRE, other organisations and survey groups with an interest in the natural sciences.

Where possible, information collected from experts was verified from the literature. Site boundaries were determined from the literature or consultation with experts.

Method
Sites were identified as research, teaching or reference/benchmark sites according to the criteria shown in Table 3.16. Research or teaching sites were only considered if they had a long history of such use.

Table 3.16: Criteria for identifying research, teaching and reference/benchmark sites.

Research sites	Teaching sites	Benchmark/Reference sites
Places where research is taking place or has taken place. Aim of research is to increase understanding about Australian natural history. Results of research are documented and available.	Places where teaching is taking place or has taken place. Aim of teaching is to increase understanding about Australian natural history.	Places with examples of biophysical characteristics or processes in a relatively undisturbed state. Progression of natural processes can be measured and observed and compared with a more disturbed environment.

Threshold
Assessment of the national estate value of sites was based on feedback from experts and assessment by EA and NRE staff. Research, teaching and benchmark/reference sites that are significant on a state or national scale were considered to be above threshold.

Results
The following areas (shown on Map 28) were considered to meet the threshold:

- Rocky Valley and Pretty Valley Plots on the Bogong High Plains (Research and Reference/Benchmark values);

- Mountain Pygmy-possum (*Burramys parvus*) population monitoring site at Mt Higginbotham (Research value);

- Trout Cod (*Maccullochella macquariensis*) population monitoring site at Seven Creeks (Research value);

- Ryans 1 and 2 billabongs of Ryans Lagoon (nationally important wetland), near Bonegilla (Research value); and

- Nineteen Reference Areas that are not currently listed on the Register of the National Estate (legislated, Reference/Benchmark values) - see Table 3.17.

Long-term plots were established in grassland and heathland on the Bogong High Plains in the 1940s to monitor ecological processes in grazed and ungrazed conditions. These plots have been carefully maintained and the vegetation remeasured regularly. The results have been published in reports and scientific journals, thus documenting long-term ecological processes. These plots are amongst the oldest reference sites in Australia and are of national and international significance (Papst et al. 1997).

The Ryans 1 and 2 billabongs have been intensively studied by various workers from the Murray-Darling Freshwater Research Centre since 1975. They are the subjects of current and on-going scientific work and are the most intensively studied of any billabong system in the world (ANCA 1996).

Mount Higginbotham is the first place where the Mountain Pygmy-possum was found. Intensive research into the biology, ecology and conservation of this nationally threatened species commenced at Mt Higginbotham in 1979 and annual monitoring is continuing (I. Mansergh, pers. comm.). Even though the summit of Mt Higginbotham is in the Gippsland RFA Region, monitoring sites occur on opposite sides of the summit, including in the North East RFA Region.

The Trout Cod population in Seven Creeks (southeast of Euroa) is the only viable population of this nationally endangered species in Victoria. A section of Seven Creeks has been regularly surveyed by NRE since at least 1979. The relevant area shown on Map 28 represents the Seven Creeks Wildlife Reserve which incorporates about 20 m of land either side of Seven Creeks from Galls Gap Road bridge to Creek Junction (CNR 1993).

Reference Areas are established under the Victorian *Reference Areas Act 1978*. They are tracts of public land containing viable samples of one or more land types that are relatively undisturbed and that are reserved in perpetuity as a reference.

Table 3.17: Reference Areas in the North East*.

Name	Size (ha)
Blue Range	400
Bungil	1,750
Burbiyong Creek	1,300
Cambatong	140
Cudgewa Creek	140
Drum Top	440
Dry Forest Creek	1,390
Glen Creek	390
Jemba	1,030
King	940
Lucyvale Creek	540
Mitta Mitta	630
Mount Buffalo	1,120
Mount Pleasant	590
Pilot Range	1,130
Pine Mountain	480
Ryans Creek	320
Toorour	480
White Box Ridge	90

* Two additional Reference Areas, Lightwood and Whiterock Creek, are already on the Register of the National Estate.

It should be noted that the LCC process has identified a number of Education Areas as areas to be set aside for the primary purpose of environmental education. A number of these occur in the North East, three of which are already on the Register of the National Estate. No additional areas are identified here as teaching or educational sites with indicative national estate significance.

Chapter 4: National Estate Outcomes

4.1 National Estate Outcomes: Cultural Values

The national estate assessment of the cultural values of the forests of the North East region was designed to achieve the best practicable understanding of the range and distribution of forest places of cultural significance within the timeframe of the CRA. The cultural assessments were based on a study of social, aesthetic and historic values. The heritage outcomes for Aboriginal values is based on establishing an agreed consultative process for heritage management with Aboriginal communities with the development of guidelines and a sensitivity zoning.

The indicative places of national estate cultural value, identified through a heritage data audit, thematic and geographical studies, and through input from the communities of the North East, fill major gaps in the understanding of national estate forest cultural values. The following are among the main outcomes from the assessment of these values:

- identification of over 90 indicative national estate forest places of particular importance to the communities of the North-East;
- identification of a wide range of indicative historic national estate places, including huts, mining areas, walking tracks, waterfalls, forest camps, pine plantations, fire towers, lookouts, sawmills and tramways that provide the community with a sense of identity and attachment to forests;
- an agreed consultative process for the management of Aboriginal heritage places involving the North East Aboriginal communities; and
- a greater understanding of places that are valued by the community.

The assessments provide an account of the current state of knowledge of cultural values, regional surveys and documentation of places in heritage registers which will be used to inform the development of conservation strategies for places of cultural significance to ensure they are considered in forest management.

4.2 Future Research: Cultural Values

There are a number of potential National Estate places of cultural value for which there was insufficient information available, or which were unable to be visited due to snow or other access restrictions to make a final assessment. These places (noted in the relevant cultural studies) were not fully assessed and would benefit from future research to clarify their significance.

Social value
Working with communities takes time, and the time often extends beyond the timeframe of the RFA. The community consultation process of returning information for comment resulted in a number of places being identified which were not researched as part of the RFA. For example, information on a group of stock routes was provided by a community member late in the process. These will be noted in the Inventory. It is anticipated that the Inventory will be used as a base to encourage further research and conservation of heritage places.

Some other suggestions for future forest-related heritage work include:
- using historic maps to uncover potential historic places which are not obvious today (such as the Buckland Valley riot site);
- using 1:25,000 topographical plans to identify potential places in forests along the Murray River and in the extreme north-east of the region;
- consulting further with rangers and forest officers (past and present) to identify a wider range of places in existing National Parks and State Forests;
- targeting community sources for further place identification; and
- encouraging community members to undertake research of heritage places, particularly oral histories of individuals who worked in the local forest environments.

Aesthetic value
Detailed investigation of all places of potential aesthetic value was not possible particularly for those with difficult access. Further investigation is therefore recommended for sites of possible national estate aesthetic value, for example during the preparation of forest management plans. This applies particularly to places in remote areas where observations by forest officers may be the only source of information on these places unless more detailed investigations are undertaken. Further investigation of a few sites in the region which had further value identified in the community review process will also be beneficial.

Historic value
The Sawmill and Tramways study (Evans, 1997) noted that much survey work still remains to be carried out in the study area. Only a tiny proportion of the 385 sawmill sites established as part of the project's inventory have been surveyed. The small "footprint" of many of the mill sites in the north-east means that they remain largely unknown both to local historians and NRE officers.

Examples which would undoubtedly repay further research include the Strathbogie Ranges, Granya State Forest and the Myrrhee-Whitfield-Tolmie area, especially in the reserve for the Benalla water supply where a number of mill sites are likely to have been undisturbed for many years. The Baranduda Ranges and Mount Big Ben would also probably repay further field survey. Further work is also required at some of the goldfield sites in order to assess the physical remains of the sawmills which made a contribution to the mining history of the area.

The assessment of the historic forest activity sites in the North East RFA region (Bannear, 1997) was hampered by the absence of comparative data and little has been written about this type of place. Sites which have subtle physical characteristics appear to be little known even within their local communities. This was reflected in responses at the North East RFA community workshops held in July 1997. Few forest activity sites were mentioned by those who attended. The pine plantations, for example, are a significant physical characteristic of the region, and it is interesting that their history is largely overlooked by the local communities.

4.3 National Estate Outcomes: Natural Values

The assessment of national estate values for the CRA of North East Victoria has resulted in the identification of areas of indicative national estate significance for a wide range of values. Extensive and localised values, covering aspects of the flora and fauna as well as other features of the natural landscape (including old-growth forest and undisturbed catchments) were all examined. Much of the information required for the assessments was already available in one form or another. Collation of the data, together with additional work commissioned as part of the CRA for the Region, provided a sound basis for undertaking the various assessments. The results of the study represent a considerable enhancement of our understanding of the natural national estate in the Region.

The following are among the main outcomes of the assessment of natural values:

- identification of many hundreds of individual sites and places of significance for a range of national estate values, many of them having significance for multiple values;

- a greatly enhanced understanding of the forests of north-eastern Victoria and their natural heritage significance; and

- the creation of a profile of the current state of scientific knowledge and opinion relating to North East natural places for use as a resource, in particular for the better appreciation and management of places of national estate significance.

4.4 Future Research: Natural Values

Another important outcome of the study is that a number of the assessment methods and their results provide very clear direction for future research. Whilst it is generally agreed that the methods adopted were 'best practice', it is recognised that some of the assumptions applied could be tested through further academic and field research.

The areas of most interest are:

Non-vascular flora
The assessment focuses predominantly on flora communities and selected vascular plant species. Given the biogeographic importance of the study area, the non-vascular flora (such as mosses, ferns, lichens) are also of interest.

Terrestrial invertebrate fauna
As for many regions of Australia, the terrestrial invertebrate fauna is inadequately known. The wide range of habitat types in the North East is likely to support a very diverse and biogeographically interesting terrestrial invertebrate fauna.

Habitat modelling
Species-specific habitat models are available for only a very few taxa (such as some owls) in the Region, therefore restricting the use of this concept to identify, for example, key fauna habitat for particular threatened species.

Species richness modelling
The model developed for the analysis of flora richness (and used as a surrogate for fauna richness) was considered by those who had input to the study as being an improvement on the methodology used for the East Gippsland and Central Highlands assessments. However, field verification to validate the results would be valuable, as would an assessment of the sensitivity of the analysis to changes in grid size.

Remnant vegetation
See point made in last paragraph of Section 3.3.8.

4.5 Management of National Estate Values

An objective of the North East Regional Forest Agreement (RFA) is to provide for the conservation of environment and heritage values through the development of a framework of comprehensive, adequate and representative reserve systems, and ecologically sustainable forest management. Fundamental to the environment and heritage objectives for the RFA is ensuring that national estate values are adequately protected within this framework. In developing the RFA for Victoria, governments will consider the level of representation of national estate values in reserves, the recommendations of the expert advisory group on ecologically sustainable forest management, and the results of an assessment of mechanisms for the protection of national estate values.

A component of the CRA has been the assessment by an independent expert advisory group of the systems and processes for ecologically sustainable forest management. Included in this assessment was an examination of the information, policy, planning, implementation and review mechanisms for conserving heritage values. The recommendations of the group are contained in the report *Victorian Statewide Assessment of Ecologically Sustainable Forest Management* (VicRFASC 1997).

While some national estate values, particularly extensive values such as old-growth forests and natural landscapes, may be best protected by formal reservations, the protection of other values, particularly site values such as historic or archaeological features, may be best achieved through other mechanisms such as management prescription.

The cultural projects identified several issues concerning the management of cultural forest sites. They found the large number of very fragile sites and limited resources makes site protection difficult.

The cultural projects identified several issues concerning the management of cultural forest sites. The large number of very fragile sites and limited resources makes site protection difficult. Public awareness of forest heritage is often limited, with some sites being considered as devoid of natural or cutural values. A few of the early nursery sites and plantations fall into this category.

Local Aboriginal groups are already involved in the conservation management plans for rock art sites and significant cultural heritage places.

A process for cutlural heritage management is provided for in the report *Guidelines for the Management of Cultural Heritage Values in the Forests, Parks and Reserves of East Gippsland* (NRE 1997). This report undertaken as part of the East Gippsland RFA will form

the basis for the development of statewide cultural heritage guidelines, and a project to develop the statewide guidelines is currently underway.

