Environment and Heritage Report - East Gippsland

Appendix A: Key Legislation to the Environment and Heritage Assessments

Appendix B: Descriptions of Datasets

Aerial Photograph Interpretation of 1960's Logging

Dataset

Title : Aerial photograph interpretation of 1960's logging
Short Title : VIC:E_Gipp:Logging_Hist_API
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Aerial photo interpretation of 1:35 000, 1977 Mallacoota 1:100 000 mapsheet photos and 1:80 000 Stratmap photos for Mallacoota, Bairnsdale and Tallangatta 1:250 000 mapsheets. This data was used to supplement VIC:E_Gipp:History_TM_MSS. This data was intended to fill gaps in regional DNRE logging records especially for logging during the 1960's.
Search Word(s) : FORESTS Disturbance History
Attributes List: YEAR - Year of photos
Geographic Extent Name(s): East Gippsland, Victoria

Data Currency

Beginning Date : 1965
Ending Date : 1977

Dataset Status

Progress : Complete
Maintenance and update Frequency : As required

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage: Interpreted polygons transferred from air photo overlays to 1:100 000 base and digitised.
Scale : 1:100 000
Positional Accuracy : 200 metres
Attribute Accuracy : The use of air photos and interpretation methods leads to high accuracy at 1:100 000 scale.
Logical Consistency : A consistent interpretation method was applied
Completeness : Complete

Agricultural and Farm Clearing

Dataset

Title : Agricultural and Farm Clearing
Short Title : VIC:E_Gipp:Agr_Farm_Clearing
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : This layer contains historical agricultural and farm clearing records on public land obtained from a records search made by Historical Places Section DNRE. The dataset covers selected records for the period circa 1880s to 1930s. Ringbarking for clearing purposes occurred within these selections but not necessarily over the entire area.
Search Word(s) : FORESTS Disturbance History
Attributes List :
PARISH-NAME- Name of Parish
UNIQUE-NO - Unique ID used in labelling
DATE-CLEARED - Last known date of selection occurring in records
AREA-CLEARED - Recorded area cleared (acres)
AREA-TOTAL - Recorded total area of allotment (acres)
SCRUB-CLEAR - Scrub cleared (recorded)
AREA-SC - Area scrub cleared (acres)
OTHER - Other types of activities eg grass planted
AREA-OTHER - Area of other activities (acres)
PERCEN-CLEAR - Percentage of total area cleared
Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1880
Ending Date : 1940

Dataset Status

Progress : Complete
Maintenance and update Frequency : As required

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage : Primary data transferred from Parish plans to 1:100 000 base and digitised.
Scale : 1:100 000
Positional Accuracy : 500 metres
Attribute Accuracy : Based on old records - variable. Records record clearing allotments but may not always reflect area cleared.
Logical Consistency : n/a
Completeness : Complete

Areas of Known Logging Regrowth and Overwood Removal Dataset

Title : Areas of known logging regrowth and overwood removal
Short Title : VIC:E_Gipp:Regrow_Overwood_Rem
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Polygons delineate areas of known logging regrowth in East Gippsland as at 1985 and overwood removal in the Cann River forest district following the 1983 fires. Original information was prepared by Ian Sebire (former Dept Conservation Forest and Lands) in 1985. Data was collected at a coarse resolution based on expert knowledge.
Search Word(s) : FORESTS Disturbance History
Attributes List: REGEN-TYPE - Distinguishes between overwood removal and fire regeneration
Geographic Extent Name(s) : Orbost region, Victoria

Data Currency

Beginning Date : Unknown
Ending Date : 1985

Dataset Status

Progress : Complete
Maintenance and update Frequency : Not planned

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage : Primary data, i.e. Ian Sebires forestry map. Transferred from DNRE regional records to 1:100 000 base and digitised.
Scale : 1:100 000
Positional Accuracy : 200 metres
Attribute Accuracy : This data was based on coarse historical records which assessed logging activities at a compartment or block scale.
Logical Consistency : n/a

Areas of Severe Dieback
Dataset

Title : : Areas of Severe Dieback
Short Title : VIC:E_Gipp:Dieback_100_000
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Polygons show areas of severe dieback (55% or more crown loss) assumed to be primarily caused by *Phytophthora cinnamomi* (cinnamon fungus) in lowland forests in 1973 mapped by DNRE (formerly the Forest Commission of Victoria) using aerial photography and field inspection.
Search Word(s) : FORESTS Disturbance History
Attributes List:DIEBACK - presence or absence.
Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1973
Ending Date : 1973

Dataset Status

Progress : Complete
Maintenance and update Frequency : Not planned

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage : Primary data transferred from 1:63 360 base to 1:100 000 base and digitised
Scale : 1:100 000
Positional Accuracy : 200 metres
Attribute Accuracy : Unknown
Logical Consistency : n/a
Completeness : Complete

Atlas of Victorian Wildlife

Dataset

Title : Atlas of Victorian Wildlife
Short Title : VIC: Wildlife_Atlas
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment

Description

Abstract : The Wildlife Atlas contains records of mammals, birds, threatened fish and threatened invertebrates recorded since European settlement. Some subfossil records are also included. The database is continuously updated with both survey data and incidental records. Records have come from the literature, the Museum of Victoria, the RAOU and other amateur groups, individuals and professional organisations.
Search Word(s) : FAUNA Records, FAUNA Invertebrates, FAUNA Vertebrates, FISHERIES Freshwater, birds
Attribute List:

REF - Unique record identifier
SUB - Unique record identifier
CHK - Species Code Check Character
SPC - Species or survey method code
COUNT - Number and qualifier (e.g. sex, age, duration of survey)
XTRA - Extra information (e.g. escape, road kill)
KIND - Type of record (e.g. seen, heard, museum)
RELIAB - Confidence of observation (e.g. confirmed specimen, doubtful)
PRJ - Project identifier
OBS - Observer code
D1; M1; YR1 - First date
D2; M2; YR2 - Last date
LAT; LONG - Latitude and Longitude (to nearest minute)
MAP - Australian Map Grid Reference
AMG - 6 digit reference (accurate to 100 metres or 1 kilometre)
ALT - Altitude
SHEET - Additional sheet qualifiers
EB; EM; EH; T1; T2 - Fields for data manipulation
NEARPLACE - Location identifiers general
LOCALITY - Locality description

Geographic Extent Name(s) : Victoria

Data Currency

Beginning Date : 1770
Ending Date : Current

Dataset Status

Progress : In Progress
Maintenance and Update Frequency : Daily

Format

Stored Data Format(s) : DIGITAL - Database

Available Format Type(s) : DIGITAL - DBF; DIGITAL - ARC/INFO (threatened species); NONDIGITAL - Printouts

Data Quality

Lineage : Records have been and continue to be collated from a wide range of sources including fauna surveys conducted by DNRE since 1972, universities and conservation groups, scientific literature and interested people. Contributors who use the Atlas to enter their own data are responsible for its accuracy, while other contributors are sent copies of newly entered records for verification. Routine checks during data entry include validity of map and amg references and species codes. Peer review of records is undertaken and detailed information is requested from observers if needed.
Positional Accuracy : Accuracy is an attribute of the data, no break down is available. The lowest resolution data comes from museum records, and early literature which provides scant positional information. Much bird data was collected from 10' grid cells prior to 1982. Most new data has a resolution of 1 minute or better with observers using 1:100 000 and increasingly 1:25 000 maps (or GPS's) to provide grid references which are likely to be accurate to + or - 100 metres. Although smaller scale maps were used for early data only a very small proportion of data collected closed to all boundaries could be affected.
Attribute Accuracy : High; checking by observers and peer review. Data is returned to contributors for checking. Distribution maps and lists of new records are checked by experts for each species group and detailed observations sought for questionable records. The taxonomy is based on the Census of Australian Vertebrate Species (CAVS) with some variation.
Logical Consistency : A variety of collection methods have been used over time.
Completeness : Geographic coverage is comprehensive but not locally exhaustive. The data set is a repository of available information of the State's wildlife. It reflects specific information requirements across the State for various species, species groups and survey methods.

Disturbance Levels for Old Growth Forest Study

Dataset

Title : Disturbance levels for old growth forest study
Short Title : VIC:E_Gipp:Old_Growth_Dist
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : This dataset identifies disturbance levels derived from a number of disturbance datasets as part of the old growth forest analysis process. Levels of disturbance were assigned on the basis of best available knowledge of disturbance effects. For areas with multiple disturbance records, the most significant disturbance level identified is assigned. Areas shown to be undisturbed indicate that no authentic disturbance records have been discovered and have not been field validated as undisturbed.
Search Word(s) : FORESTS Disturbance History
Attributes List:

DIST-LEVEL - Level of disturbance
1 - Undisturbed
2 - Negligible 'natural' disturbance
2u - Negligible 'un-natural' disturbance
3n - Significant 'natural' disturbance
3u - Significant 'un-natural' disturbance
3 - Significant disturbance, type unknown
Unknown Disturbance recorded, level unknown

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1993
Ending Date : 1994

Dataset Status

Progress : Complete
Maintenance and update Frequency : As required

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage : Research using historical and contemporary records was undertaken to delineate and map the extent and severity of eight disturbances (agricultural selection, grazing, mining, dieback, clearfelling, selective and clearfall timber harvesting, wildfire and fuel reduction burning).

These disturbances were described according to their cause; natural or un-natural (post-European human-induced). Evidence of the effect of disturbances was available from three primary sources; the existing disturbance record, aerial photo interpretation of growth stage and crown cover and the vegetation class (EVC and forest type).

In general the following principles were adopted for the analysis. The growth stage (GS) and crown cover (CC) mapping was considered to be the most reliable record. When these were unable to confirm or refute a disturbance, the disturbance record was accepted, but may be overridden by the ecological vegetation class.

Dataset derived from multiple topological overlays in accordance with rules as documented in Woodgate et al. (1994).

Scale : 1:100 000
Positional Accuracy : 200 metres. Approximately 2 mm on 1:100 000
Attribute Accuracy : Extensive field checking was carried out iteratively while assigning disturbance classes to given areas. Disturbance rules were generated during air photo interpretation and mapping of Ecological Vegetation Communities and then checked in the field.
Logical Consistency : Fundamental relationship between this dataset and other datasets (growth stage, Ecological Vegetation Community, disturbance) are expressed in analysis rules used to derive disturbance level (see Appendix G of Woodgate et al (1994)).
Completeness : Complete

East Gippsland Climate Grids

Dataset
Title : East Gippsland Climate Grids
Short Title : VIC:E_Gipp:Climate_Grids
Jurisdiction : Australia
Custodian : Environmental Resources Information Network (ERIN)), Commonwealth Department of the Environment, Sport and Territories

Description
Abstract : This dataset contains climate grids for East Gippsland for 27 bioclimatic parameters. These grids were calculated using ANUCLIM (incorporating BIOCLIM and ESOCLIM) and a 9 Second Digital Elevation Model (DEM) for East Gippsland. This DEM is part of the national DEM produced by the Centre for Resource and Environmental Studies, Australian Surveying and Land Information Group, Australian Geological Survey Organisation and the Australian Heritage Commission.
Search Word(s) : Climate and Weather: Temperature, Rainfall, Radiation
Attribute List : Climate grids for East Gippsland. Each grid is named clim01-03, 05-14, 16-22, 23-27

Tann : Annual Mean Temperature
Tra : Mean Diurnal Range (Mean(monthly max-min))
Iso : Isothermality
Tmxwm : Maximum Temperature of Warmest Period
Tmncm : Minimum Temperature of Coldest Period
Tspan : Temperature Annual Range
Twetq : Mean Temperature of Wettest Quarter
Tdryq : Mean Temperature of Driest Quarter
Twmq : Mean Temperature of Warmest Quarter
Tclq : Mean Temperature of Coldest Quarter
Pann : Annual Precipitation
Pwetm : Precipitation of Wettest Period
Pdrym : Precipitation of Driest Period
Pwetq : Precipitation of Wettest Quarter
Pdryq : Precipitation of Driest Quarter
Pwmq : Precipitation of Warmest Quarter
Pclq : Precipitation of Coldest Quarter
Rann : Annual Mean Radiation
Rhi : Highest Period Radiation
Rlo : Lowest Period Radiation
Rwetq : Radiation Wettest Quarter
Rdryq : Radiation Driest Quarter
Rwmq : Radiation Warmest Quarter
Rclq : Radiation Driest Quarter

Latitude and Longitude are in decimal degrees. Temperature values are degrees Celsius. Rainfall values are in millimetres. The radiation surfaces are in Megajoules.

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency
Beginning Date : 1900
Ending Date : 1980

Dataset Status
Progress : Complete
Maintenance and Update Frequency : As Required

Format
Stored Data Format(s) : Digital - Raster
Available Format Type(s) : Digital - ARC/INFO

Data Quality
Lineage : Obtained climatic grids using ANUCLIM by interrogating climate surfaces using 9 Second DEM for East Gippsland. The East Gippsland DEM was clipped using the East Gippsland Forest Management Area. ANUCLIM was used to generate command file for running BIOCLIM. BIOCLIM calculated climate grids for temperature, rainfall and radiation. ARC/INFO grids were created from the output of BIOCLIM. Isothermality, the ratio of Mean Diurnal Range to Temperature Annual Range, was recalculated using ARC/INFO floating point grids to obtain a continuous surface.
Cell Size : 9 seconds ((250 metres)
Positional Accuracy : Elevation inputs for the 9 Second DEM were from 1:100 000 scale sources. Major water bodies and water courses were from GEODATA TOPO-250K hydrography.
Attribute Accuracy : The climate grids were calculated using the BIOCLIM algorithm that is nationally and internationally recognised. Climate surfaces have not been updated for 10-15 years.
Logical Consistency : Units for temperature and radiation were originally in tenths of degrees and tenths of Megajoules respectively.
Completeness : Complete for East Gippsland. DEM used to interrogate climate surfaces was a pre-release of National 9 Second DEM for Melbourne 1:1 000 000 mapsheet. Seasonality (Coefficient of variation) surfaces are not provided.

East Gippsland Digital Elevation Model

Dataset

Title : East Gippsland Digital Elevation Model
Short Title :VIC:E_Gipp:Digital_Elev_Model
Jurisdiction : Australia
Custodian : Australian Survey and Land Information Group (AUSLIG)

Description

Abstract : The Digital Elevation Model (DEM) for East Gippsland is part of the national DEM produced as a cooperative effort by the Centre for Resource and Environmental Studies, Australian Surveying and Land Information Group, Australian Geological Survey Organisation and the Australian Heritage Commission. This DEM has a grid spacing of nine seconds in latitude and longitude (approximately 250 metres). The DEM for East Gippsland for use in the Comprehensive regional Assessment (CRA) was clipped from a pre-release of the Melbourne 1:1 000 000 mapsheet.
Search Word(s) : LAND Digital Elevation Model
Attribute List : Elevation (metres)
Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : Not Known
Ending Date : May 1996

Dataset Status

Progress : In Progress
Maintenance and Update Frequency : As Required

Format

Stored Data Format(s) : Digital - raster
Available Format Type(s) : Digital - ARC/INFO

Data Quality

Lineage : The East Gippsland DEM is a prelease of the GEODATA 9 Second DEM, supplied by AUSLIG. The DEM was created using the ANUDEM algorithm developed by Mike Hutchinson of the Australian National University. The DEM was clipped to the East Gippsland Forest Management Region.
Cell Size :9 seconds ((250 metres)
Positional Accuracy : Elevation inputs are from 1:100 000 scale sources. Major water bodies and water courses are from GEODATA TOPO-250K hydrography.
Attribute Accuracy : The source spot elevations have a reported error (RMS) of less than 10 metres. Each value in the DEM is at the centre of a 9" by 9" grid square and represents the average elevation covered by that grid square. As a result, the actual elevation of hills tops may not appear in the data.
Logical Consistency : As well as elevation data, the program uses watercourses and large water bodies to enforce hydrological accuracy. Sinks which are often a problem in other DEMs have been resolved by forcing the drainage where possible.
Completeness : Complete for East Gippsland. Prerelease of GEODATA 9 Second DEM for Melbourne
1:1 000 000 mapsheet.

East Gippsland Environmental Stratification

Dataset

Title : East Gippsland Environmental Stratification
Short Title : VIC:E_Gipp:Env_Stratification
Jurisdiction : Australia
Custodian : Environmental Resources Information Network (ERIN), Commonwealth Department of the Environment, Sport and Territories

Description

Abstract : The East Gippsland Environment Stratification is an environmental classification for the Comprehensive Regional Assessment (CRA). The stratification was developed using expert knowledge to select appropriate environmental variables and suitable classification rules for the East Gippsland CRA Region. The stratification consists of environmental units (strata) derived from unique combinations of continuous surfaces for elevation and precipitation and categorical data for lithology and landform. Elevation data was obtained from a pre-release of the GEODATA 9 Second Digital Elevation Model. Annual precipitation was obtained using ANUCLIM. Lithology and landform is from the Victorian Land Systems dataset at 1:250 000.
Search Word(s) : LAND Digital Elevation Model, CLIMATE Rainfall, ECOLOGY Landscape, GEOSCIENCES Geomorphology
Attribute List:

Value : Strata number
Elev : Elevation Class (5 classes)
Lith : Lithology Class (7 classes)
Land : Landform Class (5 classes)
Rain : Annual Mean Precipitation Class (3 classes)
Lithology and landform classes relate to four digit codes that represent the lithology and landform types for each land system unit. The landform and lithology codes are described in the documentation for "Landsystems of Victoria".

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1900
Ending Date : 1996

Dataset Status

Progress : Complete
Maintenance and Update Frequency : Not Planned

Format

Stored Data Format(s) : Digital - Grid Output Format Type(s) : Digital - ARC/INFO

Dataset Quality

Lineage Summary :

- **DEM SUMMARY:** Clipped to East Gippsland Study Area.
- **RAINFALL SUMMARY:** Obtained climatic grids using ANUCLIM by interrogating climate surfaces with DEM-9S. ARC/INFO grids created from the output of ANUCLIM.

- **LANDSYSTEMS SUMMARY:** Projected to Geographic. Created four digit numeric code for the lithology and landform types. Up to four types (L1-L4) are recorded for each land system unit (polygon).
- **STRATIFICATION:** The environmental variables were reclassified in ARC/INFO GRID, based on stratification rules and were combined using the COMBINE command to create unique classes.
- **STRATIFICATION RULES:**

  Class / Elevation (metres) / Precipitation (mm) / Lithology / Landform
  1 / <300 / < 800 / 1000, 1200 / 4100
  2 / 301 - 600 / 801 - 1200 / 2000, 2100 / 2000
  3 / 601 - 900 / > 1201 / 3000, 3500 / 3000
  4 / 901 - 1200 / - / 4000, 5400 / 4000
  5 / > 1201 / - / 5000 / / 5000
  6 / - / - / 5300, 5600 / -
  7 / - / - / 6000, 6500 / -
  For lithology and landform, the first digit in the code is the most dominant type, with the second, third and fourth digits progressively less dominant. The lithology classification combines similar lithological groups. For example, Class 1 includes landsystems where coarsely textured unconsolidated deposits are the dominant lithology type and where finely textured unconsolidated deposits also occur. Class 4 is any landsystem that contains limestone.

Scale : 1:250 000
Positional Accuracy : Resolution of the DEM is 9 seconds (250 metres). The scale of the Land Systems coverage used to obtain Lithology and landform varies from 1:250 000 to 1:100 000. The source datasets were clipped to East Gippsland Forest Management Region.
Attribute Accuracy : Accuracy of elevation is reported to be better than 10 metres. Climate values were obtained using the ANUCLIM algorithm, that is widely accepted and used. Climate surfaces have not been updated for the last 10 - 15 years. Lithology and landform information is compiled from various sources and has varying accuracy and resolution.
Logical Consistency : There were 137 315 records (grid cells) of which there were 964 records with missing values. These records with missing values occurred exclusively within water bodies or along the edges of the coverage. Points with missing records were not included in the final East Gippsland Environment dataset used for stratification.
Completeness : Complete for East Gippsland.

East Gippsland Geological and Geomorphological National Estate Value Dataset

Title : East Gippsland Geological and Geomorphological National Estate Values
Short Title : VIC:E_Gipp:Geol_Geomorph
Jurisdiction : Australia
Custodian : Australian Heritage Commission (AHC)

Description

Abstract : Consultant's report and associated GIS coverage of geological and geomorphological sites of national estate significance in the East Gippsland Region. A component of the East Gippsland National Estate Values Assessment.
Search Word(s) : GEOSCIENCES Geology, GEOSCIENCES Geomorphology, HERITAGE Natural, HERITAGE National Estate Register
Attribute List :

Presence/absence of Register of the National Estate Criteria:
- A1 (Past processes)
- A2 (Existing/ ongoing processes)
- A3 (Places of unusual richness)
- B1 (Uncommon Phenomena)
- C1 (Type Localities or Reference Sites)
- D1 (Principle Characteristics of Geological Class)

Site Name
Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : Not Known
Ending Date : 1993

Dataset Status

Progress : Complete
Maintenance and Update Frequency : Not Planned

Format

Stored Data Format(s) : NONDIGITAL - reports; poly point
Available Format Type(s) : NONDIGITAL - Photocopy DIGITAL ARC/INFO

Data Quality

Lineage : Derived from published material including geological maps referenced in the bibliography included in the report. Bendoc and Murrindal 1:100 000 Geological Maps; 1:250 000 Bairnsdale, Tallangatta and Mallacoota.

The basis for this review of National Estate Significance is the report of McRae-Williams, Rosengren, Kraemers 1981. The sites identified in that report were reassessed and supplemented by new data from published and unpublished research.

Scale : 1:100 000
Positional Accuracy : Sites identified to an accuracy dependent on source 1:100 000 or 1:250 000 hard copy base map.
Attribute Accuracy : Attributes are described according to the criteria against which sites have been assessed. The interpretation of the attribute has been verified and is accurate to the

criterion level. Attributes are specific within the context of National Estate awareness and are not necessarily applicable to wider interpretation.
Logical Consistency : The report and coverage when read together are clear, self explanatory and each criterion is attributed clearly even when there is overlap.
Completeness : The Dataset identifies a subset of the geological and geomorphological features that have been identified as being of above threshold value for inclusion on the Register of the National Estate. The dataset is complete in the sense all identified areas are included in report and coverage.

East Gippsland National Estate Assessment / Aboriginal Archaeological Sites

Dataset

Title : AHC/NRE East Gippsland National Estate Assessment -Aboriginal Archaeological sites
Short Title : VIC:E_Gipp:Aborig_Archaeology
Jurisdiction : Victoria
Custodian : Aboriginal Affairs Victoria (AAV)

Description

Abstract : This dataset is a subset of all Aboriginal archaeological sites recorded by Aboriginal Affairs Victoria (AAV) in the East Gippsland Forest Management Area, Victoria. The dataset was compiled in 1994 by Dr J.W. Rhoads (AAV) as part of the East Gippsland Regional Forest Assessment being undertaken by the Australian Heritage Commission (AHC). See Rhoads 1994 for a full description of this process.

Data were primarily collected from three archaeological surveys carried out in the region between 1979 and 1993. Full site information is stored on hard copy Site Record Cards, on a computerised database (Minark) and also summarily in ARC/INFO format. Sites were assessed against established AHC National Estate criteria for Indigenous values (Rhoads 1994).

Search Word(s) : HERITAGE Aboriginal, HERITAGE National Estate Register, , HUMAN ENVIRONMENT Indigenous Communities
Attribute List :

- Site Number
- AMG Grid Reference
- Site Type - As per AAV site types (e.g. isolated artefact, surface scatter, shell midden etc.)

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 01/01/1979
Ending Date : 31/12/1993

Dataset Status

Progress : Complete
Maintenance and Update Frequency : Not planned

Format

Stored Data Format(s) : DIGITAL - Database
Available Format Type(s) : DIGITAL - DXF (Minarc) ARC/INFO (summary only)

Data Quality

Lineage: Data sources: The primary data source for data on Aboriginal archaeological sites in East Gippsland is the Site Register, Heritage Services Branch, AAV. Consultant reports and other archaeological studies contain additional information on these sites.
Processing steps : Sites were incorporated into the Primary Data List if: the cultural remains could reasonably be attributed to Indigenous people; site preservation was recorded as being 'poor' or better; there was sufficient information about the characteristics of the archaeological remains. Sites situated in or near coastal environments (i.e. outside indisputable forest settings), such as middens, were also included if they contained: shellfish debris representative of species not primarily found in rocky shore environments; skeletal parts of

animals associated with forest environments; a common occurrence of flaked stone artefacts which include raw material types in addition to or other than quartz.
Scale : 1:100 000
Positional Accuracy : Sites are located using AMG Eastings and Northings, accurate to between 25 and 100 metres.
Attribute Accuracy : Standard AAV attribute categories were used for site type.
Logical Consistency : The GIS package (ARC/INFO) was used to detect highly aberrant location data, in addition to a visual check.
Completeness : Complete spatial data coverage for entire Primary Data List, with a site type attributed to every site.

East Gippsland National Estate Assessment / Aboriginal Historic Places

Dataset

Title : East Gippsland National Estate Assessment - Aboriginal Historic Places
Short Title : VIC:EGipp:Aborig_Hist_Places
Jurisdiction : Victoria
Custodian : Aboriginal Affairs Victoria (AAV) in conjunction with Aboriginal communities

Description

Abstract : In 1992 an agreement was signed between the Australian Heritage Commission (AHC) and the Department of Conservation and Natural Resources (DCNR - now Natural Resources & Environment) for the joint identification and assessment of the national estate values of the East Gippsland Forest Management Area, Victoria. The results of the study are to be incorporated into the Forests Management Plan for the study area and conservation criteria will be developed to ensure the protection of places which have national estate significance.

The East Gippsland Aboriginal Historical Places Project, begun in April 1993, was undertaken by Megan Goulding from the Heritage Services Branch, Aboriginal Affairs, Victoria. It involved collecting data from oral history and archival research on places which are significant to Aboriginal people for their historical, social, spiritual or scientific values with particular emphasis on demonstrated associations with the forests. This project was completed within the context of a statewide Aboriginal Historical Places Project, funded through the National Estate Grants Program. Further NEGP funding was made available through Regional Assessment Branch, AHC, for concentrated work to be undertaken in East Gippsland.

The national estate values under consideration include the identification of places which have contemporary value for Aboriginal people in East Gippsland. It includes those places and associations with places which have emerged since contact as well as traditional associations with places which have carried on to the present. Pre-contact archaeological sites which are not reported in historical documents or traditional oral history were not investigated in this project.

Search Word(s) : HERITAGE Aboriginal, HERITAGE Historical, HERITAGE National Estate Register , HUMAN ENVIRONMENT Indigenous Communities, HUMAN ENVIRONMENT Structures and Facilities, LAND Ownership
Attribute List :

Inventory No.
Site Number
Name
Date Listed
Date entered into database
Place Type(s) - As per AAV's thematic list of post-contact Aboriginal places/sites
History
Date Type - e.g. sustained / intermittent / single
Date From
Date To
Associated people
Information sources
Relevant Aboriginal communities - Name and contact details
Informants - Name and contact details
Location Accuracy
Location
Nearest town
Easting
Northing

End Easting
End Northing
Mapsheet
Cadastral Location - County Parish Allotment Block
Ownership details - Type name and contact details
Local Government Area
Terrain - e.g. forest, river valley, lake shore
National Estate - AHC registered yes/no
Archaeological site - AAV recorded yes/no

Geographic Extent Name(s) : East Gippsland, Victoria, Australia.