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Glossary

Acronyms

AAV	Aboriginal Affairs Victoria
AHC	Australian Heritage Commission
ANCA	Australian Nature Conservation Agency
ANIC	Australian National Insect Collection
AUSLIG	Australian Surveying and Land Information Group
BN	Biophysical Naturalness
CAMBA	China-Australia Migratory Bird Agreement
CAR	Comprehensive, Adequate and Representative
CNR	Conservation and Natural Resources, Department of
CRA	Comprehensive Regional Assessment
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EA	Environment Australia
ECC	Environment Conservation Council
EVC	Ecological Vegetation Class
GIS	Geographic Information System
IBRA	Interim Biogeographic Regionalisation of Australia
JAMBA	Japan-Australia Migratory Bird Agreement
JANIS	Joint Australian and New Zealand Environment and Conservation Council and Ministerial Council of Forestry, Fisheries and Aquaculture National Forest Policy Statement Implementation Subcommittee
NRE	Natural Resources and Environment, Department of
NWI	National Wilderness Inventory
Ramsar	Convention on Wetlands of International Importance
RAOU	Royal Australasian Ornithologists Union
RDI	River Disturbance Index
RFA	Regional Forest Agreement
RFASC	Regional Forest Agreement Steering Committee

Definitions

Action Statement A formal statement providing management prescriptions that aim to ensure the long-term conservation of a species. An Action Statement must be prepared for every plant and animal species that is listed under the Victorian *Flora and Fauna Guarantee Act 1988*.

aeolian Related to the effects of moving air, especially wind currents. Sand dunes and lunettes are aeolian landforms.

aesthetic value The response derived from an experience of the environment or particular natural and cultural attributes within it. This response can be either to visual or non-visual

elements and can embrace emotional response, sense of place, sound, smell and any other factors having a strong impact on human thoughts, feelings and attitudes.

aestivate Spend the summer in a torpid condition.

ARC/INFO Software used to display and analyse spatially represented data.

biodiversity *see* biological diversity.

biogeographic region A region defined by a combination of biological, social and geographic criteria rather than geopolitical criteria; generally, a system of related, interconnected ecosystems.

biological diversity The variety of all life forms: the different plants, animals and micro-organisms, the genes they contain, and the ecosystems they form. Biological diversity is usually considered at three levels: genetic diversity, species diversity, and ecosystem diversity. It is sometimes considered at the level of landscape diversity.

biophysical Biophysical relates to combinations of physical features, such as climate, soils, geology and landforms, and biological features, such as flora and fauna.

bioregion see biogeographic region

Cainozoic The geological era of rocks of most recent age, extending to the present.

Code of Forest Practices for Timber Production Guidelines established by the Department of Natural Resources and Environment for conducting timber harvesting and associated works in Victoria's State forests. The guidelines aim to ensure that impacts on environmental and heritage values associated with forests are minimised.

complex (vegetation complex) Occurs where floristic entitities are unable to be distinguished in an area but are known to exist discretely elsewhere.

comprehensive, adequate and representative reserve system A reserve system displaying the features of comprehensiveness, adequacy and representativeness.
comprehensiveness—the degree to which the full range of ecological communities and their biological diversity is incorporated in the reserve system.
adequacy—the reserve system's ability to maintain the ecological viability and integrity of populations, species and communities.
representativeness—the extent to which areas selected for inclusion in the reserve system are capable of reflecting the known biological diversity and ecological patterns and processes of the ecological community or ecosystem concerned.

comprehensive regional assessment A joint Commonwealth–State assessment of all forest values—environmental, heritage, economic and social—leading to the establishment of a comprehensive, adequate and representative reserve system, agreements on forest management, and the signing of a regional forest agreement.

conglomerate Rock consisting of rounded and waterworn pebbles, etc., embedded in a finer cementing material.

conservation The protection, maintenance, management, sustainable use, restoration and enhancement of the natural environment.

conservation advice The Australian Heritage Commission has a statutory obligation to furnish advice on the protection of the national estate. The advice is based on conservation principles which are aimed at protecting and maintaining national estate places. Advice is available for land management agencies and individuals who own places that have been identified as having national estate value. However, they are under no obligation to accept this advice — the AHC can only recommend ways of protecting the national estate, not enforce them.

criteria The eight criteria used by the Australian Heritage Commission to determine whether places meet the requirements for listing on the Register of the National Estate. These criteria are stipulated in the *Australian Heritage Commission Act 1975* and are listed in Appendix B.

cultural heritage value Aesthetic, historic, scientific or social value for past, present or future generations.

cultural place A site, area, landscape, building, structure or combination of these, and associated contents and surrounds.

dedicated reserve A reserve equivalent to International Union for the Conservation of Nature and Natural Resources (IUCN) Protected Area Management Categories I, II, III, or IV as defined by the IUCN Commission for National Parks and Protected Areas (1994). The status of Dedicated Reserves is secure, requiring action by the Victorian Parliament or in accordance with Victorian legislation for reservation or revocation. In Victoria, Dedicated Reserves include, but are not limited to, parks under the *National Parks Act 1975* (Vic) and flora, fauna or nature conservation reserves under the *Crown Land (Reserves) Act 1978* (Vic).

disjunct Disjunct populations are physically separated from one another, that is, there is no gene flow between the populations. They are formed over time due to the appearance of a barrier in a formerly continuous distribution. Disjunct populations often have distinctive features in an evolutionary sense from the 'parent' population, and in time may become separate species.

disturbance Any of a range of factors affecting the condition of natural areas. Disturbance may be natural or human-induced. Natural disturbance includes wildfires and rainstorms, and is part of natural ecological processes. Human-induced or 'unnatural' disturbance includes timber harvesting, agricultural clearing, mining and grazing. The factors that are important when considering disturbance are the origin, duration, and intensity of the disturbance, and its impact on the environment.

disturbance data Records of disturbances such as clearing, grazing, fire or timber harvesting that may affect themes, species or assemblages being assessed.

diversity A measure of the physical or biological complexity of a system. It refers to a range of features from artefact scatters to species presence.

ecological vegetation classes The components of a vegetation classification system. They are groupings of vegetation communities based on floristic, structural and ecological features.

ecosystem A set of normally co-occurring and interacting species associated with a particular setting in the physical environment. The aggregate of plants, animals and other organisms, and the non-living parts of the environment with which these organisms interact. A dynamic complex of plant, animal, fungal, and micro-organism communities and the associated non-living environment interacting as an ecological unit.

endemic species Species confined to a specific region or locality.

epoch A subdivision of a period in geological time. For example, the Holocene and Pleistocene epochs are subdivisions of the Quaternary period.

extensive national estate values Those national estate values that are widespread over the landscape, for example, natural landscapes (Criterion A.2).

fabric The physical material of a place. For example, the fabric of cultural places might be an artefact scatter or hut.

forest critics Forest officers and parks officers who had a sound knowledge of forest systems and particular forest areas.

fluvial Related to the effects of water in terrestrial environments. A valley is a fluvial landform.

geodiversity The natural range (diversity) of geological (bedrock), geomorphological (landform) and soil features, assemblages, systems and processes. Geodiversity includes evidence for the history of the earth (evidence of past life, ecosystems, and environments) and a range of processes (biological, hydrological and atmospheric) currently acting on rocks,landforms and soils.

geographic information system A system displaying spatially represented data; for example, ARC/INFO.

geographic representation units Subdivisions of the region that share broadly similar biophysical characteristics, especially in regard to landform, geology, soils and climate.

geoheritage Those components of geodiversity that are important to humans for purposes other than destructive exploitation; things we would wish to retain for present and future generations.

geological characteristics Features and structures associated with the formation of the earth's crust as well as major landform units such as mountains.

geomorphological characteristics Features associated with active landform processes such as erosion and deposition.

Gondwanic Those characteristics or features which relate to an ancient phase of the earth's development, at a time when the land masses of the southern hemisphere were joined together. This agglomeration of the southern continents is termed Gondwana, hence the adjective ‘gondwanic’.

graben A downthrown structure produced by faulting at the earth’s crust.

grid cells Square grids of an appropriate scale (such as 2 km) which are laid over maps and data sets on the geographic information system to aid interpretation of data and analysis of patterns.

growth stages The forest growth stage classification system is a way to classify the life-cycle of trees. The system is based on tree structure, namely, crown form. Growth stages are the categories of this system, the main ones being mature, regrowth and senescent, or over-mature.

habitat The place or environment in which an organism naturally occurs.

heritage All those things which we have inherited from previous generations and which we value. Heritage includes places (including the National Estate places), things (movable objects) and folklore (customs, songs and sayings).

historical themes Major historical activities, such as tourism and recreation, or events, such as fire disasters.

holotype A single specimen designated by the author of a plant or animal name, at the time of original publication, as that to which the name shall apply; the 'voucher specimen' of a name.

hydrological Pertaining to the science of water, its properties, movement, and distribution over the earth's surface.

igneous Igneous rock is formed by the solidification of magmas, from a molten state, either extrusive on the earth's surface (associated with volcanic activity), or intrusive into the rocks forming the earth's crust.

indicative national estate values Qualities of place that have been identified as having national estate importance and are awaiting formal assessment by the Australian Heritage Commission for consideration for the Register of the National Estate.

Interim Biogeographic Regionalisation of Australia A bioregional framework delineating natural regions in each State and Territory based on biophysical, environmental and vegetation considerations—for example, climate, soils, landform, vegetation, flora and fauna, and land use—that allow cross-border regionalisation.

interim list The Australian Heritage Commission enters places on the interim National Estate list by announcing, in the press and in the *Commonwealth Government Gazette*, its intention to register those places. Once a place is on the interim list, and before it can be entered on the Register of the National Estate, there is a minimum statutory period of three months during which any person can object to the proposal in writing. If objections are received they must be given due consideration by the Commission, but uppermost consideration must be given to the National Estate significance of the place.

identified national estate value A national estate value identified by the Australian Heritage Commission.

layer The representation of each national estate value, such as endemic plant species, on a map.

lectotype A specimen selected from among those cited with the original description of a species or subspecies to serve in place of a holotype where the holotype is missing or destroyed, or where no holotype was designated.

linear EVCs Vegetation communities which most commonly occur in an elongated linear form. They are mostly associated with water courses.

linear network A place of cultural significance which exists as a linear feature, such as a track or a route and associated sites alongside.

lithology The general characteristics of rock formations, such as composition and texture, and the sequence in which the formations were laid down.

maintenance The continuous protective care of the fabric, contents or setting of a place, as distinguished from repair. Repair involves restoration or reconstruction.

Mesozoic Belonging or relating to the geological time between the Palaeozoic and Cenozoic; from 245 million years BP.

metadata Information about the content, quality, condition and other characteristics of datasets.

metamorphic Describes rocks in the earth's crust which have undergone change since their original deposition; through the influence of heat and pressure, especially applied to the recrystallisation of sedimentary rocks.

methodology The application of the criteria and thresholds to determine national estate values within a regional context. The methodology for regional assessments is distinguished by the fact that it does not consider national estate values in isolation but attempts to place them in the context of national estate values for an entire region.

montane Occurring on mountains.

mosaic (vegetation mosaic) Consisting of discrete floristic entities (EVCs) which were unable to be distinguished in the mapping due to the scale used.

national estate Those places being components of the natural environment of Australia or the cultural environment of Australia that have aesthetic, historic, scientific or social significance or other special value for future generations and for the present community.

national estate place An area or location listed in the Register of the National Estate. A National Estate Place is the end point in the identification and assessment process.

national estate values The aesthetic, historic, scientific or social values attributed to places by the Australian Heritage Commission.

nomination Nomination of a place for consideration as a National Estate place involves informing the Australian Heritage Commission (AHC) of the place and its value. Anyone can nominate a place for listing on the Register of the National Estate. The place then undergoes detailed assessment by AHC staff and relevant outside experts. Each place is examined against specific criteria, and assessed solely on the basis of national estate values.

old-growth forest The National Forest Policy Statement defined old-growth forest as 'forest that is ecologically mature and has been subjected to negligible unnatural disturbance such as logging, roading and clearing'. For the purposes of this assessment, the proposed operational interpretation from JANIS (1997) was used; that is, 'old-growth forest is ecologically mature forest where the effects of disturbances are now negligible'.