Data Currency

Beginning Date : 1838
Ending Date : 1993

Dataset Status

Progress : In progress
Maintenance and Update Frequency : Not planned

Format

Stored Data Format(s) : NONDIGITAL- reports
Available Format Type(s) : NONDIGITAL- reports

Data Quality

Lineage : Data was compiled from historical and oral sources in 1993.
Scale : 1:100 000
Positional Accuracy : Highly variable, even for some places with 'Specific' rather than 'General' Location Accuracy.
Attribute Accuracy : Standardised categories used for some attributes and applied by sole researcher.
Logical Consistency : Variable. Archival and oral history sources.
Completeness : Highly variable depending on data source(s).

East Gippsland National Estate Assessment/Community Heritage Workshops Dataset

Title : : East Gippsland National Estate Assessment - Community Heritage Workshops
Short Title : VIC:E_Gipp:Comm_Herit_Workshops
Jurisdiction : Australia
Custodian : Australian Heritage Commission (AHC) Description
Abstract : To gain a better appreciation of the community's appreciation of the environment, history and heritage of East Gippsland, four workshops were held between 23-30 April, 1993. The workshops were held at Bonang, Mallacoota, Nowa Nowa and Orbost. After each workshop, many of the places identified at the workshops were briefly surveyed by fieldwork. The database contains the information contributed during the workshops or collected during the field work. This data was then used to derive places with aesthetics, social value and historic places for further assessment.
Search Word(s) : HERITAGE Historical, HERITAGE Aboriginal, HERITAGE Architectural, HERITAGE National Estate Register, HERITAGE Natural, HUMAN ENVIRONMENT Housing, HUMAN ENVIRONMENT Indigenous Communities, HUMAN ENVIRONMENT Recreation, HUMAN ENVIRONMENT Tourism, LAND Ownership
Attribute List :

Workshop number(s)Unique number allocated to each workshop
Place name(s) - Place/site(s) identified during workshops
Access - The address of the place and how to get there
Locality - Locality name, closest town or public land area
Grid reference - Decimal grid reference on 1:100 000 mapsheet
Ownership - Public, Private, Public/Private
Local Government Area
Theme(s) - As derived from the workshops
Inspected? - Indicated as Yes or No, sometimes with a qualifier
Description - A brief description sourced to the workshop and/or fieldwork
Integrity and condition - The state of authenticity and current state of repair or management of a property
Extent of place - Indication of extent of place, where possible. Sometimes refers to map or plan of site.
Register listings - Indicates if the place is on an existing Register: Historic Buildings Register, Register of the National Estate, National Trust Register
Historic Places Branch database number
Place type - Type of place in terms of physical characteristics eg Cave, Cultural landscape, Track, Trees(s) etc
Potential National Estate values - Reference to AHC criteria
Recommendations - Recommendations are made for all places seen or where enough information is present. In many instance the recommendations are simply 'Survey, research and assess significance'. In some instances specific recommendations are able to be made.
Attachments - Photograph and/or negative; slide; map or plan

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 23/4/1993
Ending Date : 1996

Dataset Status

Progress : Complete
Maintenance and Update Frequency : Not planned

FormatStored Data Format(s) : NONDIGITAL - Manual Records System; NONDIGITAL - Reports
Available Format Type(s) : NONDIGITAL - Photocopy

Data Quality

Lineage : A data sheet was compiled for each identified place. A community profile was conducted and four workshops were undertaken in accordance with the recommendations of the report. Fieldwork was undertaken to clarify or confirm workshop outcomes for areas with social and community values. Natural and Aboriginal heritage values were generally not checked in the field.
Scale : 1:100 000
Positional Accuracy : Grid references taken from 1:10 000 AUSLIG Topographic maps, accuracy of 25 metres.
Attribute Accuracy : Covers all information obtained at workshops and validated in field. Only approximately one third of places were documented by field work.
Logical Consistency : Sites identified at workshop without sufficient information were field checked to ensure consistency in information on which significance was determined.
Completeness : Workshops were held in four representaive communities.

East Gippsland National Estate Assessment / Historic Forest Activity Sites Dataset

Title : East Gippsland National Estate Assessment - Historic Forest Activity Sites
Short Title : VIC:E_Gipp:Forest_Act_Sites
Jurisdiction : Australia
Custodian : Australian Heritage Commission (AHC)

Description

Abstract : This dataset was compiled by du Cros & Associates in 1996 as part of the East Gippsland Regional Assessment Project undertaken jointly by the Australian Heritage Commission and the Victorian Department of Conservation and Natural Resources (now Department of Natural Resources and Environment). Detailed archaeological and historical assessments were carried out on six historic forest activity sites in East Gippsland.
Search Word(s) : HERITAGE Historical, HERITAGE National Estate Register, HUMAN ENVIRONMENT Land Use, HUMAN ENVIRONMENT Structures and Facilities, HUMAN ENVIRONMENT Utilities, LAND Ownership
Attribute List :

- Site ID
- Place Name
- Other name(s)
- Place category- AHC category codes
- Land status - Current land or reservation status (e.g. freehold, State Forest, National Park)
- Ownership/Management
- Location
- Local Government Area
- Mapsheet Name
- Mapsheet No. 1:25 000
- Easting
- Northing
- Boundaries
- Theme(s) - As per AHC's principle Australian historic themes
- History
- Physical description - Description of site and its components
- Condition -Current state of repair or management of property
- Integrity - State of authenticity of a place
- Present Use
- Significance- Statement of significance including level of significance
- National Estate Values - AHC criteria
- Heritage Status - Registered by AHC, Heritage Victoria, classified by National Trust or listed on a local planning scheme
- Sources - Text and non-text information source
- Site Plan - Hard copy map, visual materials which is a current illustration or photographic image(s)

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1916
Ending Date : 1996

Dataset Status

Progress : Complete
Maintenance and Update Frequency : Not Planned

Format

Stored Data Format(s) : NONDIGITAL - reports
Available Format Type(s) : NONDIGITAL - reports

Data Quality

Lineage : Seven historic forest activity sites were selected for further investigation from a preliminary list of places considered to have possible national estate values. A historic forest activity site was defined as a site on public land associated with forest activities dating before 1975. One place could not be located and it was not logistically possible to visit another; two sites were recorded at another place. Sites were mapped using a measuring tape and prismatic compass. Each site was divided into features (where appropriate) and described in detail.
Scale : 1:100 000
Positional Accuracy : Grid references taken from 1:25 000 and 1:100 000 AUSLIG Topographic maps, accuracy 12 - 25 metres.
Attribute Accuracy : Standardised categories used for some attributes and applied by research team.
Logical Consistency : Location, physical description and significance recorded for each place.
Completeness : Attributes provided for all records.

East Gippsland National Estate Assessment/Routes of Human Movement Dataset

Title : East Gippsland National Estate Assessment: Routes of Human Movement
Short Title : VIC:EGipp_Human_Movement
Jurisdiction : Australia
Custodian : Australian Heritage Commission (AHC)

Description

Abstract : This dataset was compiled by Alistair Grinbergs in 1993 as part of the East Gippsland Regional Assessment Project undertaken jointly by the Australian Heritage Commission and the Victorian Department of Conservation and Natural Resources (now Department of Natural Resources and Environment). Twenty-eight major land routes of Aboriginal and European movement within, and in and out of East Gippsland were documented from primary and secondary sources.
Search Word(s) : HERITAGE Aboriginal, HERITAGE Historical, HERITAGE - National Estate Register, HUMAN ENVIRONMENT - Recreation, HUMAN ENVIRONMENT - Tourism
Attribute List :

- Route number
- Route name
- Themes (e.g. farming, exploration, commerce etc)
- Mapsheet
- Commencement Easting
- Commencement Northing
- Termination Easting
- Termination Northing
- Reliability of grid reference (Low, medium, good, very good, excellent)
- Additional information

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1835
Ending Date : 1993

Dataset Status

Progress : Complete
Maintenance and Update Frequency : Not planned

Format

Stored Data Format(s) : NONDIGITAL - reports
Available Format Type(s) : NONDIGITAL - reports

Data Quality

Lineage : A review was undertaken of the available primary and secondary historical sources of information, including letters and journals of pioneers, explorers and settlers; official local histories; and ethnographic documents.
Scale : 1:100 000
Positional Accuracy : Variable with an estimate of reliability given for each record. Good references for these routes are based on assumptions about existing roads adopting the older pathways. More information is required before these existing routes can be identified as the original pathways.

Attribute Accuracy : Standardised categories were used for some attributes and applied by sole researcher.
Logical Consistency : Each identified route of human movement has an identified theme(s) reliability information and details supporting the information is in the report.
Completeness : All records (n = 28) have a route number, name and theme although only 9 records have no locational information.

East Gippsland National Estate Assessment/Survey of Art & Literature Sources Dataset

Title : East Gippsland National Estate Assessment - Survey of Art & Literature Sources
Short Title : VIC:E_Gipp:Art_Lit_Survey
Jurisdiction : Australia
Custodian : Australian Heritage Commission (AHC)

Description

Abstract : This database is not intended to be a comprehensive listing of all works of art and literature relating to particular areas, but rather an indication of which areas have been visited, interpreted and explored by artists and writers.
Search Word(s): HERITAGE Historical, HERITAGE Aboriginal, HERITAGE Architectural, HERITAGE National Estate Register, HERITAGE Natural, HERITAGE Wilderness, HUMAN ENVIRONMENT Indigenous Communities, HUMAN ENVIRONMENT Recreation, HUMAN ENVIRONMENT Structures and Facilities, , HUMAN ENVIRONMENT Tourism, HUMAN ENVIRONMENT Utilities
Attribute List :

- Title of Art/Literature work
- Artist/Author
- Spot place; Easting
- Spot place; Northing
- Description of place
- Comments on the work
- Background info
- Year of work
- Location of original
- References

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1859
Ending Date : 1986

Dataset Status

Progress : Complete
Maintenance and Update Frequency : Not planned

Format

Stored Data Format(s) : NONDIGITAL - manual records system; NONDIGITAL - reports
Available Format Type(s) : NONDIGITAL - Photocopy

Data Quality

Lineage : A review was conducted of public collections in major libraries for art and literature sources that related to the study area.
Scale : 1:100 000
Positional Accuracy : Grid references taken from 1:10 000 AUSLIG Topographic maps, accuracy of 25 metres.
Attribute Accuracy : Variable depending on specific/source.
Logical Consistency : Not relevant
Completeness : The title of the work, the location of the place to which the work relates and description linking the two were recorded for all sites.

East Gippsland Old Growth Forest Areas

Dataset

Title : East Gippsland Old Growth Forest Areas
Short Title : VIC:E_Gipp:Old_Growth_100_000
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Procedure for defining and delineating 'old-growth' for all forests in the study area using the Victorian old-growth forest definition developed by Woodgate et al (1994) as follows: "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." Refer to page 64 of Woodgate et al. (1994) for some important technical requirements of this definition.
The dataset was derived by firstly defining forest, secondly by quantifying growth stage and thirdly by examining the impact of natural and human induced disturbances on the structural and floristic attributes of the forests. The most prominent old-growth characteristics were represented by stands that comprised the oldest growth stage classes and the least disturbed forest for a given forested vegetation class.
Search Word(s) : FORESTS Natural, FORESTS Disturbance History, FLORA Structure
Attributes List :
Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Begin date: December 1993
End date: March 1994

Dataset Status

Progress : Complete
Maintenance and update Frequency : As required

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage :
Dataset derived from multiple topological overlays in accordance with rules as documented in Woodgate et al (1994).
Layers or themes of spatial data included the following: administration boundaries; topography; cadastral; land tenure; agricultural clearing; logging; wildfires; grazing; mining; floristic vegetation; structural vegetation; and growth stage.
The growth stages, crown cover projections, vegetation classes, structural forest types and disturbances were all compiled in map form then entered into a GIS. Each map was registered to the appropriate 1:100 000 scale Australian Map Grid (AMG) map sheet. The separate layers of spatial data, were overlayed on each other to produce composite maps using ARC/INFO.
The analysis procedure used to assess, rank, classify and describe forest stands according to their level of old-growth characteristics are as follows:

Step 1: Identification of forest vegetation;
Step 2: Review of growth stage and crown cover projection for Jacobs and non-Jacobs

forested vegetation;
Step 3: Assignment of disturbance levels;
Step 4: Assignment of old-growth status.

Scale : 1:100 000

Attribute Accuracy : Comprehensive verification of the maps derived as a result of the old growth analysis was not possible over such a large area although substantial field work was undertaken during the mapping of primary data (e.g. growth stages, ecological vegetation classes and forest types) and in the development of disturbance impact rules. Precautionary principles were used favouring the growth stage and crown cover mapping (1:40 000 - 1:100 000) over less reliable records such as historical data (1:100 000 down to 1:1 000 000).

Subsequent to the study by Woodgate et al (1994) and as part of the East Gippsland Forest Management Plan every polygon greater than 100 hectares was field checked.

Logical Consistency : The old growth status was derived from a number of datasets of differing scale and resolution. Logical consistency was maintained throughout the analysis by use of a set of decisions rules (refer to appendix G of Woodgate et al (1994) page 182).

Completeness : Complete for study area to the extent possible based on historical nature of the disturbance data.