Palaeozoic The era of geological time from 570 million years BP. This era lies between the Precambrian and Mesozoic, and is the oldest era in which life is known to have existed. It includes the Cambrian, Ordovician, Silurian, Devonian, Carboniferous and Permian periods.

periglacial On or bordering a glacial area.

Permian Of the uppermost divisions of the Palaeozoic series of strata.

phylogenetic Referring to the evolutionary line of descent of an individual taxon or groups of taxa.

point site A site that covers a limited area, expressed as points when mapped at a large scale.

predictive model for archaeological sites A model that predicts archaeological sites or locations inferred from existing information and usually links site density to particular landscape units.

prescription Standards specified within the Code of Forest Practices which describe acceptable management practices related especially to timber harvesting. They are regulatory rather than legislative.

principal characteristics of class The essential features which define, or are most commonly associated with a particular heritage value. The concept is sometimes expressed as representative examples.

Quaternary The present geological period, which began 1.6 million years BP. and includes the Pleistocene and Holocene epochs.

Recovery Plan A management plan intended to ensure the long-term conservation of a species, prepared under the Commonwealth *Endangered Species Protection Act 1992* which requires recovery plans to be prepared for scheduled species.

refugia, refuges Biological communities or geographic entities that, because of their moderating structural characteristics or physical isolation, or both, provide a sanctuary to which species or groups of species have retreated or have been confined in response to threatening processes, including climatic change.

regional forest agreement An agreement, between the Commonwealth and a State or Territory government, for the long-term management and use of forests in a particular region. The purpose is to reduce uncertainty, duplication and fragmentation in government decision making by establishing a durable agreement on the management and use of forests.

Register of the National Estate The national inventory of places of natural, historic and Aboriginal heritage significance, which have been rigorously assessed by the Australian Heritage Commission and deemed to be worth conserving for present and future generations. It serves to notify all Australians, and particularly planners and decision-makers, of places of national estate significance.

richness A measure of the abundance of individual elements within a particular place. For instance, the species richness of an ecological vegetation class (EVC) is the number of species which occur within that EVC. The concept is closely related to diversity.

riparian Associated with river banks.

selective logging The logging of a selected portion of a stand of timber, usually according to pre-determined criteria relating to the intensity of the logging and the nature of the stand remaining after logging.

significance indicators Used to provide an indication of whether or not a place potentially holds national estate value.

stakeholder Established groups or organisations with an interest in the forests of the region, e.g. industry, recreation or conservation.

species A group of organisms capable of interbreeding with each other.

storylines Strong regional patterns or stories which provide links between historical themes, for example, sawmill sites and transport links in remote forest locations. Storylines are the product of people's memories and association with places. They often link places with one another.

subcriteria Components of the eight criteria used by the Australian Heritage Commission. They are useful in applying the eight criteria to specific aspects of the environment (see Appendix B).

succession The change in vegetation composition over time, one community 'succeeding' over the other. For example, wet forests in areas such as gullies that are protected from fire and other disturbance may eventually become rainforest. This occurs over a long period of time in which rainforest species first colonise the understorey and, as the emergent eucalypts die out, rainforest species become the dominant species in the canopy.

taxon (*pl.* taxa) The named classification unit to which individuals or species are assigned.

terrane Geological formation or series of formations.

threshold The level above which a value is considered acceptable for entry on the Register of the National Estate. Thresholds are developed through scientific assessment or expertise, and an analysis of data within a regional context.

type specimen (biological/geological) The original specimen from which a new species (biological or geological) is scientifically described. The type location is the place where the original type specimen was found.

vascular plant A plant that possesses a vascular system, the conducting tissue that enables the transport of water, minerals and synthesised food materials throughout the plant and provides mechanical support.

wilderness quality A measure of differing levels of human impact on the natural environment, as part of a continuum of remote and natural conditions varying from pristine to urban. Wilderness quality is measured in terms of four variables: remoteness from access, remoteness from settlement, apparent naturalness, and biophysical naturalness.

Appendices

Appendix A: Forest Places in the Register of the National Estate

The list of registered national estate places in the North East region covers forest places and those linked to forests. It excludes urban sites. Map 1 shows all National Estate registered and interim listed places in the North East region.

Place name	Nearest town	Class code	Number	Status
Barry Mountains Reserve (former)	Hotham Heights	Natural	004599	Registered
Bogong High Plains	Falls Creek	Natural	004590	Registered
Bogong National Park	Mount Beauty	Natural	004586	Registered
Bontharambo Homestead	Wangaratta	Historic	004660	Registered
Broken River Rail Bridge	Benalla	Historic	019231	Registered
Broken River Road Bridge	Benalla	Historic	019243	Registered
Burnside Reference Area	Benambra	Natural	004692	Registered
Burrowa - Pine Mountain National Park	Walwa	Natural	004645	Registered
Chiltern Park Including Iron Bark Forest	Chiltern	Natural	004614	Registered
Chiltern Railway Station	Chiltern	Historic	015428	Registered
Conic Range Area	Koetong	Aboriginal	004634	Registered
Delatite Education Area	Merrijig	Natural	004503	Registered
East Caledonia Reference Area	Mount Buller Alpine Village	Natural	004582	Registered
Eildon State Park	Eildon	Natural	004378	Registered
Eldorado Dredge	Eldorado	Historic	004656	Registered
Euroa Area	Euroa	Aboriginal	004496	Registered
Fairfield and Outbuildings	Rutherglen	Historic	015605	Registered
Faithfull Massacre Site Memorial	Benalla	Aboriginal	004493	Registered
Forests Office (former)	Beechworth	Historic	004544	Registered
Granite Peak Reserve (former)	Mitta Mitta	Natural	004640	Registered
Gundowring Homestead	Gundowring	Historic	004671	Registered
Habitat of the Mt Stirling Stonefly	Mount Buller	Natural	018901	Registered
Hollonds Knob Reference Area	Falls Creek	Natural	004588	Registered
Howqua Hills Historic Area	Merrijig	Historic	004502	Registered
Howqua Quarries	Merrijig	Aboriginal	004505	Registered
Hughes Creek Road Bridge	Avenel	Historic	004447	Registered
Hunters Plains Homestead and Stables	Corryong	Historic	004644	Registered
Lakeview	Chiltern	Historic	004605	Registered
Lightwood Refence Area	Dartmouth	Natural	004643	Registered
Mount Barlow Reserve (former)	Biggara	Natural	004648	Registered
Mount Benambra Reserve	Dartmouth	Natural	004641	Registered
Mount Bogong Area	Mount Beauty	Natural	004591	Registered
Mount Buffalo National Park	Porepunkah	Natural	004573	Registered
Mount Cravensville Reserve	Dartmouth	Natural	004642	Registered
Mount Feathertop and the Razorback		Natural	004592	Registered

Mount Freezeout Reserve (former)	Hotham Heights	Natural	004598	Registered
Mount Gibbo Reserve	Nariel Creek	Natural	004638	Registered
Mount Granya State Park (proposed)	Granya	Natural	014208	Registered
Mount Ophir Winery	Rutherglen	Historic	004623	Registered
Mount Pilot Art Site, Beechworth Shelter	Beechworth	Aboriginal	004556	Registered
Mount Porcupine Area	Walwa	Aboriginal	004631	Registered
Mount Russell Education Area	Mirimbah	Natural	004504	Registered
Mount Samaria State Park		Natural	004494	Registered
Mount Sarah Reserve		Natural	004600	Registered
Mount Skene Reserve	Jamieson	Natural	004501	Registered
Mount Wills Reserve	Glen Valley via Omeo	Natural	004639	Registered
Mt Pilot Art Site Area	Beechworth	Aboriginal	004557	Registered
Mudgeegonga Area	Mudgeegonga	Aboriginal	004554	Registered
Newtown Bridge	Beechworth	Historic	004547	Registered
Nine Mile Creek Historic Area	Beechworth	Historic	015560	Registered
Noorongong Stables and Wagon Shed	Noorongong via Tallangatta	Historic	018142	Registered
Old Hall and School	Murmungee	Historic	004523	Registered
Old Ovens Goldfields Hospital Ruins	Beechworth	Historic	004519	Registered
Olive Hills Homestead	Rutherglen	Historic	004629	Registered
Pinnibar Reserve (former)	Nariel Creek	Natural	004647	Registered
Porphyry Hill Reference Area	Benambra	Natural	004693	Registered
Reedy Creek Homestead	Reedy Creek	Historic	004386	Registered
Shepherds Creek Reference Area	Hotham Heights	Natural	004595	Registered
Sunnyside Education Area	Glen Valley via Omeo	Natural	004704	Registered
The Bluff - Mt Clear Area		Natural	004499	Registered
The Governor Area	Mount Buller	Natural	004500	Registered
The Hermitage Homestead	Barnawartha	Historic	004607	Registered
The Rock Cavern	Beechworth	Historic	004513	Registered
Thowgla Headwaters Reserve (former)	Nariel Creek	Natural	004646	Registered
Tom Groggin Reference Area	Nariel Creek	Natural	004755	Registered
Victorian Alps	Hotham Heights	Natural	004497	Registered
Wabonga Plateau State Park (former)	Cheshunt	Natural	004620	Registered
Wallaces Hut	Falls Creek	Historic	004577	Registered
Walwa Homestead	Walwa	Historic	004632	Registered
Warra	Wangaratta	Historic	004652	Registered
Water Wheel and Mine Machinery, Weone Mine	Murmungee	Historic	004531	Registered
Whiterock Creek Reference Area	Falls Creek	Natural	004589	Registered
Wild Boar Range Reserve	Nariel Creek	Natural	004637	Registered
Wonnangatta Station Site	Dargo	Historic	016384	Registered
Calder Woodburn Memorial Avenue	Kialla West	Historic	100944	Identified

Places with Indicative Status in the Database of the Register of the National Estate.
These places have not been assessed for national estate significance, although a number are under assessment as part of the RFA process.

Baranduda Range	Yackandandah	Historic	004667	Indicative
Beechworth Scenic Drive	Beechworth	Historic	004567	Indicative
East Kiewa Mountain Forest Area	Bogong	Natural	018364	Indicative
Eldorado valley	Eldorado	Historic	004565	Indicative
Falls Creek Alpine Area (part)	Falls Creek	Natural	019716	Indicative
Happy Valley Landscape	Myrtleford	Historic	014670	Indicative
Kelly sites at Stringybark and Kellys Creeks	Mansfield	Historic	04506	Indicative
Mitta Mitta Valley	Mitta Mitta	Historic	04635	Indicative
Mount Buffalo National Park and adjacent areas	Porepunkah	Natural	015515	Indicative
Mount Hotham Alpine Area	Hotham Heights	Natural	018143	Indicative
Mount Lawson State Park	Koetong	Natural	016461	Indicative
Mount Pilot range Multi-Purpose Park	Eldorado	Natural	016504	Indicative
Mount Wills Historic Area	Omeo	Natural	015663	Indicative
Mt Wombat - Garden Range Flora and Fauna Reserve	Euroa	Natural	016493	Indicative
Myrtle and Circular Creeks Valleys	Stanley	Natural	004569	Indicative
Ovens Valley at Harrietville	Harrietville	Historic	004576	Indicative
Oxley and Wangaratta Shires Red Gum Area	Wangaratta	Historic	004621	Indicative
Paradise Falls and Environs	Cheshunt	Historic	014671	Indicative
Reedy Creek Landscape Area	Eldorado	Historic	004566	Indicative
Trawool Valley	Seymour	Historic	015136	Indicative
Twelve Apostles Mining Claim	Stanley	Historic	004572	Indicative
Upper Indigo Valley	Barnawartha	Historic	004681	Indicative
Upper Kiewa Valley	Mount Beauty	Historic	004578	Indicative
Upper Wongungarra River Catchment	Hotham Heights	Natural	018363	Indicative
Wabba Wilderness Park	Nariel Creek	Natural	100076	Indicative
Wandiligong Valley	Wandiligong	Historic	004580	Indicative

Appendix B: The Australian Heritage Commission Criteria for the Register of the National Estate

Without limiting the generality of sub-section (1) of the *Australian Heritage Commission Act*, a place that is a component of the natural or cultural environment of Australia is to be taken to be a place included in the national estate if it has significance or other special value for future generations as well as for the present community because of:

CRITERION A:
ITS IMPORTANCE IN THE COURSE, OR PATTERN, OF AUSTRALIA'S NATURAL OR CULTURAL HISTORY

A.1 Importance in the evolution of Australian flora, fauna, landscapes or climate.

A.2 Importance in maintaining existing processes or natural systems at the regional or national scale.

A.3 Importance in exhibiting unusual richness or diversity of flora, fauna, landscapes or cultural features.

A.4 Importance for association with events, developments or cultural phases which have had a significant role in the human occupation and evolution of the nation, State, region or community.

CRITERION B:
ITS POSSESSION OF UNCOMMON, RARE OR ENDANGERED ASPECTS OF AUSTRALIA'S NATURAL OR CULTURAL HISTORY

B.1 Importance for rare, endangered or uncommon flora, fauna, communities, ecosystems, natural landscapes or phenomena, or as a wilderness.

B.2 Importance in demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practised, in danger of being lost, or of exceptional interest.

CRITERION C:
ITS POTENTIAL TO YIELD INFORMATION THAT WILL CONTRIBUTE TO AN UNDERSTANDING OF AUSTRALIA'S NATURAL OR CULTURAL HISTORY

C.1 Importance for information contributing to a wider understanding of Australian natural history, by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.

C.2 Importance for information contributing to a wider understanding of the history of human occupation of Australia.

CRITERION D:
ITS IMPORTANCE IN DEMONSTRATING THE PRINCIPAL CHARACTERISTICS OF:
(I) A CLASS OF AUSTRALIA'S NATURAL OR CULTURAL PLACES; OR
(II) A CLASS OF AUSTRALIA'S NATURAL OR CULTURAL ENVIRONMENTS

D.1 Importance in demonstrating the principal characteristics of the range of landscapes, environments or ecosystems, the attributes of which identify them as being characteristic of their class.

D.2 Importance in demonstrating the principal characteristics of the range of human activities in the Australian environment (including way of life, custom, process, land-use, function, design or technique).

CRITERION E:
ITS IMPORTANCE IN EXHIBITING PARTICULAR AESTHETIC CHARACTERISTICS VALUED BY A COMMUNITY OR CULTURAL GROUP

E.1 Importance for a community for aesthetic characteristics held in high esteem or otherwise valued by the community.

CRITERION F:
ITS IMPORTANCE IN DEMONSTRATING A HIGH DEGREE OF CREATIVE OR TECHNICAL ACHIEVEMENT AT A PARTICULAR PERIOD

F.1 Importance for its technical, creative, design or artistic excellence, innovation or achievement.

CRITERION G:
ITS STRONG OR SPECIAL ASSOCIATIONS WITH A PARTICULAR COMMUNITY OR CULTURAL GROUP FOR SOCIAL, CULTURAL OR SPIRITUAL REASONS

G.1 Importance as a place highly valued by a community for reasons of religious, spiritual, symbolic, cultural, educational, or social associations.

CRITERION H:
ITS SPECIAL ASSOCIATION WITH THE LIFE OR WORKS OF A PERSON, OR GROUP OF PERSONS, OF IMPORTANCE IN AUSTRALIA'S NATURAL OR CULTURAL HISTORY

H.1 Importance for close associations with individuals whose activities have been significant within the history of the nation, State or region.

Appendix C: Consultancies Commissioned

- Bannear, D. 1997 A Study of Historic Forest Activity Sites in the North East Forest Region, Victoria
- Context Pty Ltd 1997, Community Heritage Workshops Reports
- Context Pty Ltd 1997 Identification and Assessment of Community Heritage Values in the North East Forest Region, Victoria: Workshop Overview Report
- Context Pty Ltd 1997 Identification and Assessment of Community Heritage Values in the North East Forest Region, Victoria: Social Value Assessment Report
- Context Pty Ltd 1997 Identification and Assessment of Community Heritage Values in the North East Forest Region, Victoria: Inventory of Community Heritage Places
- Evans, P. 1997 A Study of Historic Sawmill and Tramway Sites in the North East Forest Region, Victoria
- Graeme Butler & Associates 1997 Historic Places in the Box-Ironbark Investigation Area
- Graeme Butler & Associates 1997 A Study of Places Relating to Selected Historic Forest Themes in the North East Forest Region Victoria
- Huonbrook Environment & Heritage Pty Ltd 1998 Development of a Model for Aboriginal Cultural Heritage Management in the Victorian Regional Forest Agreement (RFA) Areas
- Keating, J. 1997 Contextual History of the Box-Ironbark Area
- Marshall, B., Jones, R. and Jordan, J. 1996 Victorian Cultural Heritage Data Audit and Analysis for the RFA Regions: the Box-Ironbark and Midlands Areas
- Marshall, B. and Jones, R. 1997 Victorian Cultural Heritage Data Audit and Analysis for the RFA Regions: the North East
- Robin Crocker & Associates 1997 Identification and Assessment of Aesthetic value in the North East Forest Region Victoria
- Sheehan, M. 1996 Regional Community Profiles for the Victorian Regional Forest Agreement Assessment: Box- Ironbark Area
- Sheehan, M. 1996 Regional Community Profiles for the Victorian Regional Forest Agreement Assessment Process

Appendix D: Consultation with Aboriginal People and a Statement By Aboriginal People

Meetings December 1997

Wurrundjeri Tribe Land Compensation and Cultural Heritage Council Inc. meetings

Wilma Xiberras	Wurrundjeri Chariperson
Annette Xiberras	Wurrndjeri
Megan Goulding	Aboriginal Affairs Victoria (AAV)
David Clark	AAV
Gary Nelson	AAV
Ted Stabb	Natural Resources and Environment (NRE)
Roger Hall	Environment Forest Taskforce (EFT)

Camp Jungai meetings

Shane Charles	Camp Jungai Co-op Ltd.
Gavin Sharp	
Mick Harding	Aboriginal Affairs Victoria (AAV), Traralgon
Megan Goulding,	AAV
Gary Nelson	AAV
David Clarke	AAV
Roger Hall	EFT
Ted Stabb	NRE

Shepparton Aboriginal Arts Council Cooperative meeting

Kevin Atkinson	Shepparton Cooperative
Max Atkinson	Shepparton Cooperative
Gary Nelson	AAV
Mick Harding	AAV
Megan Goulding	AAV
David Clark	AAV
Roger Hall	EFT
Ted Stabb	NRE

Mungabareena Aboriginal Corporation meeting

Patina Love	Mungabareena Aboriginal Corporation
Jocelyn Stevenson	Mungabareena Aboriginal Corporation
Carmen Denniss	Mungabareena Aboriginal Corporation
Eddie Kneebone	
Ted Stabb	NRE
Roger Hall	EFT

Camp Jungai Workshop March 1998

Shane Charles	Camp Jungai Co-op Ltd.
Mick Harding	Aboriginal Affairs Victoria (AAV), Traralgon
Gary Nelson	AAV, Nathalia
Megan Goulding	AAV, Melbourne
Kevin Atkinson	Cultural Officer, Shepparton Aboriginal Aboriginal Arts Council, Keeping Place
Max Atkinson	Director, Shepparton Aboriginal Aboriginal Arts Council
Mary Atkinson	Administrator, Shepparton Aboriginal Aboriginal Arts Council
Roland Atkinson	Trainee Cultural Officer, Shepparton Aboriginal Aboriginal Arts Council
Dave Atkinson	Trainee Cultural Officer, Shepparton Aboriginal Aboriginal Arts Council
Patina Love	Mungabareena Aboriginal Corporation

Lisa Arnold	Chairperson, Mungabareena Aboriginal Corporation
Carmen Denniss	Administrator, Mungabareena Aboriginal Corporation
Andom Rendell	Trainee Cultural Officer, Mungabareena Aboriginal Corporation
Representatives	WurrudjeriTribe Cultural Heritage Land & Compensation
• unable to attend	Council Inc
Sean Sexton	Mirimbiak Nations Aboriginal Corporation
Ben James	Mirimbiak Nations Aboriginal Corporation
Brian Thompson	Natural Resources and Environment, Benalla
Juliet Ramsay	Environment Forest Taskforce, Canberra
Michelle Gabriel	Department of Primary Industry and Energy, Canberra

Wodonga Workshop February 1999

Shane Charles	Camp Jungai Co-op Ltd.
Kevin Atkinson	Cultural Officer, Shepparton Aboriginal Aboriginal Arts Council, Keeping Place
Roland Atkinson	Trainee Cultural Officer, Shepparton Aboriginal Arts Council
Dave Edwards	Trainee Cultural Officer, Shepparton Aboriginal Arts Council
Pettina Love	Mungabareena Aboriginal Corporation
Lisa Arnold	Mungabareena Aboriginal Corporation
Andom Rendell	Cultural Officer, Mungabareena Aboriginal Corporation
Mark Beach	Mungabareena Aboriginal Corporation
Kakkib li'Dthia Warrawee'a	C/- Mungabareena Aboriginal Corporation
Janelle Everett	Taungurrong Group
Megan Goulding	AAV, Melbourne
Mick Harding	AAV Traralgon
Philip Hughes	Huonbrook Environment & Heritage
Kristal Buckley	Context Pty Ltd
Ted Stabb	NRE Wodonga
Juliet Ramsay	EFT, Canberra
Claire Howlett	EFT, Canberra
Nicholas Hall	Australian Heritage Commission
Marylou Dixon	Parks Victoria
Evan McDowell	Parks Victoria
Tony Long	Parks Victoria
Peter Ashton	Parks Victoria
Brett Mc Namara	Alps Liaison Committee

Bright Meeting March 1999

Andom Rendell	Mungabareena Aboriginal Corporation
Lisa Arnold	Mungabareena Aboriginal Corporation
Pettina Love	Mungabareena Aboriginal Corporation
Kakkib li'Dthia Warrawee'a	C/- Mungabareena Aboriginal Corporation
Janelle Everett	Taungurrong Group
Megan Goulding	AAV, Melbourne
Joanna Freslov	AAV, Melbourne
Kristal Buckley	Context Pty Ltd

Statement made by Aboriginal People at the Bright Meeting

27 March 1999:

We believe that the RFA process in its present form will lead to degeneration and destruction of that land that we are custodians of. Therefore we formally object and make it known that we have been placed by the RFA process and the Governments - State /Federal - into a position where we are forced to decide between: walking away from the RFA process and thereby neglect our land and our responsibility to our culture and land; and taking part in the process which will in turn lead to being the instrument of destruction of our land leading to the destruction of our culture.

We can only hope that in the future societies and their governments will respect our environment's role in humanity's future. What is gone is lost forever.

Statement in response by State and Federal Governments:

While this statement has been included out of respect to the Aboriginal communities' views, Governments will continue to work with the communities to improve dialogue and foster greater participation of Aboriginal groups in forest management decisions that affect them.