Ecological Vegetation Classes 1:100 000

Dataset

Title : Ecological Vegetation Classes 1:100 000
Short Title : VIC:Ecological_Veg_Classes
Jurisdiction: Victoria
Custodian : Department Natural Resources & Environment, Flora and Fauna Branch

Description

Abstract: This layer represents ecological vegetation classes (EVCs) as described by the Flora & Fauna Branch, principally on public land. The classification was based on work completed by Woodgate et al. (1994) which revised vegetation mapping based on a combination of floristic, structural and ecological factors. The EVCs have been adopted as the primary basis for planning flora conservation and represent one of the fundamental Statewide environmental datasets at 1:100,000. The layer has, to date, principally been used in the delineation of old-growth forest and National Estate areas in the Central Highlands, East Gippsland, North-East and Box-Ironbark Forests. This layer is one of the key resource datasets in the analysis and delineation of old-growth forest.
Search Word(s) : ECOLOGY Community, FLORA Structure
Attribute List :
EVC - Ecological Vegetation Class (code) linked to EVC.LUT
EVC_QUAL - EVC Qualifier linked to EVC_QUAL.LUT
EVC100_SRC - Data Source linked to EVC100_SRC.LUT (code and description)
VERSION - Tracks edit history during an Arcedit session

Redefined Attributes:
FC - Floristic Community (there may be many EVCs in an FC (linked to EVC_FC.LUT

Look up Tables:
evc.lut

EVC - Ecological Vegetation Class (code)
MOSAIC - Indicates presence of EVC mosaics
EVC_DESC - Description of Code
EVC_STUDY- -Identifies study that first identified EVC. Linked to EVC_STUDY.LUT (code and description)
EVC_MOSAIC - Code for EVC Mosaic (Y - mosaic; N - not a mosaic) (redefined item)

evc_qual.lut

EVC_QUAL - Code for floristic communities
EVC_DESC - Description of code
EVC_STUDY - Identifies study that first identified EVC

evc_fc.lut

FC - Floristic Community
EVC_STUDY - Identifies study that first identified EVC
EVC - Ecological Vegetation Class
EVC_QUAL - Code for floristic communities

Geographic Extent Name(s) : Eastern and Central Victoria

Data Currency

Beginning Date : 1994
Ending Date : Current

Dataset Status

Progress : In Progress
Maintenance and Update Frequency : Irregular

Format

S**tored Data Format(s) :** Digital - Polygon
Available Format Type(s) : Digital - ARC/INFO

Data Quality

Lineage : The EVC datasets have been developed as part various studies:

- **Central Highlands:** Floristic community mapping for Melbourne 2 LCC Review. Selected EVC100 datasets for the Central Highlands were updated with North-East EVC data using the ARC/INFO update command with the documented dataset fuzzy tolerance. No processing has been performed on Central Highlands datasets.
- **East Gippsland:** LCC Structural Vegetation and Geological mapping. East Gippsland EVC100 datasets were captured as one 1:100 000 coverage, and split on a 1:100 000 mapsheet basis using the ARC/INFO identity command with the documented dataset fuzzy tolerance. The East Gippsland EVC100 datasets were derived from 1:100 000 structural vegetation mapping (the percussor to the SVEG100 dataset).
- **Box Ironbark:** EVC and floristic community mapping for Goldfields study area, with line work drawing on 1:25 000 forest stand class boundaries. Box-Ironbark datasets were captured as 1:25 000 coverages, and joined on a 1:100 000 mapsheet basis using the ARC/INFO update command with the documented dataset fuzzy tolerance.
- **North East:** EVC mapping for the North East Old-growth Forest study.
- **Otways:** Floristic community mapping for the Otway Forest Management Area.
- **Mallee:** Mallee Vegetation mapping project (LCC 1987).
- Selected Mallee EVC100 dataset were digitally captured by scanning original hand painted 1:100 000 Mallee Vegetation maps into ER Mapper as digital images. These images were converted to grid in ARC/INFO and then polygonised into vector coverages.

Scale : 1:100 000
Positional Accuray: 100 metres to 1 kilometre. EVC information is registered to the 1:100 000 base features. Positional accuracy is a function of pen thickness, base accuracy and nature of boundaries mapped. Map errors of 0.5 mm to 3 mm, or 50 metres to 300 metres are possible.
Attribute Accuracy : Based on attribute checking procedures:

1. polygons > 4 hectares: an error of 1 in 50 (approximately 98% accuracy)
< 2. polygons < 4 hectares: an error of 1 in 20 (approximately 95% accuracy)

Logical Consistency : There is a many to one relationship between the redefined item FC (floristic community) and EVC item (ecological vegetation class). This relationship is expressed in the lockup table EVC_FC.LUT. EVC100 supersedes VEG500. LANDMMT100 boundaries have been incorporated where appropriate as most EVC mapping has occurred on public land.

The layer design has been revised to accommodate floristic community naming protocols developed for the first time to accommodate Box-Ironbark forest vegetation. This has involved the addition of the EVCQUAL (EVC qualifier) item and the assignment of FC as a redefined item (covering EVC and EVCQUAL) rather than a dataset attribute in its own right. The data structure also allows for mosaics that consist of more than one EVC in a given map unit.

Completeness : As of May 1996, the dataset covers EVC mapping for the Central Highlands Old-growth (CHOG) Project, East Gippsland Old-growth (EGOG) Project, North-East Old-growth (NEOG) Project East, Goldfields Vegetation Mapping Project, Otway Forest Management Plan and Mallee Vegetation Study for the LCC (1987). Note the Kerang mapsheet for the Mallee Vegetation Study was not converted to digital form in this project.

Flora Information System of Victoria

Dataset

Title : Flora Information System of Victoria
Short Title : VIC:Flora_Information_System
Jurisdiction : Victoria
Custodian : Secretary, Department of Natural Resources and Environment (Effective custodian: Manager, Flora and Fauna Branch)

Description

Abstract : The Flora Information System (FIS) is a digital spatial database containing information about the distribution of vascular plants and bryophytes in Victoria. Site-based data contained within the FIS comprise floristic quadrat data, incidental records, herbarium specimen data, and defined area species lists. Data are combined to constitute a 10 minute grid database, which includes some data not present as site records.
Search Word(s) : FLORA Floristics, FLORA Records, FLORA Nonvascular
Attributes:

Header file:

record number
location (latitude/longitude)
date
collector
number of species
ten minute grid
vegetation type
altitude

Main data file:

record number
species code
cover/abundance code

Species file:

species code
species botanical name
common name
family name
origin (native/exotic)
Victorian status
National status
authority

Geographic Extent Name(s) : Victoria

Data Currency

Beginning Date : Herbarium records from mid-1800s; Quadrat records from 1973; Definable area lists from early
Ending Date : Current

Dataset Status

Progress : In Progress
Maintenance and Update Frequency : Continuous

Format

Stored Dataset Format(s): dBase TM files
Available Format Type(s) : dBase TM files

Data Quality

Lineage : Incidental site data are sourced primarily from NRE staff, Melbourne Herbarium records, biological consultants, researchers/students and amateurs. Quadrat data are sourced primarily from NRE staff, biological consultants and researchers/students. Defined area species lists are sourced from NRE staff, biological consultants, researchers/students amateurs and the literature. Data are entered manually from hard copy records or automatically from compatible digital databases. Incoming data are validated. Data are curated to maintain taxonomic currency.
Positional Accuracy : Variable, depending on the age of the record (e.g. Herbarium records from 1800s compared with GPS-based positioning for new quadrat records) and accuracy of the recorder - range between 100 kilometres and 100 matres.
Attribute Accuracy : Herbarium specimen records - very high - professional determination by taxonomic botanist - specimen allows for verification and redetermination. Floristic quadrat records - high - all species present determined to at least species level - data mainly collected by trained botanists with plant identification skills. Incidental records and defined area species lists - variable - depends on skill and accuracy of recorder. Note that all data are validated for attribute and positional accuracy using automated routine.
Logical Consistency : A variety of data collection methods have been used over time to collect the data in the FIS.
Completeness : The FIS is not complete for Victoria. Data has been accumulated opportunistically. Distribution and type of records depend on the source.

Forest Growth Stage and Crown Cover Projection

Dataset
Title : : Forest growth stage and crown cover projection
Short Title : VIC:E_Gipp:Forest_Growth_Stage
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description
Abstract : Aerial photograph interpretation was used to identify the crown cover projection and relative proportion of growth stages in the upper stratum in each distinct stand (polygon) of forest. Complete air photo coverage of the study area (approximately 700 photos) was available from a combination of air photo projects from 1987, 1990 and 1992 and includes both colour and black and white photos. All photos were at a scale of 1:40 000.

The growth stage categories used were based on Jacobs (1955) description but were modified according to the detail evident from 1:40 000 scale air photos. Growth stages were classified as either senescing, mature, regrowth and regeneration.

Most stands of forest contained more than one growth stage in the upper stratum, therefore the relative proportion of each growth stage was estimated using categories to assign crown cover projection densities for each growth stage. Crown cover densities included: dominant; codominant; subdominant; sparse or absent.
Search Word(s) : FLORA Structure, FORESTS Natural
Attributes List:

CROWN-COVER - Crown cover proportions for each growth stage within each mapped stand of forest.
SENES-PROP - The proportion of senescent forest growth stage to total crown cover.
MATURE-PROP - The proportion of mature forest growth stage to total crown cover.
REGROWTH-PROP - The proportion of regrowth forest growth stage to total crown cover
SIGNIFICANCE - Disturbance type identified during aerial photograph interpretation (API)
SPECIES-DESC - Non-eucalypt vegetation types identified
API-STAFF - API mapper
PHOTO-PROJ - Year, type and aerial photography project
GS-CLASS - Growth stage code (does not include crown cover)
GS-LABEL - Growth stage map code used on photographs
GS - Full forest growth stage code (includes crown cover)

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency
Begin date : 1987
End date: 1992

Dataset Status
Progress : Complete
Maintenance and update Frequency : As required

Format
Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality
Lineage : Growth stages were interpreted in all forest areas from aerial photos onto clear overlays according to 32 growth stage classes and ordered by dominance of oldest growth stages. The minimum polygon size was approximately 10 hectares, however, the average polygon size was approximately 80 hectares. This information was field checked then

transferred to 1:100 000 base and digitised.
Scale : 1:100 000
Positional Accuracy : Approximately 200 metres
Attribute Accuracy : Field checking was conducted throughout the survey to assess the accuracy of growth stage identification and crown cover mapping. Prior to the mapping of crown cover, the air photo interpreters established ground trials to calibrate measurements from the photographs. A series of diagrams were also used as an aid to maintain uniform assessments of crown density throughout the study. The crown cover mapping was further checked on selected stands through the application of the field-based crown cover estimation technique of McDonald *et al.* (1990) and Walker *et al.* (1988), described in Appendix B of Woodgate *et al.* (1994). Results of the field calibration trails were not documented. Sampling was generally carried out along short transects and restricted to areas accessible by road or track.

The use of API is partly a subjective process, however ongoing field calibration was carried out to check for consistency to ground truth interpretation and between interpreters. There was a total of four photo interpreters with approximately 20% of project time spent on field checking. Approximately 80% of the interpretation was conducted from 1990-92 colour photographs.

Approximately 700 aerial photographs at a scale of 1:40 000 were interpreted to produce a map of the current growth stages and crown cover projection of all forested areas, public and private, within the study area. The total number of distinct growth stage polygons in the study area was in excess of 11 000, representing 977 802 hectares of forested vegetation. The total number of unique combinations of polygons by growth stage and crown cover projection was 218 or 68 if the crown cover projection classes were disregarded. These were further reduced to 32 classes for the final analysis by aggregating those growth stages which were only a few hectares in size.

Logical Consistency : A consistent approach to growth staging was applied for the whole study area. The key rule is that for any given polygon only one dominant growth stage can be identified. Where two or more growth forms are in equal proportion, co-dominant growth stages can be identified.
Completeness : Complete.

Grazing Leases 1991

Dataset

Title : Grazing leases 1991
Short Title : VIC:E_Gipp:Grazing_Leases_1991
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Polygons delineate areas larger than 2 hectares currently (1991) leased for grazing purposes as recorded in DNRE Land Information Management System (reference system for management of crown land parcels) database. The type of grazing permitted with each lease is idntified.
Search Word(s) : FORESTS Disturbance History, AGRICULTURE Grazing
Attributes List :

OCCUP-SITENO - DNRE file relating to current grazing lease
OCCUP-TYPE - Category of lease (3 = seasonal bush grazing, 4 = agistment permit, 5 = grazing, 6 = alpine grazing)

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1991
Ending Date : 1991

Dataset Status

Progress : Complete
Maintenance and update Frequency : Not planned

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage : Primary data transferred from parish plans and DNRE regional files to 1:100 000 base and digitised.
Scale : 1:100 000
Positional Accuracy : 200 metres
Attribute Accuracy : 100% accuracy for areas leased for grazing. These areas do not necessarily reflect actual grazing pressure.
Logical Consistency : n/a
Completeness : Complete.