Appendix E: Organisations invited to Participate in the Community Heritage Workshops

Industry Organisations – Timber/Forest Products

Construction Forestry Mining & Energy Union (CFMEU)
Forest Protection Society
Pulp and Paper Federation
Timber Promotion Council
Victorian Association of Forest Industries

Industry Organisations - Other

Country Victoria Tourism Council
Host Farms Association
Mountain Cattlemen's Association of Victoria
Prospectors & Miners Association
Victorian Apiarists Association
Victorian Chamber of Mines
Victorian Farmers Federation
Victorian Tour Operators Association

Recreation Organisations

Australian Anglers Association (Victorian Division) Inc.
Australian Deer Association
Australian Motorcycle Trail Riders Association (AMTRA)
Australian Trail Horse Riders Association (Vic)
Bicycle Victoria
Bird Observers Club of Australia
Birds Australia (Royal Australasian Ornithologists Union)
Camping Association of Victoria
Federation of Victorian Walking Clubs Inc. (VICWALK)
Game Fishing Association of Victoria
Guides Victoria
Horse Riding Clubs Association of Victoria
Melbourne Bushwalkers
Melbourne Older Adults Recreation Network
Outdoor Recreation Centre
Scout Association of Victoria
Shooting Sports Council of Victoria Inc.
Ski Touring Association of Victoria
Sport & Recreation Victoria
Sporting Shooters Association of Victoria
Victorian Association of Four Wheel Drive Clubs
Victorian Association of Photographic Societies
Victorian Canoe Association
Victorian Climbing Club
Victorian Field & Game Association
Victorian Fossickers Club
Victorian Game & Deerstalking Association
Victorian Gem Clubs Association
Victorian Metal Detector & Prospectors Association

Victorian Orienteering Association
Victorian Piscatorial Council
Victorian Recreational Fishing Peak Body (VRFISH)
Victorian Rogaining Association
Victorian Speleological Association

Environment/Conservation Organisations

Australian Conservation Foundation
Australian Trust for Conservation Volunteers
Environment Victoria
Environs Australia
Field Naturalists Club of Victoria
Friends of the Earth
Friends Network Committee
Greening Australia (Vic)
Indigenous Flora & Fauna Association
Roadside Conservation Committee of Victoria
The Wilderness Society
Threatened Species Network
Trust for Nature
Victorian National Parks Association
World Wide Fund for Nature

Education Organisations

Gould League of Victoria
Victorian Association for Environmental Education
Victorian Outdoor Education Association

Aboriginal Heritage Organisations

Aboriginal Heritage Branch, Aboriginal Affairs Victoria
Mirimbiak Nations Aboriginal Corporation

Heritage Organisations

Heritage Victoria
National Trust of Australia (Vic)
Scienceworks
Institution of Engineers, Heritage Branch
Royal Historical Society of Victoria

Other Organisations

Country Womens Association
Landcare Groups
Public Land Council
Timber Towns Victoria
Parks Victoria
Land Conservation Council
Municipal Association of Victoria
Dept. Natural Resources and Environment

Appendix F: Participants in the Community Heritage Workshops

Attendance list – Corryong Workshop

Hazel Pepper	
Keith Whitsed	
John Morrow	
Desley Wolter	
Ruth Nicholas	
Ken Coulston	
Neville Simpson	
Andrew Bowman	
M. Hewatt	
R. M. Hamilton	
Bob Coulston	CFA
Lyn Coulston	Farm Tree Group Nursery
Ben Roberts	NRE, Corryong
B. R. Lee	Omeo Historical Society
Marilyn Clydsdale	Tintaldra Landcare
Don Haberecht	Upper Murray Development Board
Neil Clydsdale	Upper Murray Development Board
Rodney Wolter	Walwa Landcare

Attendance list – Tallangatta Workshop

Noel Gough	
W. (Bob) Lambeth	
Andrew Kimber	
Les Carver	
Marilyn Clydsdale	
Pauline Weickhardt	Department of Natural Resources and Environment
Ernie Cole	Department of Natural Resources and Environment
Margaret Kirk	Jarvis Creek Landcare Group
Ray Healy	Regional Business Development Network
John Scales	Towong Shire
Victoria Melinda	Towong Shire

Attendance list - Melbourne Workshop

Tim Barker	Australian Deer Association
Joy Weller	Country Womens Association
Brian Thompson	Department of Natural Resources & Environment
David Rimmer	Federation of Victorian Walking Clubs Inc. (VICWALK)
Kirstin Gentle	Forest Protection Society
Mike McIntyre	Heritage Victoria
Peter Tucker	Indigenous Flora & Fauna Association
Natalie Broughton	National Trust of Australia (Vic)
Mel Sporry	Outdoor Recreation Centre
John Grinpukel	Parks Victoria
Geoff Strang	Prospectors & Miners Association

Tim Barker	Public Land Council
John Horn, Branch Commissioner	Scout Association of Victoria
Tony Buckland, Coordinator	Shooting Sports Council of Victoria Inc.
Ian Fenslau, Resource Chairman	Victorian Apiarists Association
John Wright	Victorian Association of Forest Industries
Neville Lester	Victorian Association of Four Wheel Drive Clubs
Pam Anderson & Laurie Atkins	Victorian Canoe Association
Blair Trewin	Victorian Orienteering Association

Attendance list – Bright Workshop

Prue Borschmann	
Ray Borschmann	
Ken Lewis	
Derrick Rolland	
Anne Seller	
Brian Webb	Alpine Paragliders
Sarah Nicholas	Australian Forest Growers
John Griffiths	Biatholon Assoc.
Rob Kaufman	Bright Gold Shop
Andrew Swift	Bright Gold Shop
Lorraine Thompson	Bright Gold Shop
Geoff White	Bright Hikers Backpackers/North East Hang Gliding Club
Frank Russo	Bright Landcare
Peter Shennan	Bright Outdoor Centre
Ronice Goebel	Bright P-12 College
David Chalwell	Bright Visitors Centre
James Neary	Burgigee Creek Landcare
David Wettenhall	Carter Holt Harvey
Warren Rowney	CFMEU
Mick Dwyer	CFMEU
Stephen Deed	Department of Natural Resources & Environment
Peter Panozzo	Fishing Tours
Adrian Webster	Freeburgh Trail Rides
Miffy Robb	Friends of Buffalo
John Costenaro	Friends of Mt Buffalo
Jamie Baker	Goulburn Murray Water
Geoff Green	Greenfreight Logging P/L
Ron Buggs	MCAV
Beverley Lawrence	Mt.Hotham Cross Country Ski Patrol
Jeanette McClaren	NE Victoria Hang Gliding Club
Dermot Meancy	North East Vic Hang Gliding Club
Barbara DeViell	Ovens & King Community Health
Evan McDowell	Parks Victoria
Marian White	Parks Victoria
David Panozzo	Southern Hydro

Attendance list – Mt Beauty Workshop

Julia Martin	
Yvette Pettitt	
Ian Roper	
Harry Ryder	
John Thomson	
Ross Webster	
Kirsten McDonald	Alpine Shire
Brian Keeble	Bogong Outdoor Education Centre

Ian Ryan	Bogong Outdoor Education Centre
Les Wiebenga	Bogong Rover Chalet & Lions Club
Ann Burleigh	Community Consultation Committee, NEWB
Andrew Pook	Department of Natural Resources & Environment
Ted Stabb	Department of Natural Resources & Environment
Gary Addensall	MB Timbers
Phil Lemin	Mountain Logistix
Craig Hore	Parks Victoria
Ron Reilly	Parks Victoria
Barbara Pyle	Pyles Coaches
Mark Ghirardello	Re-Veg Group
David Harley	Tawonga Recreation Reserve

Attendance List Mansfield Workshops

Bernie Anstee	
'Stick' Beamish	
Dr Joan Curtis	
Irene & Ron Jones	
Keith & Aileen Lovick	
Terry Murphy	
Joy Pearson	
David Scott	
John Steele	CALP
Don & Lyn Uren	Delatite LandCare Group
Alan Harrison	Department of Natural Resources & Environment
David Hurley	Department of Natural Resources & Environment
Mr G. Murphy	Department of Natural Resources & Environment
Peter Tange	Department of Natural Resources & Environment
Fred Wentworth	Department of Natural Resources & Environment
Garry Wilson	Department of Natural Resources & Environment
Ed Adamson	First Selection Landcare Services
Barbara Bateson	Jamieson Historical Society
Kaye Draper	Mansfield Primary School
Chris Stoney	Mountain Cattlemen
Craig Jones	Mt. Stirling Task Force
Peter Roberts	Parks Victoria
Nigel Watts	Parks Victoria
Olga & Neil Walker	Strathbogie Store and Info Centre
Colin Gibson	Victorian Farmers Federation, Mansfield

Attendance list - Wodonga Workshops

Lionel Jewell	
Alan Scammell	Albury Rural Lands Protection Board
Bevin McGrath	Albury Wodonga Bicycle Touring Club
Stephen Guilliford	Beechworth Environment Group
Peter Anfruns	Beechworth Environment Society
Betty Carrasco	Border Bushwalking Club
Bruce Key	Border Bushwalking Club
Jim Birckhead	Charles Sturt University
Michael Lockwood	Charles Sturt University
Harry & Lyn Sakulas	Charles Sturt University
Geoff McKernan	Chiltern Landcare Group
Bill De Leeuw	Department Natural Resources & Environment
Brian Thompson	Department Natural Resources & Environment
David Buntine	Department of Natural Resources & Environment

Philippa Noble	Department of Natural Resources & Environment
Ian Davidson	Greening Australia, C/- Land and Water
Stafford Simpson	Greenwells Fly Fishing Club Inc.
Sue Richardson	Indigo Valley Landcare Group
Vida McMurrial	Kiewa/ Bonegilla Landcare Group
Mrs Marjorie Hyslop	National Trust - Rutherglen
Tony Long	Parks Victoria
Rob Fenton	Riverina Institute of TAFE
Barry Deas	Rutherglen Historical Society
Ron Donohue	Telemark Nordic Ski Club Inc.
Leisa Kelly	Wodonga CEC
Eileen Andrews	Wodonga Historical Society
Fred Andrews	Wodonga Historical Society
Jo Millar	Yackandandah Environment Society

Project team members at various workshops

Chris Johnston	Consultant (Context Pty Ltd)
Carol Kunert	Consultant
Krystal Buckley	Consultant
Juliet Ramsay	Environment Forests Taskforce, Environment Australia
Katie Saxby	Environment Forests Taskforce, Environment Australia
Terence Uren	Environment Forests Taskforce, Environment Australia
Gail Barry	Environment Forests Taskforce, Environment Australia
Paul Marsh	Environment Forests Taskforce, Environment Australia
Tom Aldred	Department of Prime Minister & Cabinet
Ian Miles	Department of Natural Resources & Environment
Sue Houlden	Department of Natural Resources & Environment
Daniel Catrice	Historic Places, Department of Natural Resources & Environment
David Bannear	Historic Places, Department of Natural Resources & Environment
Peter Evans	Historic Places, Department of Natural Resources & Environment
Ray Supple	Historic Places, Department of Natural Resources & Environment
Marilyn Clydsdale	Local coordinator, Tallangatta and Corryong
Annie Marlow	Local coordinator, Bright and Mount Beauty
Marie Rossier	Local coordinator, Mansfield
Leisa Kelly	Local coordinator, Wodonga

Invited To All Workshops

Mrs Elwyne Papworth	Victorian Apiarists Association - North East Region
Mr Rex Atkinson	Shepparton Aboriginal Arts Council Co-operative Aboriginal Keeping Place
Mr Shane Charles	Camp Jungai Cooperative
Mr Neville Atkinson	Rumbalara Aboriginal Cooperative
Mr Garry Cecil	Indigo Shire Council
Mr Peter Bull	Towong Shire Council
Mr Mark Henderson	Alpine Shire Council
Mr Peter Marshall	Wodonga Rural City
Mr Graeme Emonson	Wangaratta Rural City
Mr Rob Hauser	Delatite Shire Council

Appendix G: Participants in the Forest Critics Workshops

Mansfield Workshop

Allan Harrison, Senior Forester, Mansfield
Anthony Wentworth
Garry Wilson
Neale Cleeland
Nigel Watts
Jim Kilpatrick

Tallangatta Workshop

David Buntine, Senior Forester, Wodonga
Stuart O'Brien
Ernie Cole
Ron Patterson
Ron Warren

Bright Workshop

Neil Wilson, Forester in Charge, Bright
Leith McKenzie
Dennis Moloney
Lou Maher
Rob Chalwell
Evan McDowell

Contacts

Ross Penny, Manager Forest Assessment Section, Melbourne
Andrew McLean, Manager Strategic Forest Planning Section, Melbourne
Richard Wadsworth, Forest Environment Section, Melbourne
Peter Tange, Forest Planner, Melbourne
Tony Edgar, Manager Forests and Fire, North East
Allan Harrison, Senior Forester, Mansfield
David Buntine, Senior Forester, Wodonga
Bob Jones, Chief Ranger, Parks Victgoria, Bright
Ted Stabb and Donna Sweatman, Forest Planners, Wodonga

Appendix H: Indicative National Estate Places of Social Value

Places meeting the threshold for National Estate Value Criterion G1

Avondale Gardens
Back Creek School Environmental Site
Beechworth Historic Park, Gorge Cascades
Bethanga- Granya gold mining area
Bindaree Hut
Blairs Hut
Bon Accord Spur Track
Bon Accord Hut
Bungalow Spur Walking Track
Chiltern Box-Ironbark National Park
Craigs Hut
Crystal Mine
Cudgewa Bluff & Bluff Falls
Dibbins Hut
Eldorado Dredge
Eurobin Falls and Creek
Fitzgeralds Hut
Fred Frys Hut
Glen Wills Historic Area
Gooram Falls
Granya Hut and Waterfall
Harrietville-Mount St Bernard Road
Howqua Hills Historic Area
King Hut
Lake Hume
Lake Moodemere
Lovicks Hut
Mass Tree
Mitchell's Homestead Site and Gorge
Mount Beauty
Nariel Festival Ground
Osbornes Flat Community Hall & Rowdy Flat Forest
Paradise Falls
Pioneer Mine and Water Races
Police Paddocks (Goormadda)
Polly McQuinns Reserve
Powers Lookout
Shelley: School, Railway Station and Hotel Site
Stacey Bridge (Nariel)
The Bluff Hut and Range
The Rocky
Towong Racecourse
Wallaces Hut
Westons Hut
Woolshed Falls
Yackandandah Historic Gorge and Walkway

Places from the Central Highlands RFA Assessment
Lake Eildon including Dam Wall and Power Station.

Appendix I: Indicative National Estate Places of Aesthetic Value

Places meeting the threshold for National Estate Value; Criterion E1

Alpine National Park (Bogong Unit)
Alpine National Park (Cobberas-Tingaringy Unit)
Alpine National Park (Dartmouth Unit)
Alpine National Park (Wabonga Plateau Unit)
Alpine National Park (Wonangatta-Moroka Unit)
Australian Alps Walking Track
Barunduda Range
Beechworth Forest Drive
Beechworth Historic Park (aesthetic component)
Beechworth Stanley Plateau and Flagstaff Ridge
Bindaree Falls & Creek
Buckland Valley
Buffalo River (above dam)
Burrowa-Pine Mountain National Park
Chiltern Box-Ironbark National Park
Craig's Hut & setting
Eldorado Valley and Forest
Eskdale Spur and Mount Emu
Howqua River
Jamieson River
Lake Eildon National Park - Enterprise Block
Mount Buffalo National Park
Mount Hotham Summit and View
Mount Murramarangbong & Big Ben
Mount Pilot Park
Mount Porepunkah & fire tower
Mount Samaria State Park
Mount Sarah
Mount Stirling Circuit Road
Mount Wills Summit, Hut and Carved Rock
Mount Wombat
Murray River: Lake Hume to Towong
Omeo Highway: Alpine Ash & Fernvale View
Powers Lookout
Seven Creek - Strathbogie Ranges
Snowy Creek - Lightning Creek junction
Snowy Creek and Clearings
Tawonga Gap and Lookout
The Paps
The Pinnacles and Mount Jack including Barwidgee Creek
Upper Delatite Valley
Upper Kiewa Valley
Wangdiligong Valley
West Kiewa River Valley
Wongungarra Catchment/Forest

Places of potental National Estate aeshetic significance requiring further information:
Pilot range
Tower Hill Lookout
Mount Mitta Mitta (Mittamatite)
Biggara Valley & Murray river

Appendix J: Indicative National Estate Places of Historic Value

Places meeting the threshold for National Estate values: Criteria A3, A4, B2, D2, F1 or H1

Forest Activity Places:
Mount Stanley Fire Tower & Scenic Reserve
Bright Boys Camp
Racecourse Plantation
Mount Pilot Distilling Site
The Mansions
Mount Wills Fire Lookout
Whorouly Forest Camp

Sawmill and Tramway Places:
Bartels Sawmill, Kiewa
Dumbrells Sawmills and Timber Tramway
McCashney and Harper Mills and Tramways
Sloans Sawmill, Snowy Creek
Spring Creek Sawmill and Seasoning Works, Mount Samaria

Selected Forest Theme Places:
Alpine Road, early route
Ben Cooper Cairn
Bethanga Cemetery
Bishop Green's House Site & Trees
Blair's Top (bottom) Cattleman Hut
Bowmans Forest Cemetery
Bright Cemetery
Bright Street Trees
Buckland Valley Cemetery
Corryong Cemetery
Country Roads Board Refuge Hut
Dungey's Track
Eldorado Cemetery
Ellen Kelly Homestead Ruins
Forlonge Memorial & Grave of Eliza Forlonge
Gadsden Memorial
Gibson's Old Hut
Greta Cemetery

Selected Forest Theme Places (cont.):
Howqua Hills Property & Garden
Jack Rileys Grave
Johnson's Hut Site and Monument
Joyce Brockhoff Memorial Cabin
Kiewa HES: Big Hill Bench (No. 5) & Aqueduct
Kiewa HES: Bogong High Plains Road
Kiewa HES: Bogong Village
Kiewa HES: Clover Flat Arboretum
Kiewa HES: Clover Power Station
Kiewa HES: McKay Creek Power Station
Kiewa HES: Pole lines route, Pretty Valley to Mt. Cope
Kiewa HES: Pretty Valley Pondage
Kiewa HES: Rocky Valley Storage Dam
Kiewa HES: West Kiewa Power Station
King Billy Tree
Lake Catani & Dam Wall, Mt. Buffalo
Langfords Aqueduct
Lookout Shelter, Mount Buffalo
Maisie Fawcett Exclosures
Mansfield Railway Station Complex
Mount St Bernard Hospice site
Old Goulburn River Bridge to Mount Cope
Police Memorial
Powers Lookout
Maisie Fawcett Exclosure, Rocky Valley
Richard Thomas Grave (part Corryong cemetery group)
Snow Pole Line, Staircase Spur
The Horn, Mount Buffalo
Tomahawk Hut
Upper Jamieson River Hut
Upper Murray Ski Club hut
Wangaratta South Cemetery
Whitefield Cemetery
Whitlands Catholic Settlement
Wodonga Cudgewa Railway Line

Places from the Central Highlands RFA Assessment:
Delatite Homestead
Ghin Ghin Gold Diggings and Water Race
Habbies Howe
Jamieson Alluvial Workings
Kevington Hotel
Ten Mile Alluvial Diggings
Mansfield to Woods Point Road

Places of potential National Estate significance requiring further investigation
Selected Forest Themes Places:
Barambogie Railways Department Reservoir &
Chiltern Town Water Supply
Delatite River Bridge & environs
Freeburgh Cemetery
Geelong Grammar School Hut, Mt Stirling
Glen Wills Cemetery
Horn Hut site, Mount Buffalo
Johnny Byrne's hut
Ladies Bath & Eurobin Falls picnic ground
Lake Catani Camping reserve & Huts and Sites
Mount Wombat Cemetery
Mountain Creek Picnic & Camping Area
Pole line, SEC Wallaces Hut to Falls Creek
Sassafras Graveyard & old township
Stone Retaining Wall, Stanley-Myrtleford Road
Wangaratta to Whitfield Narrow Gauge Railway,
former Tarawarra Complex

Appendix K: Natural Values Workshop Participants

Held 24 August, 1998 at NRE offices, 250 Victoria Parade, East Melbourne.

Participant	Organisation
Mr Tim Doeg	Consultant
Dr Murray Littlejohn	University of Melbourne
Mr Peter Robertson	Consultant
Dr Ian Thomas	University of Melbourne
Mr Neville Walsh	National Herbarium, Melbourne
Dr Trevor Whiffin	La Trobe University
Dr Alan Yen	Museum of Victoria
Mr Rod Anderson	NRE, Parks, Flora and Fauna
Mr Hugh Bramwells	NRE, Parks, Flora and Fauna
Mr David Cameron	NRE, Parks, Flora and Fauna
Ms Cathy Molnar	NRE, Parks, Flora and Fauna
Mr Adrian Moorrees	NRE, Parks, Flora and Fauna
Mr Bill Peel	NRE, Parks, Flora and Fauna
Mr Steve Saddlier	NRE, Parks, Flora and Fauna
Mr Ian Miles	NRE, Forests Service
Ms Kylie White	NRE, Forests Service
Mr Richard Bland	Environment Conservation Council, Victoria
Dr Geoff Dyne	EA, Environment Forest Taskforce
Ms Susie Edwards	EA, Environment Forest Taskforce
Mr Felix Schlager	EA, Environment Forest Taskforce

Appendix L: Fauna Species Occurring in the North East RFA Region and Showing those with A1 and B1 Values

Scientific Name	Common Name	Conservation Status			Endemicity			Dis-junct Pops.	Limit of Range
		TFV[1]	FFG[2]	ESP[3]	NE[4]	BR[5]	Vic[6]		
Mammals									
Acrobates pygmaeus	Feathertail Glider								
Antechinus flavipes	Yellow-footed Antechinus								
Antechinus stuartii	Brown Antechinus								
Antechinus swainsonii	Dusky Antechinus								
Burramys parvus	Mountain Pygmy-possum	V	L	V		AA		✓	✓
Canis familaris dingo	Dingo	K							
Cercartetus nanus	Eastern Pygmy-possum								
Chalinolobus gouldii	Gould's Wattled Bat								
Chalinolobus morio	Chocolate Wattled Bat								
Dasyurus maculatus	Tiger Quoll	V	L	V					
Falsistrellus tasmaniensis	Great Pipistrelle								
Hydromys chrysogaster	Water Rat								
Macropus giganteus	Eastern Grey Kangaroo								
Macropus robustus robustus	Eastern Wallaroo	R							
Macropus rufogriseus	Red-necked Wallaby								
Mastacomys fuscus	Broad-toothed Rat	R						✓	
Miniopterus schreibersii	Common Bent-wing Bat	C	L						
Myotis macropus	Large-footed Myotis	R							
Nyctophilus geoffroyi	Lesser Long-eared Bat								
Nyctophilus gouldi	Gould's Long-eared Bat								
Ornithorhynchus anatinus	Platypus								
Perameles nasuta	Long-nosed Bandicoot								
Petauroides volans	Greater Glider								
Petaurus australis	Yellow-bellied Glider								
Petaurus breviceps	Sugar Glider								
Petaurus norfolcensis	Squirrel Glider	V	L						
Phascogale tapoatafa	Brush-tailed Phascogale	R	L						
Phascolarctos cinereus	Koala								
Potorous longipes	Long-footed Potoroo	E	L	E				✓	✓
Pseudocheirus peregrinus	Common Ringtail Possum								
Pseudomys fumeus	Smoky Mouse	V							
Pteropus poliocephalus	Grey-headed Flying-fox	C							
Pteropus scapulatus	Little Red Flying-fox								
Rattus fuscipes	Bush Rat								
Rhinolophus megaphyllus	Eastern Horseshoe-bat	C							
Scotorepens balstoni	Western Broad-nosed Bat								
Scotorepens orion	Eastern Broad-nosed Bat								
Sminthopsis murina	Common Dunnart	R						✓	
Tachyglossus aculeatus	Short-beaked Echidna								
Tadarida australis	White-striped Freetail Bat								
Trichosurus caninus	Mountain Brushtail Possum								
Trichosurus vulpecula	Common Brushtail Possum								
Vespadelus darlingtoni	Large Forest Bat								
Vespadelus regulus	King River Eptesicus								
Vespadelus vulturnus	Little Forest Eptesicus								
Vombatus ursinus	Common Wombat								
Wallabia bicolor	Swamp Wallaby								
Birds									
Acanthagenys rufogularis	Spiny-cheeked Honeyeater								
Acanthiza chrysorrhoa	Yellow-rumped Thornbill								
Acanthiza lineata	Striated Thornbill								
Acanthiza nana	Yellow Thornbill								
Acanthiza pusilla	Brown Thornbill								
Acanthiza reguloides	Buff-rumped Thornbill								
Acanthiza uropygialis	Chestnut-rumped Thornbill								