Gridded Grazing History Information

Dataset

Title : Gridded grazing history information
Short Title : VIC:E_Gipp:Grazing_Hist_Grid
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Polygons delineate areas that have been issued with grazing leases between 1880 and 1990. A 2 km x 2 km grid was used to record the presence/absence of grazing leases from historic records. The type of lease and date range is indicated.
Search Word(s) : FORESTS Disturbance History, AGRICULTURE Grazing
Attributes List :

LABEL - Unique ID number linking Dbase file
START_DATE - Earliest date that lease held
FIN_DATE - Latest date that lease held
LANDS_DEPT - Indicator of whether a Lands Department lease
FOR_COMM-NOA - Forest Commission file No. A
FOR_COMM-NOB - Forest Commission file No. B

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1880
Ending Date : 1990

Dataset Status

Progress : Complete
Maintenance and update Frequency : As required

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage : Historical records transferred to 1:100 000 base on which 2km x 2km cells were identified and given a unique code. Lease attributes were entered into a Database file and linked to a polygon grid coverage. If a lease covers >50% of a grid cell, the cell was marked with attributes of that lease. Only leases of >400 hectares were recorded.
Scale : 1:100 000
Positional Accuracy : 2 kilometres
Attribute Accuracy : 100% accuracy for areas leased for grazing. These areas do not necessarily reflect actual grazing pressure.
Logical Consistency : n/a
Completeness : Complete.

Gridded Information of Recorded Fuel Reduction Burns Since the 1960's Dataset

Title : : Gridded information of recorded fuel reduction burns (FRBs) since the 1960s
Short Title : VIC:E_Gipp:Fuel_Reduction_Burn
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Delineates recorded Fuel Reduction Burns since the 1969/70 fire season on the basis of a 2 km x 2 km grid. The dataset identifies the year of the last FRB and the frequency of FRBs since the 1969/70 fire season, based on district records and paper maps kept by NRE. Records usually in map form but not always displayed on a standard map base.
Search Word(s) : FORESTS Disturbance History; HAZARDS Fire
Attributes List:FRB-FRQ- Number of FRBs since 1969/70
LAST-FRB - Date of last FRB
Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1969
Ending Date : 1992

Dataset Status

Progress : Complete
Maintenance and update Frequency : Unknown

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage : Regional FRB records were transferred from a 1:100 000 base on which 2km x 2km cells were identified, attributed and digitised. A positive record is given if the area of FRB covered >50% of the area of a grid cell.
Scale : 1:100 000
Positional Accuracy : 2 kilometres
Attribute Accuracy : Unknown
Logical Consistency : Intensity of burning within mapped perimeter unknown.
Completeness : Complete.

Historic Places Section Database

Dataset

Title : Historic Places Section database
Short Title : VIC:Historical_Places_DB
Jurisdiction : Victoria
Custodian : Historic Places Section, Department of Natural Resources and Environment

Description

Abstract : The database was created by the Historic Places Branch in 1982 to record information about historic places on Victorian public land. It covers all Victorian RFA regions. The data structure has recently been re-designed to conform with more rigorous data standards. The database now uses Sybase software to create linkages to GIS. The database holds information on approximately 5 000 historic places. Fields in the database include grid reference, location, land status, description, history, significance, and heritage status.
Search Word(s) : HERITAGE Historical, HERITAGE Architectural, HUMAN ENVIRONMENT Land Use, , HUMAN ENVIRONMENT Structure and Facilities, , HUMAN ENVIRONMENT Utilities, Land Ownership
Attribute List :

HPS No. - Site number PLACE NAME NRE AREA - As per NRE's list PARK MANAGEMENT AREA - As per NRE's list FOREST MANAGEMENT AREAAs per NRE's list LOCATION MUNICIPALITY - Local Government Area LAND STATUS - Current management status eg National Park LCC RECOMMENDATION - Land Conservation Council recommendations on use and status of public land GIS SITE TYPE - Point, linear, polygon MAP NAME - Mapsheet name MAP NUMBER - Mapsheet number EASTING - Grid reference number (6 characters) NORTHING - Grid reference number (7 characters) DESCRIPTION - Description of essential elements of place GROUP - As per AHC's codes CATEGORY - As per AHC's codes THEME - As per AHC's principle Australian historic themes DATE - Date of construction/establishment; period of use HISTORY - Description of the history of the place SIGNIFICANCE Level and statement of significance AHC - Registered by AHC HERITAGE VICTORIARegistered by Heritage Victoria NATIONAL TRUSTClassified by National Trust PLANNING - List on local planning scheme LIMS PARCEL No.Land Information Management System FURTHER INFORMATIONe.g. bibliography, interested community groups INFORMATION SOURCEe.g. field inspection heritage study

Geographic Extent Name(s) : Victoria

Data Currency

Beginning Date : 1803
Ending Date : Current

Dataset Status

Progress : In progress
Maintenance and Update Frequency : As required

Format

Stored Data Format(s) : DIGITAL - point
Available Format Type(s) : DIGITAL - ASCII

Data Quality

Lineage : The database was created in 1982 from information supplied to the Section from Victorian National Parks Service rangers. Thereafter, source data was derived from field survey undertaken by the Historic Places Section. The Section keeps the site recording forms from

which the data is entered into the database. Source data is also derived from field survey undertaken by consultants.
Scale : 1:100 000
Positional Accuracy : Grid references from 1:100 000 AUSLIG Topographic maps.
Attribute Accuracy : Attributes in database determined by expert staff in the Department's Historic Places Section. During 1996, many of the attributes determined by National Parks Service rangers in 1982 (when database was created) were reviewed. Many records were deleted, if irrelevant. Many of the attributes were corrected, if inaccurate.
Logical Consistency : Each record is internally consistent with respect to locational and descriptive information
Completeness : The re-design of the database in 1995-96 provided an opportunity to delete some fields that were not documented when the database was created in 1982 (and so, contained data that could not be de-coded). Some new fields were incorporated in the new database design, notably Historic Theme, Category (or Site Type), Heritage Status, History, Information Source. For these new fields, the data is not complete. That is, no attribute has been recorded for these fields.

Known Existing and Historic Mine Site Locations

Dataset

Title : Known existing and historic mine site locations
Short Title : VIC:E_Gipp:Mine_Sites
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Points delineate mine sites identified in work commissioned by the Land Conservation Council and undertaken by Butler and Associates (1985). Information is derived from a database held by Historic Places Section of DNRE. Locations of mines are referenced to the nearest 1 kilometre AMG grid cell.
Search Word(s) : FORESTS Disturbance History, MINERALS Mine Sites
Attributes List :

- X-XOORD - Eastings in AMG coords
- Y-COORD - Northings in AMG coords
- MINE-NAME - Name of mine or workings
- DATE - Date of mine
- CIRCA - Period of mine operation
- MINE-TYPES - Type of mine or workings
- DATE-REACTIVATED - Date of reactivation of mine

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1850
Ending Date : 1994

Dataset Status

Progress : Complete
Maintenance and update Frequency : Not planned

Format

Stored Data Format(s) : Digital - Point
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage: Site co-ordinates in minesite database used to create a point coverage in ARC/INFO.
Scale : 1:100 000
Positional Accuracy : 1 kilometre
Attribute Accuracy : Variable due to historical nature of some of the data and type of mining.
Logical Consistency : n/a
Completeness : Complete.

Landsystems of Victoria 1:250 000

Dataset

Title : Landsystems of Victoria 1:250 000
Short Title : VIC:Landsystems_1:250_000
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment

Description

Abstract : The Land Systems of Victoria, as described and delineated by Rowan in 1989, provide a statewide coverage of land types that are applicable to a wide range of land resources management and planning programs. This dataset consolidates a broad range of land resource information drawn from an uneven base to provide a consistent, if limited, coverage of the lands of Victoria. The explicit links with the original sources of data have been retained. The dataset was developed from a range of studies of varying methodologies and intensities over some forty years. The reliability of information varies across regions accordingly.
Search Word(s) : ECOLOGY Landscape, GEOSCIENCES Geomorphology
Attribute List:

FEATURE : Data classified into salt marsh, urban area, water body or landsystem (linked to lsys250.fea)
GMU : 29 geomorphic units (linked to lsys250.gmu)
LANDFORM :13 landform classes (linked to lsys250.lan)
LITHOLOGY : 9 lithology classes (linked to lsys250.lit)
CLIMATE : 10 climate classes (linked to lsys250.cli)
SUBSCRIPT : Distinguishes landsystems with similar landform, lithology and climate but different soils and vegetation
LANDSYSTEM: A combination of geomorphology, landform, lithology and climate and subscript
VERSION : Tracks edit history

Redefined Attributes:
UNIT : Major geomorphic unit (linked to lsys250.gmu)
LF1: LANDFORM1/ LI1:LITHOLOGY1
LF2: LANDFORM2/ LI2: LITHOLOGY2
LF3: LANDFORM3/ LI3: LITHOLOGY3
LF4: LANDFORM4/ LI4: LITHOLOGY4
(LI1 through LI4 and LF1 through LF4 represent the highest to lowest proportional coverage for Lithology and Landform.)

Look up Tables used in CRA:
lsys250.lit
0: Not applicable / Unknown or uncertain
1: Coarsely-textured unconsolidated deposits
2: Finely-textured unconsolidated deposits
3: Granites and gneisses
4: Limestone
5: Sedimentary rocks
6: Volcanic rocks
7: Saline finely-textured deposits
lsys250.lan
0: Unknown or not applicable
1: Coastal Dune, East-west Dune, Irregular Dune, Lunette, Weakly Elongated Dune, Gypseous Dune, Stranded Beach Ridge (usually trending NNW-SSE)
2: Present Floodplain

3: Gentle to Moderate Hill
4: Plain above Flood Level
5: Steep Mountain and Hill

Geographic Extent Name(s) : Victoria

Data Currency

Beginning Date: c. 1950 Ending Date: March 1994

Dataset Status

Progress : Complete
Maintenance and Update Frequency : Not Planned

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital - ARC/INFO

Data Quality

Lineage : This land system dataset was constructed by Jim Rowan, based on a geomorphic framework established by Jeff Jenkin, and using more detailed land resource information derived from some twenty eight other studies by a range of investigators. Rowan supplemented this information with information based on his own experiences over much of Victoria over a period of forty years. Les Russell, Keith Reynard and Lyn Mathews have been responsible for capturing this data set using a geographical information system (GIS).
Scale : 1:250 000
Positional Accuracy : The maps and land system descriptions are drawn from an uneven database of some 28 individual studies of the land and additional unpublished data, with varying levels of detail and reliability.
Attribute Accuracy : The land systems are represented as polygons that do not account for the considerable variation in each land system - each land system is treated as a single entity, when it is actually a complex of land types with a range of variation.
Logical Consistency : The Land Systems approach is appropriate for some purposes, but is not suitable for all uses and should be used with care. Contact the custodian for advice and assistance.
Completeness : The dataset is spatially complete for Victoria and classified uniformly across the State using information sourced from approximately 28 studies and other unpublished data.

Logging History from Landsat TM and MSS Transparencies Dataset

Title : Logging history from Landsat TM and MSS transparencies
Short Title : VIC:E_Gipp:Log_History_TM_MSS
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Logging coupes were identified from Landsat TM (bands 3,4,5) 1987 and 1990 images and Landsat MSS (bands 1,3,4) 1972, 1978, 1980, 1984 and 1986 images. A high confidence rating was given to highly disturbed areas such as logging coupes and agricultural clearance from the 1980 to 1990 images. A medium confidence rating was given to coupes identified from lower quality images from 1972 and 1978. Less distinct forest disturbances were given a low confidence rating. These disturbances probably resulted from fire or low intensity logging and in some cases represented occurrences of less dense forest on exposed aspects.

This layer was used to confirm and provide accurate spatial representation of regional DNRE logging records and to fill in gaps where regional records could not be located. Only high confidence rating polygons were used in the old growth analysis.
Search Word(s) : FORESTS Disturbance History
Attributes List:

- IMAGE_YEAR
- IMAGE_DAY_MONTH
- CONFIDENCE - low, medium and high
- INT_KEY - Original ranking of attributes

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1972
Ending Date : 1992

Dataset Status

Progress : Complete
Maintenance and update Frequency : As required

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage : Landsat TM imagery (bands 3, 4 and 5) in transparency from at scale 1:1 000 000 (March 1990) and 1:250 000 (April 1992) was interpreted at scale of 1:100 000 using a Kartoflex (photogrammetric map revision instrument) to map the clearfelling coupe boundaries from the late 1980s to the present. Landsat MSS transparencies (bands 1, 3 and 4) at scale 1:1 000 000 from August 1972 to February 1987 (with scenes from August and December 1972, February 1978, October and November 1980, March 1984, January and July 1986, and January and February 1987) were also interpreted on the Kartoflex in order to map clear felling boundaries at a scale of 1:100 000 back to the early 1970s.
Scale : 1:100 000

Positional Accuracy : 200 metres for 1992 data and 500 metres for 1972 - 1990.
Attribute Accuracy : Some of the early satellite images suffered from severe line striping and contrast deficiencies which significantly impaired the quality of mapping. Despite these deficiencies the mapping was comparable with local regional records that had been compiled over the years by interpretation of both small and large format aerial photos and associated field mapping.
Only polygons rated as high confidence polygons used in the Old Growth Analysis
Logical Consistency : n/a
Completeness : Complete.

Logging Utilisation Records By Decade from the 1960's to the 1980's Dataset

Title : Logging utilisation records by decade from the 1960's to the 1980's
Short Title : VIC:E_Gipp:Logging_Hist_100K
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Logging history by decade redrafted from 1:25 000 regional DNRE block maps. Some spatial generalisation was made when redrafting to 1:100 000 base. The block maps used covered the period from the late 1960's to the late 1980's although very little early 1960's data was available.
Search Word(s) : FORESTS Disturbance History
Attributes List:

DECADE - i.e. 1960, 1970 or 1980
LOG-KEY -Numerical key recorded from the decade

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : Post 1965
Ending Date : 1990

Dataset Status

Progress : Complete
Maintenance and update Frequency : Not planned

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage : Individual coupe boundaries transferred from 1:25 000 regional DNRE block maps to 1:100 000 base and digitised.
Scale : 1:100 000
Positional Accuracy : 200 metres
Attribute Accuracy : Source data of varying reliability (1:25 000) however at 1:100 000 the accuracy is improved.
Logical Consistency : n/a
Completeness : Complete.