Scientific Name	Common Name	Conservation Status			Endemicity			Dis-junct Pops.	Limit of Range
		TFV[1]	FFG[2]	ESP[3]	NE[4]	BR[5]	Vic[6]		
Acanthorhynchus tenuirostris	Eastern Spinebill								
Accipiter cirrhocephalus	Collared Sparrowhawk								
Accipiter fasciatus	Brown Goshawk								
Accipiter novaehollandiae	Grey Goshawk	R							
Acrocephalus stentoreus	Clamorous Reed-Warbler								
Aegotheles cristatus	Australian Owlet-nightjar								
Alauda arvensis	Skylark								
Alcedo azurea	Azure Kingfisher								
Alisterus scapularis	Australian King-Parrot								
Anas castanea	Chestnut Teal								
Anas gracilis	Grey Teal								
Anas querquedula	Garganey								
Anas rhynchotis	Australasian Shoveler								
Anas superciliosa	Pacific Black Duck								
Anhinga melanogaster	Darter	C							
Anseranas semipalmata	Magpie Goose	K							
Anthochaera carunculata	Red Wattlebird								
Anthochaera chrysoptera	Little Wattlebird								
Anthus novaeseelandiae	Richard's Pipit								
Aphelocephala leucopsis	Southern Whiteface								
Apus pacificus	Fork-tailed Swift								
Aquila audax	Wedge-tailed Eagle								
Ardea alba	Great Egret	C	L						
Ardea ibis	Cattle Egret								
Ardea intermedia	Intermediate Egret	C							
Ardea pacifica	White-necked Heron								
Artamus cyanopterus	Dusky Woodswallow								
Artamus leucorynchus	White-breasted Woodswallow								
Artamus personatus	Masked Woodswallow								
Artamus superciliosus	White-browed Woodswallow								
Aythya australis	Hardhead								
Barnardius zonarius	Australian Ringneck								
Biziura lobata	Musk Duck								
Botaurus poiciloptilus	Australasian Bittern	K							
Burhinus grallarius	Bush Stone-curlew	V	L						
Cacatua galerita	Sulphur-crested Cockatoo								
Cacatua roseicapilla	Galah								
Cacatua sanguinea	Little Corella								
Cacatua tenuirostris	Long-billed Corella								
Cacomantis flabelliformis	Fan-tailed Cuckoo								
Cacomantis variolosus	Brush Cuckoo								
Calidris acuminata	Sharp-tailed Sandpiper								
Callocephalon fimbriatum	Gang-gang Cockatoo								
Calyptorhynchus funereus	Yellow-tailed Black-Cockatoo								
Certhionyx niger	Black Honeyeater								
Charadrius ruficapillus	Red-capped Plover								
Chenonetta jubata	Australian Wood Duck								
Cheramoeca leucosternus	White-backed Swallow								
Chlidonias hybridus	Whiskered Tern	C							
Chrysococcyx basalis	Horsfield's Bronze-Cuckoo								
Chrysococcyx lucidus	Shining Bronze-Cuckoo								
Chrysococcyx osculans	Black-eared Cuckoo								
Chthonicola sagittata	Speckled Warbler								
Cincloramphus cruralis	Brown Songlark								
Cincloramphus mathewsi	Rufous Songlark								
Cinclosoma punctatum	Spotted Quail-thrush								
Circus approximans	Swamp Harrier								
Circus assimilis	Spotted Harrier								
Cisticola exilis	Golden-headed Cisticola								
Climacteris affinis	White-browed Treecreeper	V	L						
Climacteris erythrops	Red-browed Treecreeper								
Climacteris picumnus	Brown Treecreeper								
Colluricincla harmonica	Grey Shrike-thrush								
Coracina novaehollandiae	Black-faced Cuckoo-shrike								

Scientific Name	Common Name	Conservation Status			Endemicity			Dis-junct Pops.	Limit of Range
		TFV[1]	FFG[2]	ESP[3]	NE[4]	BR[5]	Vic[6]		
Coracina papuensis	White-bellied Cuckoo-shrike								
Coracina tenuirostris	Cicadabird								
Corcorax melanorhamphos	White-winged Chough								
Cormobates leucophaeus	White-throated Treecreeper								
Corvus coronoides	Australian Raven								
Corvus mellori	Little Raven								
Coturnix australis	Brown Quail								
Coturnix pectoralis	Stubble Quail								
Cracticus nigrogularis	Pied Butcherbird								
Cracticus torquatus	Grey Butcherbird								
Cuculus pallidus	Pallid Cuckoo								
Cygnus atratus	Black Swan								
Dacelo novaeguineae	Laughing Kookaburra								
Daphoenositta chrysoptera	Varied Sittella								
Dendrocygna eytoni	Plumed Whistling-Duck								
Dicaeum hirundinaceum	Mistletoebird								
Dromaius novaehollandiae	Emu								
Egretta garzetta	Little Egret	C							
Egretta novaehollandiae	White-faced Heron								
Elanus axillaris	Black-shouldered Kite								
Elanus scriptus	Letter-winged Kite	R							
Elseyornis melanops	Black-fronted Dotterel								
Entomyzon cyanotis	Blue-faced Honeyeater								
Eopsaltria australis	Eastern Yellow Robin								
Epthianura albifrons	White-fronted Chat								
Erythrogonys cinctus	Red-kneed Dotterel								
Eudynamys scolopacea	Common Koel								
Eurostopodus mystacalis	White-throated Nightjar								
Eurystomus orientalis	Dollarbird								
Falco berigora	Brown Falcon								
Falco cenchroides	Nankeen Kestrel								
Falco longipennis	Australian Hobby								
Falco peregrinus	Peregrine Falcon								
Falco subniger	Black Falcon	R							
Falcunculus frontatus	Crested Shrike-tit								
Fulica atra	Eurasian Coot								
Gallinago hardwickii	Latham's Snipe								
Gallinula tenebrosa	Dusky Moorhen								
Gallinula ventralis	Black-tailed Native-hen								
Gallirallus philippensis	Buff-banded Rail								
Geopelia cuneata	Diamond Dove								
Geopelia striata	Peaceful Dove								
Gerygone fusca	Western Gerygone								
Gerygone olivacea	White-throated Gerygone								
Glossopsitta concinna	Musk Lorikeet								
Glossopsitta porphyrocephala	Purple-crowned Lorikeet								
Glossopsitta pusilla	Little Lorikeet								
Grallina cyanoleuca	Magpie-lark								
Grantiella picta	Painted Honeyeater	R	L						
Grus rubicunda	Brolga	R	L						
Gymnorhina tibicen	Australian Magpie								
Haliaeetus leucogaster	White-bellied Sea-Eagle	R	L						
Haliastur sphenurus	Whistling Kite								
Hieraaetus morphnoides	Little Eagle								
Himantopus himantopus	Black-winged Stilt								
Hirundapus caudacutus	White-throated Needletail								
Hirundo ariel	Fairy Martin								
Hirundo neoxena	Welcome Swallow								
Hirundo nigricans	Tree Martin								
Hylacola pyrrhopygia	Chestnut-rumped Heathwren								
Ixobrychus minutus	Little Bittern	R							
Lalage sueurii	White-winged Triller								
Larus novaehollandiae	Silver Gull								

Scientific Name	Common Name	Conservation Status			Endemicity			Dis-junct Pops.	Limit of Range
		TFV[1]	FFG[2]	ESP[3]	NE[4]	BR[5]	Vic[6]		
Lathamus discolor	Swift Parrot	E	L	V					
Leucosarcia melanoleuca	Wonga Pigeon								
Lichenostomus chrysops	Yellow-faced Honeyeater								
Lichenostomus fuscus	Fuscous Honeyeater								
Lichenostomus leucotis	White-eared Honeyeater								
Lichenostomus melanops	Yellow-tufted Honeyeater								
Lichenostomus ornatus	Yellow-plumed Honeyeater								
Lichenostomus penicillatus	White-plumed Honeyeater								
Lichenostomus virescens	Singing Honeyeater								
Limnodromus semipalmatus	Asian Dowitcher								
Lophoictinia isura	Square-tailed Kite	V							
Malacorhynchus membranaceus	Pink-eared Duck								
Malurus cyaneus	Superb Fairy-wren								
Manorina melanocephala	Noisy Miner								
Manorina melanophrys	Bell Miner							✓	
Megalurus gramineus	Little Grassbird								
Melanodryas cucullata	Hooded Robin								
Meliphaga lewinii	Lewin's Honeyeater								
Melithreptus brevirostris	Brown-headed Honeyeater								
Melithreptus gularis	Black-chinned Honeyeater								
Melithreptus lunatus	White-naped Honeyeater								
Melopsittacus undulatus	Budgerigar								
Menura novaehollandiae	Superb Lyrebird								
Merops ornatus	Rainbow Bee-eater								
Microeca fascinans	Jacky Winter								
Milvus migrans	Black Kite								
Mirafra javanica	Singing Bushlark								
Myiagra cyanoleuca	Satin Flycatcher								
Myiagra inquieta	Restless Flycatcher								
Myiagra rubecula	Leaden Flycatcher								
Neochmia temporalis	Red-browed Finch								
Neophema chrysostoma	Blue-winged Parrot								
Neophema pulchella	Turquoise Parrot	R	L						
Neophema splendida	Scarlet-chested Parrot								
Ninox connivens	Barking Owl	R	Rec.						
Ninox novaeseelandiae	Southern Boobook								
Ninox strenua	Powerful Owl								
Nycticorax caledonicus	Nankeen Night Heron								
Nymphicus hollandicus	Cockatiel								
Ocyphaps lophotes	Crested Pigeon								
Oreoica gutturalis	Crested Bellbird							✓	
Oriolus sagittatus	Olive-backed Oriole								
Oxyura australis	Blue-billed Duck								
Pachycephala inornata	Gilbert's Whistler								
Pachycephala olivacea	Olive Whistler								
Pachycephala pectoralis	Golden Whistler								
Pachycephala rufiventris	Rufous Whistler								
Pardalotus punctatus	Spotted Pardalote								
Pardalotus striatus	Striated Pardalote								
Pelecanus conspicillatus	Australian Pelican	C							
Petroica goodenovii	Red-capped Robin								
Petroica multicolor	Scarlet Robin								
Petroica phoenicea	Flame Robin								
Petroica rodinogaster	Pink Robin								
Petroica rosea	Rose Robin								
Phalacrocorax carbo	Great Cormorant								
Phalacrocorax melanoleucos	Little Pied Cormorant								
Phalacrocorax sulcirostris	Little Black Cormorant								
Phalacrocorax varius	Pied Cormorant	C							
Phaps chalcoptera	Common Bronzewing								
Phaps elegans	Brush Bronzewing								
Philemon citreogularis	Little Friarbird								
Philemon corniculatus	Noisy Friarbird								

Scientific Name	Common Name	Conservation Status			Endemicity			Dis-junct Pops.	Limit of Range
		TFV[1]	FFG[2]	ESP[3]	NE[4]	BR[5]	Vic[6]		
Phylidonyris albifrons	White-fronted Honeyeater								
Phylidonyris melanops	Tawny-crowned Honeyeater								
Phylidonyris novaehollandiae	New Holland Honeyeater								
Phylidonyris pyrrhoptera	Crescent Honeyeater								
Platalea flavipes	Yellow-billed Spoonbill								
Platalea regia	Royal Spoonbill	C							
Platycercus elegans	Crimson Rosella								
Platycercus elegans flaveolus	Yellow Rosella								✓
Platycercus eximius	Eastern Rosella								
Plectorhyncha lanceolata	Striped Honeyeater								
Plegadis falcinellus	Glossy Ibis	C							
Podargus strigoides	Tawny Frogmouth								
Podiceps cristatus	Great Crested Grebe								
Poliocephalus poliocephalus	Hoary-headed Grebe								
Pomatostomus superciliosus	White-browed Babbler								
Pomatostomus temporalis	Grey-crowned Babbler	E	L						
Porphyrio porphyrio	Purple Swamphen								
Porzana fluminea	Australian Spotted Crake								
Porzana tabuensis	Spotless Crake								
Psephotus haematonotus	Red-rumped Parrot								
Psophodes olivaceus	Eastern Whipbird								
Ptilonorhynchus violaceus	Satin Bowerbird								
Pycnoptilus floccosus	Pilotbird								
Rallus pectoralis	Lewin's Rail	R							
Rhipidura fuliginosa	Grey Fantail								
Rhipidura leucophrys	Willie Wagtail								
Rhipidura rufifrons	Rufous Fantail								
Sericornis frontalis	White-browed Scrubwren								
Sericornis magnirostris	Large-billed Scrubwren								
Smicrornis brevirostris	Weebill								
Stagonopleura guttata	Diamond Firetail								
Sterna caspia	Caspian Tern	C							
Stictonetta naevosa	Freckled Duck	R	L						
Strepera graculina	Pied Currawong								
Strepera versicolor	Grey Currawong								
Struthidea cinerea	Apostlebird	R						✓	✓
Tachybaptus novaehollandiae	Australasian Grebe								
Tadorna tadornoides	Australian Shelduck								
Taeniopygia bichenovii	Double-barred Finch								
Taeniopygia guttata	Zebra Finch								
Threskiornis molucca	Australian White Ibis								
Threskiornis spinicollis	Straw-necked Ibis								
Todiramphus pyrrhopygia	Red-backed Kingfisher								
Todiramphus sanctus	Sacred Kingfisher								
Tringa nebularia	Common Greenshank								
Turnix pyrrhothorax	Red-chested Button-quail	K							
Turnix varia	Painted Button-quail								
Turnix velox	Little Button-quail								
Tyto alba	Barn Owl								
Tyto novaehollandiae	Masked Owl	R	L						
Tyto tenebricosa	Sooty Owl	R	L						
Vanellus miles	Masked Lapwing								
Vanellus tricolor	Banded Lapwing								
Xanthomyza phrygia	Regent Honeyeater	E	L	E					
Zoothera lunulata	Bassian Thrush								
Zosterops lateralis	Silvereye								
Reptiles									
Amphibolurus muricatus	Jacky Lizard								
Austrelaps ramsayi	Highland Copperhead								
Austrelaps superbus	Copperhead								
Bassiana duperreyi	Eastern Three-lined Skink								
Bassiana platynotum	Red-throated Skink								✓

Scientific Name	Common Name	Conservation Status			Endemicity			Dis-junct Pops.	Limit of Range
		TFV[1]	FFG[2]	ESP[3]	NE[4]	BR[5]	Vic[6]		
Carlia tetradactyla	Southern Rainbow Skink								✓
Chelodina longicollis	Eastern Long-necked Tortoise								
Cryptoblepharus carnabyi	Carnaby's Wall Skink								
Ctenotus robustus	Striped Skink								
Ctenotus taeniolatus	Copper-tailed Skink								✓
Cyclodomorphus praealtus	Alpine She-oak Skink	V	L			AA		✓	✓
Delma impar	Striped Legless Lizard	V	L	V					
Delma inornata	Olive Legless Lizard								
Diplodactylus vittatus	Stone Gecko								
Drysdalia coronoides	White-lipped Snake								
Egernia cunninghami	Cunningham's Skink								
Egernia saxatilis intermedia	Black Rock Skink								
Egernia striolata	Tree Skink								
Egernia whitii	White's Skink								
Emydura macquarii	Murray Turtle								
Eulamprus heatwolei	Yellow-bellied Water Skink								
Eulamprus kosciuskoi	Alpine Water Skink	V	L					✓	✓
Eulamprus tympanum	Southern Water Skink								
Hemiergis decresiensis	Three-toed Skink								
Lampropholis delicata	Grass Skink								
Lampropholis guichenoti	Garden Skink								
Lerista bougainvillii	Bougainville's Skink								
Lialis burtonis	Burton's Legless Lizard								✓
Morelia spilota variegata	Carpet Python	V	L					✓	
Morethia boulengeri	Boulenger's Skink								
Nannoscincus maccoyi	McCoy's Skink								
Niveoscincus coventryi	Coventry's Skink								
Notechis scutatus	Eastern Tiger Snake								
Phyllodactylus marmoratus	Marbled Gecko								
Physignathus lesueurii howittii	Gippsland Water Dragon								
Pogona barbata	Bearded Dragon								
Pseudechis porphyriacus	Red-bellied Black Snake								
Pseudemoia cryodroma	Alpine Bog Skink	V	L			AA			
Pseudemoia entrecasteauxii	Southern Grass Skink								
Pseudemoia pagenstecheri	Tussock Skink								
Pseudemoia rawlinsoni	Glossy Grass Skink	K						✓	
Pseudemoia spenceri	Spencer's Skink								
Pseudonaja textilis	Eastern Brown Snake								
Ramphotyphlops nigrescens	Gray's Blind Snake								
Ramphotyphlops proximus	Woodland Blind Snake	R							
Rhinoplocephalus nigrescens	Eastern Small-eyed Snake								
Saproscincus mustelinus	Weasel Skink								
Suta dwyeri	Dwyer's Snake								
Suta flagellum	Little Whip Snake								
Tiliqua nigrolutea	Blotched Blue-tongued Lizard								
Tiliqua scincoides	Eastern Blue-tongued Lizard								
Tympanocryptus diemensis	Mountain Dragon								
Varanus gouldii	Gould's Goanna								
Varanus rosenbergi	Rosenberg's Goanna	V						✓	✓
Varanus varius	Lace Monitor								
Vermicella annulata	Bandy Bandy	V							
Amphibians									
Crinia parinsignifera	Plains Froglet								
Crinia signifera	Common Eastern Froglet								
Crinia sloanei	Sloane's Froglet								
Geocrinia victoriana	Eastern Smooth Frog								✓
Limnodynastes dumerilii	Southern Bullfrog								

Scientific Name	Common Name	Conservation Status			Endemicity			Dis-junct Pops.	Limit of Range
		TFV[1]	FFG[2]	ESP[3]	NE[4]	BR[5]	Vic[6]		
Limnodynastes dumerilii dumerilii									
Limnodynastes fletcheri	Barking Marsh Frog	K							✓
Limnodynastes peronii	Striped Marsh Frog							✓	
Limnodynastes tasmaniensis	Spotted Marsh Frog								
Litoria booroolongensis	Booroolong Frog								✓
Litoria ewingii	Southern Brown Tree Frog								
Litoria lesueuri	Lesueur's Frog								
Litoria paraewingi	Plains Brown Tree Frog						✓		✓
Litoria peronii	Peron's Tree Frog								
Litoria phyllochroa	Leaf Green Tree Frog								
Litoria raniformis	Growling Grass Frog								
Litoria spenceri	Spotted Tree Frog	E	L	E		AA			
Litoria verreauxii alpina	Alpine Tree Frog	K				AA			
Litoria verreauxii verreauxii	Verreauxii's Tree Frog								
Neobatrachus sudelli	Common Spadefoot Toad								
Pseudophryne bibronii	Brown Toadlet								
Pseudophryne dendyi	Dendy's Toadlet								
Uperoleia laevigata	Smooth Toadlet								
Fish									
Gadopsis bispinosus	Two-spined Blackfish								
Gadopsis marmoratus	Freshwater Blackfish	K							
Galaxias brevipinnis	Broad-finned Galaxias								
Galaxias fuscus	Barred Galaxias	E	L	E			✓		✓
Galaxias olidus	Mountain Galaxias	K							
Galaxias rostratus	Flat-headed Galaxias	R							
Hypseleotris klunzingeri	Western Carp Gudgeon								
Maccullochella macquariensis	Trout Cod	E	L	E					
Maccullochella peelii	Murray Cod	V	L						
Macquaria ambigua	Golden Perch	R							
Macquaria australasica	Macquarie Perch	V	L						
Melanotaenia fluviatilis	Crimson-spotted Rainbowfish	R	L						
Nannoperca australis	Southern Pigmy Perch								
Invertebrates									
Archeophylax canarus	Caddisfly	R	L						
Acrodipsas brisbanensis	Large Ant Blue	R	L						
Canthocamptus longipes	Harpactacoid copepod	K							
Euastacus armatus	Murray River Crayfish	K							
Euastacus crassus	Alpine Spiny Crayfish	R							✓
Euastacus woiwuru	Central Highlands Spiny Cray						✓	✓	✓
Riekoperla intermedia	Stonefly	V	L		✓	AA	✓	✓	✓
Riekoperla isosceles	Stonefly	V	L		✓	AA	✓	✓	✓
Thaumatoperla alpina	Stonefly	R	L		✓	AA	✓	✓	✓
Thaumatoperla flaveola	Stonefly	V	L		✓	AA	✓		✓

Notes:
1. TFV = *Threatened Fauna in Victoria* list (CNR 1995).
2. FFG = Victorian *Flora and Fauna Guarantee Act 1988* .
3. ESP = Commonwealth *Endangered Species Protection Act 1992.*
4. Endemic to the North East RFA Region.
5. Endemic to a biogeographic region (AA = Australian Alps).
6. Endemic to Victoria and with most records of that taxon in the North East.

E = Endangered, V = Vulnerable, R = Rare, L = Listed, Rec. = Recommended for listing, K = insufficiently known, C = restricted colonial breeding or roosting.

Appendix M: National Estate Geoheritage Sites of Significance Occurring in the North East RFA Region

Site	National Estate Status	National Estate Criteria
Beechworth Area Gemsites	Some sites in registered areas	A3, B1, D1
Bogong High Plains	Registered	A1, A3, B1, D1
Brandy Creek Quarry (Brandy Creek Mine, Whites Claim)	Under assessment	A1, C1, D1
Bruarong - Kiewa Fault Zone	Not Registered	D1
Cope Creek Area	Not Registered	A1, B1, C1, D1
Eldorado Area	Not Registered	C2
Fluorite Mine	In registered area	D1
Golden Point Ridge: Mount Loch	Under assessment	A1, B1, D1
High Plains Creek Leaf Fossil Site	Not Registered	A1, B1, D1
Kiewa Valley & Kiewa Fault Zone	Not Registered	A1, D1
Lake Findlay	Not Registered	A1, B1
Mount Bogong	Registered	B1, D1
Mount Buffalo	Registered	A1, D1
Mount Fainter South	Registered	A1, B1
Mount Feathertop & the Razorback	Registered	A2, A3, B1
Mount Jim	Not Registered	A1, B1, D1
Mount Nelse & Mount Nelse North	Registered	A1, A2, B1, D1
Moyhu Permian Glacial Pavements	Not Registered	A1
Murmungee Basin	Not Registered	D1
Ovens Graben Permian Sites, including - Byawatha Glacials - Moyhu Permian Glacial Pavements - Springhurst Railway Cutting - Wooragee Permian Glacials	Not Registered	A1, A3, B1, D1
Rocky Creek - Debris Avalanche	Not Registered	D1
Tawonga Fault	Not Registered	A1
The Barry Mountains - The Razor & the Viking	Registered	B1, D1
The Niggerheads	Registered	B1, D1
Upper Swindlers Creek	Under assessment	A1, D1
Wabonga Plateau (Mt Typo, Bennie Cliffs)	Not Registered	A1, D1
Wonnangatta River Valley	Registered	A1, A3, D3
Wooragee Permian Glacials	Not Registered	A1, C1, D1

Appendix N: Metadata Reference

The importance of documenting key aspects of data so as to better understand, manage and use the data is being increasingly recognised. This description, or documentation, of the data is commonly referred to as 'metadata'.

As part of the CRA process, a standard approach had been used to document data consistently. The standard was developed by the Australia New Zealand Land Information Council (ANZLIC), a group formed to coordinate the collection and transfer of all land and geographic information across all levels of government. All jurisdictions are represented on ANZLIC.

The core metadata outlined in the ANZLIC standard provide basic information about the data, including descriptions of the data, their geographic extent, currency, status, accessibility and quality, and contact information. A list of attributes has also been included in the data descriptions.

The metadata inventory of datasets will be available on the CRA/RFA web site as follows: http://www.rfa.gov.au/index.html