National Wilderness Inventory Database/East Gippsland Dataset

Title : National Wilderness Inventory (NWI) Database: East Gippsland
Short Title : VIC:EGipp_Nat_Wilderness_Inven
Jurisdiction : Australia
Custodian : Australian Heritage Commission (AHC)

Description

Abstract : The East Gippsland National Wilderness Inventory (NWI) database was updated in conjunction with the Australian Heritage Commission's regional assessment work. The data is a subset of the national NWI database and shares the same methodologies and standards.

NWI survey work is implemented by measuring variation in wilderness quality across the landscape using four wilderness quality 'indicators' that represent the two essential attributes of wilderness: remoteness and naturalness. These are derived from the definition of wilderness quality as the extent to which a location is remote from and undisturbed by the influence of modern technological society.

Indicators are: Remoteness from Settlement, Remoteness from Access, Apparent Naturalness, Biophysical Naturalness. The wilderness database is constructed by establishing a lattice of sampling points across all areas selected for inclusion in the survey. A range of measurements are calculated for each sampling point which are then processed to produce values for each of the four wilderness quality indicators. These indicators are, in turn, processed to produce a total wilderness quality index. The wilderness database consists of all measurements used to derive wilderness indicator values, the wilderness indicator values themselves, and a final wilderness quality index.

Search Word(s) : FLORA Landcover, FORESTS Disturbance history, HERITAGE Wilderness, HUMAN ENVIRONMENT Land Use Survey
Attribute List : See NWI Handbook for complete discussion of attributes. The lattice coverage (GIS) which is used to generate grids contains following attributes:

Remoteness from Access for 4 classes (ACC1-4) of roads and tracks, range 0-30 000m
Remoteness from Settlement for 4 classes (SET1-4), range 0-30 000m
Apparent Naturalness for 3 classes (AES1-3) of infrastructure, range 0-30 000m.
Biophysical naturalness based on disturbance.
Wilderness Quality Value, derived from weighted values of four indicators (Access, Aesthetic, Settlement, Biophysical)

Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1978
Ending Date : 1994

Dataset Status

Progress : Complete
Maintenance and Update Frequency : As Required

Format

Stored Data Format(s) : DIGITAL - Point
Available Format Type(s) : NONDIGITAL - Plotted maps; DIGITAL - ARC/INFO

Data Quality

Lineage : The results of this work replace the original work that was undertaken in 1986. The survey was done as part of the Australian Heritage Commission's Regional Assessment work which used updated information and better methodologies. Refer to: National Wilderness Inventory Handbook, Second Edition, 1995. Australian Heritage Commission. This reference gives a complete detailed account of the methodology used for the national database.
Cell Size : 500 metres
Positional Accuracy : Data compiled from 1:100 000 scale or better mapping.
Attribute Accuracy : Attributes are classified according to feature codes as described in the National Wilderness Inventory Handbook, Second Edition, 1995. Verification of feature codes done at summary level (ie grades of impact) using expert knowledge and results of interim analyses.
Logical Consistency : Topological checks undertaken by ARC/INFO, all source data checked prior to analysis, some allowance given to dangles in line data, otherwise consistency ensured. NWI database point data consistency ensured through ARC/INFO.
Completeness : Database covers all natural land cover areas only, and all records contain standard NWI attributes.

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Regional Wildfire Records
Dataset

Title : : Regional Wildfire Records
Short Title : VIC:E_Gipp:Wildfire_Recs_100K
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment (DNRE)

Description

Abstract : Polygons delineating major wildfire boundaries derived from records for the period 1953 to 1991 held in regional DNRE offices on 1:100 000 base maps. Historical records were used for wildfires from 1939 to 1952. Areas are indicative only and do not show precise distribution and intensity of fires.
Search Word(s) : FORESTS Disturbance History, HAZARDS Fire
Attributes List:WILDFIRE - presence/absence
SEASON X-Y - presence absence of fire in a given fire season (eg 1972/73)
Geographic Extent Name(s) : East Gippsland, Victoria

Data Currency

Beginning Date : 1939
Ending Date : 1991

Dataset Status

Progress : Complete
Maintenance and update Frequency : As required

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital ARC/INFO

Data Quality

Lineage : Primary data transferred from historical and regional records to 1:100 000 base and digitised
Scale : 1:100 000
Positional Accuracy : 200 metres for contemporary records but variable for historical records.
Attribute Accuracy : The external perimeter of fires is accurate however the severity of fire damage within boundaries is not known.
Logical Consistency : n/a
Completeness : Complete.

Register of the National Estate Boundaries Dataset

Title : Register of the National Estate Boundaries
Short Title : AUS:Reg_Nat_Estate_Boundaries
Jurisdiction : Australia
Custodian : Australian Heritage Commission (AHC)

Description

Abstract: The Register is the only heritage list which covers the entire country and which seeks to include all aspects of Australia's culture, history and natural environment, including Aboriginal and Torres Strait Islander places. Compiled by the Australian Heritage Commission, the Register includes national estate places 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.'

A national estate place can be a site, area or region, a building or other structure. Places proposed for entry in the Register are assessed against detailed technical criteria outlining national estate values. Assessments are made solely on the basis of national estate value. The eight national estate criteria include significant evolutionary, historic, rarity, representative, research, aesthetic, technical, creative or social values. Full details on criteria are available from the Commission, together with a Background Note on the subject.

Search Word(s) : HERITAGE Aboriginal, HERITAGE Architectural, HERITAGE Historical, HERITAGE National Estate Register, HERITAGE Natural
Attribute List :

RNE file number - Includes numeric code for state and local government areas
Site Name
Class - Natural, Aboriginal, Cultural, Unassigned

Geographic Extent Name(s) : Australia plus external territories and Barrier Reef.

Data Currency

Beginning Date : Not known
Ending Date : December 1995

Dataset Status

Progress : Complete
Maintenance and Update Frequency : As Required

Format

Stored Data Format(s) : DIGITAL - Polygon; DIGITAL - Point; DIGITAL - Line
Available Format Type(s) : DIGITAL - ARC/INFO

Data Quality

Lineage :

1. AHC evaluated nominated sites against Heritage values. Sites meeting criteria placed on RNE.
2. Sites and polygons digitised by AUSLIG, using maps and descriptions provided by AHC. ARC/INFO coverages created.

3. Each of the state coverages (e.g. types 320, 321, 321cir etc.) was MAPJOINed to adjacent state coverages to form the relevant AUS coverages (e.g. aus320, aus321 aus321cir etc).
4. Attributes added and separate state coverages joined into national coverages.

Scale : 1:250 000

Positional Accuracy : Varies. Sites and polygons digitised from 1:100 000 to 1:250 000 (e.g. large arid regions) scale maps. Sites less 200 m2 in size digitised as points. Sites listed for Aboriginal or endangered biota are often generalised to nearest half degree.

Attribute Accuracy : Approximately 2% of sites have wrong RNE id or name. These are flagged [as CLASS=Unassigned] where known.

Logical Consistency : The RNEDB identifier as used by AUSLIG is not unique to the range of values as held by the AHC. This would affect approximately 2% of the data. This affects the attribute data and not its spatial integrity.

Completeness : Urban sites not included (approx 30% of all RNE sites) in spatial dataset.

Register of the National Estate Database
Dataset

Title : Register of the National Estate Database
Short Title : AUS:Reg_Nat_Estate_Database
Jurisdiction : Australia
Custodian : Australian Heritage Commission (AHC)

Description

Abstract : A record for each place nominated for entry in the Register of the National Estate. Records contain information about the location, significance, status in the registration process, relevant dates, etc.
Search Word(s) : HERITAGE Aboriginal, HERITAGE Architectural, HERITAGE Historical, HERITAGE National Estate Register, HERITAGE Natural, HERITAGE - Wilderness, HUMAN ENVIRONMENT - Indigenous communities, HUMAN ENVIRONMENT - Land use, HUMAN ENVIRONMENT - Recreation, HUMAN ENVIRONMENT - Structures and Facilities, HUMAN ENVIRONMENT - Tourism, HUMAN ENVIRONMENT - Utilities, HUMAN ENVIRONMENT - Urban Design, LAND - Ownership
Attribute List :

Name - Place Name
File Number
Other names
Database Number
Area - Hectares Net area
Class - Highest level of thematic classification i.e. Aboriginal, Historic, or Natural. Places are assigned to one or more Classes
Group - As per AHC's Group codes. The Group Level is the second level in the hierarchical classification, below Class and above Category
Category - As per AHC's Group codes. The Group Level is the second level in the hierarchical classification, below Class and above Category
Theme - As per AHC's Principal Australian Historic Themes. Theme is used to denote the historical processes and the pattern of human activity.
Legal Status - The status a Place may have under the AHC Act and relevant legal opinions - Indicative Place, Interim List, Registered, Rejected, Removed.
Administrative status - The administrative status of a Place, clarifying the Legal Status. For example a number of Places may be on the Interim List (its Legal Status) but may variously:

- be open to objection within the objection period
- have objections pending
- have no objections at end of objection period
- be awaiting gazettal of AHC decision to register.

Next step status - Represents a basic level of project management of a Place when administrative processes are initiated by nomination, assessment, decision or advice.
Nomination date
Interim list date - List of places that the Commission has gazetted as Places proposed for entry in the Register.
Register date - The date a notice of registration has been published. Registration follows interim listing and consideration of any objections.
Construction date - Date of construction/establishment; period of use.
Address - No, street, town, State. Post code
Nearest town - Distance and direction from
Conurbation
Local Government Areas
Map sheets
Latitude/Longitude information
Related places - Another place that has some relationship to the place, eg a place within a

place
Bibliography
Condition - The current state of repair or management of a property.
Integrity - The state of authenticity of a Place.
Location/boundary description - The boundary of the registered area which may be a single point (say, for a hitching rail or a hearth site) or an extensive area. Boundary information is held in text form in the RNEDB, in map form in the map collection and usually with one or maps on the hard copy file.
Property information - Tenure information
Nominator's statement of significance
Description - The description of a Place refers to the essentially factual description of its physical fabric, its processes (historic themes or natural processes), its association with historical figures and associated events or dates. Descriptive material may include text, photographs, plans, maps and all thematic references (whether purely descriptive or significant).
Official statement of significance - Significance is the reason or the basis for considering a Place to be part of the National Estate. Significance may be established by assessing the potentially significant items against the Criteria within their regional and thematic context and making a judgment against threshold. Information about Significance consists largely contextual analysis and interpretation and assessment of relative value and may include text (Statement of Significance), Values Tables and mapped value assessments.
Owner information

Geographic Extent Name(s) : Australia, continental shelf, territorial sea, External Territories

Data Currency

Beginning Date : 1606
Ending Date : Current

Dataset Status

Progress : In progress
Maintenance and Update Frequency : Continuous

Format

Stored Data Format(s) : DIGITAL - Text file
Available Format Type(s) : NONDIGITAL - Printouts

Data Quality

Lineage : Commenced 1977, using data supplied by nominators, and stored on CSIRO Cyber72. Continually upgraded with new records and new data for existing records. Transferred to PICK system 1984. Transferred to current UNIX system 1995.
Scale : 1:250 000
Positional Accuracy : Variable. Locations taken from various scale maps from 1:25 000 to 1:250 000.
Attribute Accuracy : Not documented.
Logical Consistency : Each record is internally consistent with respect to locational and descriptive information.
Completeness : All Registered places included. Data on new places continuously added.

Structural Vegetation 1:100 000 Dataset

Title : Structural Vegetation 1:100 000
Short Title : VIC:Structural_Vegetation
Jurisdiction : Victoria
Custodian : Department of Natural Resources & Environment, Natural Resources Systems Branch

Description

Abstract : This layer represents structural vegetation mapping of forest in North Central and Eastern Victoria, based on the Land Conservation Council (LCC) vegetation classification scheme. The layer is independent of land tenure and is a combination of existing data from multiple sources (predominantly LCC) and primary mapping based on satellite image interpretation.
Search Word(s) : FLORA Structure
Attribute List:

HEIGHT - Potential height of species (SVEG100_HEIGHT.LUT)
SPP - Dominant overstorey species (SVEG100_SPP.LUT)
SPP2 - Subdominant overstorey species (SVEG100_SPP.LUT)
VEGFORM - Vegetation structural form (LCC classification) (SVEG100_VEGFORM.LUT)
DENSITY -Crown Cover Projection (SVEG100_DENSITY.LUT)
SOURCE - Source of polygons and attributes (SVEG100_SOURCE.LUT). 39 sources listed
VERSION - Higher version number is most recent update (SVEG100_VERSION.LUT) (4 versions)

Look up Tables:
SVEG100_SPP.LUT
SPP - Standard Vic Vascular Plants species code
SPECIES_NAME - Scientific name of species
COMMON_NAME - Common name

SVEG100_SOURCE.LUT
SOURCE - New source codes developed for SVEG100
DESCRIPTION - Description of feature

SVEG100_HEIGHT.LUT
HEIGHT - Height code developed for NFI project (7 classes)
DESCRIPTION - Description of feature

SVEG100_DENSITY.LUT
DENSITY - From McDonald et al (1990) Aust Soil & Land Survey. Field Handbook. (5 classes)
DESCRIPTION - Description of density ranges

SVEG100_VEGFORM.LUT
VEGFORM - Standard LCC VEGFORM codes used by NFI project
FOREST.TYPE - Standard SVEG100 forest types (14 classes)
HEIGHT - Height (metres)

Geographic Extent Name(s) : North, Central and Eastern Victoria

Data Currency

Beginning Date : Early 1970's
Ending Date : 1980's

Dataset Status

Progress : In Progress
Maintenance and Update Frequency : Irregular

Format

Stored Data Format(s) : Digital - Polygon
Available Format Type(s) : Digital - ARC/INFO

Data Quality

Lineage : The data has been captured and collated from a number of sources as follows:

- Existing Digital Data: LCCVEG100; PLANTN100; FEBOX25; River Murray Riparian Vegetation Data; TREE100_9093
- Existing Hard copy/Map Data: Forest Commission Victoria Repromats; Published LCC Study Area Maps
- Primary Data for New Mapping: 1993 Landsat TM Imagery; Aerial Photography

The dataset was derived using a number of attribute conversions and manual transfer of line work from the existing data sources. It also involved the on-screen digitising of new data based on satellite image interpretation; namely the mapping of freehold forest.

- "SVEG100 Explanatory Notes" details how existing datasets and new data (including capture methods) were used to create SVEG100.

Scale : 1:100 000
Positional Accuracy : 100 - 500 metres (for existing data sources) up to 1 kilometre (for mapping on freehold land). Based on drafting and digitising error for existing data sources and field verification for mapping on freehold land.
Attribute Accuracy : None of the existing data sources used had any statement of attribute accuracy. As the mapping on freehold land was largely an extension of this data, it is not possible to make a statement of accuracy without a formal assessment being undertaken.
Logical Consistency : The line work from the existing data sources used varies in detail due to the different mapping scales of the data. Attributes are consistent across whole dataset and their logical associations have been verified.
Completeness : The area north and east of Melbourne has been completed with work in the north west beginning in February 1995.

Victorian Freshwater Fish and Estuarine Fish

Dataset

Title : Victorian Freshwater and Estuarine Fish
Short Title : VIC:Freshwater_Fish
Jurisdiction : Victoria
Custodian : Department of Natural Resources and Environment

Description

Abstract : The Victorian Fish Dataset contains records of freshwater and estuarine fish and aquatic decapod crustacea recorded since European settlement. The dataset is continuously updated with both survey data, stocking data and incidental records. Records have come from the literature, the Museum of Victoria, NRE surveys, universities, and other amateur groups, individuals and professional organisations.
Search Word(s) : FAUNA Records, FAUNA Invertebrates, FAUNA Vertebrates, FISHERIES Freshwater, FISHERIES Fish
Attribute List :

WAT - Name of water body (e.g. Deddick River)
LOC1 - Brief location of water body (e.g. tributary of Snowy River)
LOC2 - Detailed site location description (e.g. 100m upstream of Bonang Highway Bridge)
MAP - Australian Map Grid Reference
AMG1 - 6 digit reference for single site, or beginning reach
AMG2 - 6 digit reference for end of survey reach
ALT - Altitude (metres)
DATE - Date of Observation
METHOD - Observation technique (e.g. Electrofishing)
SPC - Species name
COUNT - Number observed
OBS - Observer or literature reference

Geographic Extent Name(s) : Victoria

Data Currency

Beginning Date : 1770
Ending Date : Current

Dataset Status

Progress : In Progress
Maintenance and Update Frequency : Daily

Format

Stored Data Format(s) : DIGITAL - Text files
Available Format Type(s) : DIGITAL - ASCII; DIGITAL - Word processer, NONDIGITAL - Printouts

Data Quality

Lineage : Records have been and continue to be collated from a wide range of sources since 1992. Museum records provided the earliest form of data, but have been and are added to from NRE surveys and research projects from 1970 to the present, the scientific literature, Victorian Fisheries stocking data, universities and interested groups and individuals as they

become available. Although currently only available in Text File format, it is intended in 1996/97 to transfer data to a digital database format.
Positional Accuracy : Positional accuracy is an attribute of the individual records and data source, and varies accordingly. No breakdown is available. The lowest resolution is from early records (museum and literature) which often provided scant positional information. The majority of recent information collected after 1970 has a resolution of 1 minute or better with observers using 1:100,000 maps to provide grid references likely to be accurate to + or - 100 metres.
Attribute Accuracy : The attribute accuracy is generally high. Museum specimens have been re-examined where possible to verify identifications. Data supplied by sources external to NRE are examined by experts and further details sought for questionable records. The majority of data is from NRE sources so most is of consistently high quality.
Logical Consistency : Not Relevant
Completeness : While the overall geographic coverage is comprehensive, local coverage is not exhaustive. Several areas of the State (at the subcatchment level) have no or few records.

Victorian Rare or Threatened Plant Database
Dataset

Title : Victorian Rare or Threatened Plant Database
Short Title : VIC:Rare-Threatened_Plants
Jurisdiction : Victoria
Custodian : Secretary, Department of Natural Resources and Environment (Effective custodian: Manager, Flora and Fauna Branch)

Description

Abstract : The Victorian Database and Interactive Report is a digital reference database containing information about rare or threatened vascular plant taxa in Victoria. Summarised locality information is derived from the Flora Information System including site-based data from floristic quadrats, incidental records and herbarium specimen data, as well as the combined 10 minute grid database.

For individual taxa life form, life history, key habitats, RFA Regions, linear geographic range in Victoria, minimum and maximum altitude, Endangered Species Protection Act 1992 (ESP Act) status, Flora and Fauna Guarantee Act 1988 (FFG Act) status, and select bibliographies are indicated.

Search Word(s) : FLORA, ECOLOGY Habitat
Attribute List :

Species names file - Species code, species botanical name, species common name, family name, authority, Victorian status, National status, security status (for sensitive species)
Species taxonomic group files - Family number, family name, division name, taxonomic group code
Species range file- Species code, number of (quadrat) site records, linear geographic range, minimum/maximum altitude
Species status files -Species code, FFG status code, FFG status text, ESP status
Species habitat file - Species code, habitat code
Species threat file - Species code, disturbance code, notes
Species actions file - Species code, action code, notes
Species ecological data codes file - Species code, life form, sexual reproduction, asexual reproduction, palatability, disturbance, fire regeneration, habitat breadth, regeneration frequency, current Victorian distribution, past Victorian distribution, Australian distribution, protection status, reservation status, collection status
Species bibliography reference file - Reference number, species number, threat/action code
Life form file - Life form code, life form name, life form description, lumped life form code, 6 group life form code
Ecological data file - Ecological data codes, ecological data descriptions
Ten minute grid data files - Ten minute grid (quadrat) number, ten minute grid label, species code, RFA Region code, RFA Region name
Habitat data file - Habitat code, habitat name, habitat description
Bibliography file - Reference number, abstract, author, article author, title, article, year, month, volume, pages, publisher, place of publication, edition, series, organisation, reliability
Community (EVC) data file - Community (EVC) code, community (EVC) number, habitat code, FFG status text, ESP status, notes
Community (EVC) threat file - Community (EVC) code, disturbance code, threat potential, existence of threat, notes
Community (EVC) actions file - Community (EVC) code, action code, notes
Community RFA file - Community (EVC) code, RFA Region code
Community (EVC) bibliography reference file - Reference number, community (EVC) code, threat/action code

Geographic Extent Name(s) : Victoria

Data Currency

Beginning Date : Herbarium records from mid-1800s; Quadrat records from 1973; Species attributes since 1995
Ending Date : Current

Dataset Status

Progress : In Progress
Maintenance and Update Frequency : As Required

Format

Stored Data Format(s) : Microsoft Access (Version 2
Available Format Type(s) : Microsoft Access (Version 2

Data Quality

Lineage : Taxonomic nomenclature, Victorian status and distribution data are derived directly from the Flora Information System. National status derived from updated electronic ROTAP list (Briggs and Leigh 1995) supplied by the ANCA Endangered Species Unit. FFG status maintained manually. ESP Act status maintained manually from hard copy record. Habitat categories defined by Flora Section and assigned to species by expert botanical consultant. Life form and life history categories defined by Flora Section in consultation with expert botanical consultant. Categories assigned to species by expert botanical consultant. RFA Region species list derived from ten minute grid data with manual refinement of records. Key threat and key action categories derived directly from NRE Victorian Rare or Threatened Plant Population Monitoring database (VrotPop). Key threats and key actions derived from published and unpublished information, principally in Action Statements or FFG nominations.
Positional Accuracy : Variable, depending on the age of the record (e.g. Herbarium records from 1800's compared with GPS-based positioning for new quadrat records) and accuracy of the recorder. Geographic range accurate to +/- 10 kilometres.
Attribute Accuracy : Distribution records - as for Flora Information System. Attributes covering life form, life history and habitat categories are assigned by expert opinion of botanists with knowledge of species distribution and ecology. Key threats and key actions for species described in Action Statements and/or FFG Act nominations. Information is opinion that has been formulated in consultation with NRE flora staff and other botanical experts, and accepted as valid by the FFG Scientific Advisory Committee.
Logical Consistency : Not applicable
Completeness : Data for East Gippsland is more complete than other parts of the State, but information gaps still occur.

Appendix C: East Gippsland Stratification and Flora Survey Intensity

Stratum Number	Stratum Location	Elevation	Annual Precip-itation	Lithology	Landform	Area (ha)	No. of Sites	Site Density (ha/site)
72	Bemm-Brodibb Coast / Far East Coast / Far East Foothills / Cann Foothills / Orbost-Buchan Foothills / Snowy River Valley	<300m	800 - 1200mm	Finely-textured unconsolidated deposits	Plain above flood level	175485	1141	153.8
49	Orbost-Buchan Foothills /Brodribb Foothills / Bemm-Brodibb Coast / Cann Foothills / Far East Foothills / Snowy River Valley / Lake Tyers-Corringle Coast / Far East Coast	<300m	800 - 1200mm	Sedimentary rocks	Steep mountain / hill	162126	1026	158.0
44	Cann Foothills / Brodribb Foothills / Far East Foothills / Snowy River Valley / Orbost-Buchan Foothills / Upper Buchan Mountains	300 - 600m	800 - 1200mm	Sedimentary rocks	Steep mountain / hill	101387	1123	90.3
43	Far East Foothills / Cann Foothills / Far East Coast / Orbost-	<300m	800 - 1200mm	Granites and gneisses	Steep mountain / hill	89490	439	203.9

	Buchan Foothills / Brodribb Foothills / Snowy River Valley							
39	Far East Foothills	300 - 600m	800 - 1200mm	Granites and gneisses	Steep mountain / hill	62430	317	196.9
83	Lake Tyers-Corringle Coast / Orbost-Buchan Foothills / Bemm-Brodibb Coast	<300m	800 - 1200mm	Finely-textured unconsolidated deposits	Gentle to moderate hill	53075	96	552.9
26	Snowy River Valley / Snowy Deddick Rain Shadow area / Errinundra Tablelands / Brodribb Foothills / Cann Foothills	600 - 900m	800 - 1200mm	Sedimentary rocks - granites and gneisses; limestone	Gentle to moderate hill	43702	276	158.3
18	Snowy Deddick Rain Shadow area / Upper Buchan Mountains / Snowy River Valley	300 - 600m	<800mm	Granites and gneisses	Steep mountain / hill	40076	31	1292.8
12	Upper Buchan Mountains / Snowy River Valley / Snowy Deddick Rain Shadow area	600 - 900m	<800mm	Granites and gneisses	Steep mountain / hill	38120	32	1191.3
88	Lake Tyers-Corringle Coast / Orbost-Buchan Foothills	<300m	<800mm	Finely-textured unconsolidated deposits	Gentle to moderate hill	35067	59	594.4
14	Snowy River Valley / Errinundra Tablelands / Cann	600 - 900m	800 - 1200mm	Sedimentary rocks	Steep mountain / hill	31229	316	98.8

	Foothills / Brodribb Foothills / Snowy Deddick Rain Shadow area / Upper Buchan Mountains							
86	Bemm-Brodibb Coast / Far East Coast / Lake Tyers-Corringle Coast	<300m	800 - 1200mm	Coarse-textured unconsolidated deposits	Dune / beach ridge	29845	163	183.1
68	Bemm-Brodibb Coast / Lake Tyers-Corringle Coast / Far East Coast / Far East Foothills / Brodribb Foothills / Cann Foothills	<300m	800 - 1200mm	Finely-textured unconsolidated deposits	Present floodplain	26362	61	432.2
8	Upper Buchan Mountains / Snowy Deddick Rain Shadow area / Snowy River Valley / Errinundra Tablelands	900 - 1200m	800 - 1200mm	Granites and gneisses	Steep mountain / hill	26317	18	1462.1
63	Snowy River Valley / Upper Buchan Mountains / Orbost-Buchan Foothills	<300m	800 - 1200mm	Volcanic rocks	Steep mountain / hill	24608	51	482.5
61	Upper Buchan Mountains / Snowy River Valley / Orbost-Buchan Foothills	300 - 600m	800 - 1200mm	Volcanic rocks	Steep mountain / hill	24445	34	719.0
16	Snowy Deddick Rain	600 - 900m	<800mm	Sedimentary rocks	Steep mountain	20100	5	4019.9

	Shadow area / Upper Buchan Mountains				/ hill			
9	Snowy River Valley / Snowy Deddick Rain Shadow area / Upper Buchan Mountains / Brodribb F H / Cann Foothills	600 - 900m	800 - 1200mm	Granites and gneisses	Steep mountain / hill	18682	83	225.1
3	Upper Buchan Mountains / Snowy Deddick Rain Shadow area / Snowy River Valley / Errinundra Tablelands	900 - 1200m	800 - 1200mm	Sedimentary rocks	Steep mountain / hill	17001	14	1214.4
41	Brodribb Foothills / Errinundra Tablelands / Snowy River Valley / Snowy Deddick Rain Shadow area	900 - 1200m	>1200mm	Sedimentary rocks - granites and gneisses; limestone	Gentle to moderate hill	14958	175	85.5
27	Errinundra Tablelands / Snowy Deddick Rain Shadow area / Snowy River Valley	900 - 1200m	800 - 1200mm	Sedimentary rocks - granites and gneisses; limestone	Gentle to moderate hill	12619	25	504.8
4	Upper Buchan Mountains	>1200m	>1200mm	Granites and gneisses	Steep mountain / hill	10981	34	323.0
21	Snowy Deddick Rain Shadow area / Upper Buchan Mountains	300 - 600m	<800mm	Sedimentary rocks	Steep mountain / hill	10415	1	10415.2
25	Errinundra Tablelands / Snowy Deddick Rain Shadow area	600 - 900m	<800mm	Sedimentary rocks - granites and gneisses; limestone	Gentle to moderate hill	9155	3	3051.6
33	Snowy River	600 -	800 -	Sedimentary	Steep	8749	32	273.4

	Valley / Errinundra Tablelands	900m	1200mm	rocks - granites and gneisses; limestone	mountain / hill			
51	Far East Foothills / Brodribb Foothills / Errinundra Tablelands / Cann Foothills	600 - 900m	>1200mm	Granites and gneisses	Steep mountain / hill	8105	78	103.9
5	Upper Buchan Mountains / Snowy Deddick Rain Shadow area	900 - 1200m	800 - 1200mm	Granites and gneisses	Gentle to moderate hill	7044	3	2348.0
74	Orbost-Buchan Foothills	<300m	800 - 1200mm	Sedimentary rocks	Gentle to moderate hill	6768	2	3384.2
1	Upper Buchan Mountains / Snowy Deddick Rain Shadow area	>1200m	>1200mm	Sedimentary rocks	Steep mountain / hill	6603	8	825.4
20	Snowy Deddick Rain Shadow area	<300m	<800mm	Granites and gneisses	Steep mountain / hill	6451	3	2150.4
6	Errinundra Tablelands / Brodribb Foothills /Upper Buchan Mountains / Errinundra Tablelands	900 - 1200m	>1200mm	Granites and gneisses	Steep mountain / hill	5687	103	55.2
7	Upper Buchan Mountains	>1200m	>1200mm	Granites and gneisses	Gentle to moderate hill	5265	12	438.7
31	Snowy River Valley / Snowy Deddick Rain Shadow area / Upper Buchan Mountains	600 - 900m	<800mm	Volcanic rocks	Gentle to moderate hill	5029	2	2514.6
69	Snowy River Valley / Orbost-Buchan Foothills	<300m	800 - 1200mm	Limestone	Gentle to moderate hill	4911	4	1227.8

57	Brodribb Foothills / Cann Foothills / Far East Foothills / Errinundra Tablelands	600 - 900m	>1200mm	Sedimentary rocks	Steep mountain / hill	4820	109	44.2
55	Snowy River Valley / Upper Buchan Mountains / Orbost-Buchan Foothills	600 - 900m	800 - 1200mm	Volcanic rocks	Steep mountain / hill	4694	6	782.3
34	Snowy River Valley / Errinundra Tablelands	900 - 1200m	800 - 1200mm	Sedimentary rocks - granites and gneisses; limestone	Steep mountain / hill	4533	18	251.8
89	Orbost-Buchan Foothills	<300m	<800mm	Sedimentary rocks	Gentle to moderate hill	3889	1	3889.1
23	Snowy Deddick Rain Shadow area / Orbost-Buchan Foothills	<300m	<800mm	Sedimentary rocks	Steep mountain / hill	3218	2	1609.1
79	Snowy River Valley / Orbost-Buchan Foothills	300 - 600m	>1200mm	Sedimentary rocks	Steep mountain / hill	2968	40	74.2
71	Brodribb Foothills / Cann Foothills / Far East Foothills /	<300m	800 - 1200mm	Limestone	Steep mountain / hill	2948	4	736.9
60	Upper Buchan Mountains / Snowy River Valley	300 - 600m	<800mm	Volcanic rocks	Steep mountain / hill	2674	1	2674.3
70	Orbost-Buchan Foothills / Snowy River Valley / Upper Buchan Mountains	300 - 600m	800 - 1200mm	Sedimentary rocks	Gentle to moderate hill	2379	1	2378.6
53	Snowy River Valley /	600 - 900m	800 - 1200mm	Sedimentary rocks	Gentle to moderate	2301	3	767.0

	Upper Buchan Mountains / Orbost-Buchan Foothills				hill			
56	Upper Buchan Mountains / Snowy River Valley	600 - 900m	<800mm	Volcanic rocks	Steep mountain / hill	2259	2	1129.6
50	Cann Foothills / Errinundra Tablelands / Brodribb Foothills	600 - 900m	>1200mm	Sedimentary rocks - granites and gneisses; limestone	Gentle to moderate hill	2232	38	58.7
2	Errinundra Tablelands / Cann Foothills / Upper Buchan Mountains	900 - 1200m	>1200mm	Sedimentary rocks	Steep mountain / hill	1996	17	117.4
22	Snowy Deddick Rain Shadow area / Snowy River Valley / Upper Buchan Mountains	900 - 1200m	<800mm	Granites and gneisses	Steep mountain / hill	1973	1	1972.8
40	Snowy River Valley / Snowy Deddick Rain Shadow area / Cann Foothills / Brodribb Foothills	300 - 600m	800 - 1200mm	Sedimentary rocks - granites and gneisses; limestone	Gentle to moderate hill	1426	12	118.9
48	Snowy River Valley / Upper Buchan Mountains	600 - 900m	800 - 1200mm	Volcanic rocks	Gentle to moderate hill	1417	0	-
45	Snowy River Valley	300 - 600m	800 - 1200mm	Sedimentary rocks - granites and gneisses; limestone	Steep mountain / hill	1339	1	1338.7
54	Upper Buchan Mountains	600 - 900m	<800mm	Sedimentary rocks	Gentle to moderate hill	1329	2	664.4
47	Upper Buchan	900 - 1200m	800 - 1200mm	Volcanic rocks	Gentle to moderate	1312	0	-

	Mountains				hill			
29	Upper Buchan Mountains	900 - 1200m	800 - 1200mm	Sedimentary rocks	Gentle to moderate hill	1242	2	620.8
58	Upper Buchan Mountains / Orbost-Buchan Foothills / Snowy River Valley	300 - 600m	800 - 1200mm	Volcanic rocks	Gentle to moderate hill	1239	0	-
76	Orbost-Buchan Foothills / Snowy River Valley	<300m	800 - 1200mm	Granites and gneisses	Gentle to moderate hill	1193	1	1193.0
37	Snowy River Valley / Errinundra Tablelands	900 - 1200m	>1200mm	Sedimentary rocks - granites and gneisses; limestone	Steep mountain / hill	1188	18	66.0
92	Lake Tyers-Corringle Coast / Orbost-Buchan Foothills	<300m	<800mm	Finely-textured unconsolidated deposits	Present floodplain	1057	1	1056.7
66	Upper Buchan Mountains / Snowy River Valley / Orbost-Buchan Foothills	300 - 600m	800 - 1200mm	Limestone	Gentle to moderate hill	869	2	434.5
15	Upper Buchan Mountains / Snowy Deddick Rain Shadow area	600 - 900m	<800mm	Granites and gneisses	Gentle to moderate hill	867	0	-
87	Brodribb Foothills	<300m	>1200mm	Sedimentary rocks	Steep mountain / hill	856	3	285.3
73	Cann Foothills \ Far East Foothills	300 - 600m	>1200mm	Granites and gneisses	Steep mountain / hill	822	4	205.4
95	Lake Tyers-Corringle Coast	<300m	<800mm	Coarse-textured unconsolidated deposits	Dune / beach ridge	686	9	76.2
75	Snowy River Valley	300 - 600m	800 - 1200mm	Granites and gneisses	Gentle to moderate	619	0	-

					hill			
90	Orbost-Buchan Foothills / Lake Tyers-Corringle Coast	<300m	<800mm	Granites and gneisses	Gentle to moderate hill	608	0	-
42	Upper Buchan Mountains / Snowy River Valley / Snowy Deddick Rain Shadow area	300 - 600m	<800mm	Volcanic rocks	Gentle to moderate hill	496	0	-
10	Snowy Deddick Rain Shadow area / Upper Buchan Mountains / Snowy River Valley	>1200m	800 - 1200mm	Granites and gneisses	Steep mountain / hill	489	0	-
93	Orbost-Buchan Foothills / Lake Tyers CC	<300m	<800mm	Volcanic rocks	Steep mountain / hill	467	3	155.6
67	Upper Buchan Mountains	300 - 600m	<800mm	Sedimentary rocks	Gentle to moderate hill	416	1	416.2
84	Cann Foothills / Far East Foothills / Far East Coast	300 - 600m	800 - 1200mm	Finely-textured unconsolidated deposits	Plain above flood level	397	5	79.4
36	Snowy Deddick Rain Shadow area	300 - 600m	<800mm	Sedimentary rocks - granites and gneisses; limestone	Gentle to moderate hill	275	0	-
19	Snowy Deddick Rain Shadow area / Upper Buchan Mountains / Snowy River Valley	900 - 1200m	<800mm	Sedimentary rocks	Steep mountain / hill	267	0	-
32	Snowy Deddick Rain Shadow area	900 - 1200m	<800mm	Volcanic rocks	Gentle to moderate hill	249	0	-
13	Upper Buchan	>1200m	800 - 1200mm	Granites and gneisses	Gentle to moderate	213	0	-

	Mountains				hill			
24	Snowy Deddick Rain Shadow area / Upper Buchan Mountains	>1200m	800 - 1200mm	Sedimentary rocks	Steep mountain / hill	213	0	-
62	Cann Foothills / Brodribb Foothills	300 - 600m	800 - 1200mm	Finely-textured unconsolidated deposits	Present floodplain	213	0	-
11	Upper Buchan Mountains / Snowy Deddick Rain Shadow area	600 - 900m	800 - 1200mm	Granites and gneisses	Gentle to moderate hill	196	0	-
17	Upper Buchan Mountains	900 - 1200m	>1200mm	Granites and gneisses	Gentle to moderate hill	195	0	-
64	Upper Buchan Mountains	300 - 600m	<800mm	Finely-textured unconsolidated deposits	Present floodplain	195	0	-
65	Upper Buchan Mountains	300 - 600m	<800mm	Limestone	Gentle to moderate hill	186	0	-
35	Errinundra Tablelands	600 - 900m	<800mm	Sedimentary rocks - granites and gneisses; limestone	Steep mountain / hill	169	0	-
91	Orbost-Buchan Foothills	<300m	<800mm	Finely-textured unconsolidated deposits	Plain above flood level	167	0	-
85	Orbost-Buchan Foothills	<300m	800 - 1200mm	Volcanic rocks	Gentle to moderate hill	159	0	-

Appendix D: Fauna Survey Analysis

East Gippsland Stratification - Arboreal Mammal Survey Site Analysis

Stratum	Area (Ha)	Sites	Ha / Site	Percent Total Area	Percent Total Sites
71	2 948	45	65.5	0.24	2.58
87	856	8	107	0.07	0.46
51	8 105	54	150.1	0.67	3.1
57	4 820	28	172.1	0.4	1.61
50	2 232	11	203	0.18	0.63
2	1 996	9	221.7	0.17	0.52
6	5 687	20	284.3	0.47	1.15
41	14 958	49	305.3	1.24	2.81
49	162 126	521	311.2	13.42	29.93
95	686	2	342.9	0.06	0.11
44	101 387	240	422.4	8.39	13.79
43	89 490	198	452	7.41	11.37
37	1 188	2	594	0.1	0.11
39	62 430	101	618.1	5.17	5.8
27	12 619	17	742.3	1.04	0.98
34	4 533	6	755.4	0.38	0.34
9	18 682	24	778.4	1.55	1.38
26	43 702	55	794.6	3.62	3.16
83	53 075	61	870.1	4.39	3.5
72	175 485	174	1 008.5	14.52	9.99
14	31 229	29	1 076.9	2.58	1.67
68	26 362	20	1 318.1	2.18	1.15
88	35 067	24	1 461.1	2.9	1.38
86	29 845	18	1 658.0	2.47	1.03
7	5 265	3	1 754.9	0.44	0.17
33	8 749	4	2 187.3	0.72	0.23
63	24 608	8	3 076.0	2.04	0.46
20	6 451	2	3 225.6	0.53	0.11
3	17 001	5	3 400.3	1.41	0.29
18	40 076	2	20 038.1	3.32	0.11
16	20 100	1	20 099.5	1.66	0.06
1	6 603	0	-	0.55	0
4	10 981	0	-	0.91	0
5	7 044	0	-	0.58	0
8	26 317	0	-	2.18	0
10	489	0	-	0.04	0
11	196	0	-	0.02	0
12	38 120	0	-	3.16	0
13	213	0	-	0.02	0
15	867	0	-	0.07	0
17	195	0	-	0.02	0
19	267	0	-	0.02	0
21	10 415	0	-	0.86	0

22	1 973	0	-	0.16	0
23	3 218	0	-	0.27	0
24	213	0	-	0.02	0
25	9 155	0	-	0.76	0
29	1 242	0	-	0.1	0
31	5 029	0	-	0.42	0
32	249	0	-f	0.02	0
35	169	0	-	0.01	0
36	275	0	-	0.02	0
40	1 426	0	-	0.12	0
42	496	0	-	0.04	0
45	1 339	0	-	0.11	0
47	1 312	0	-	0.11	0
48	1 417	0	-	0.12	0
53	2 301	0	-	0.19	0
54	1 329	0	-	0.11	0
55	4 694	0	-	0.39	0
56	2 259	0	-	0.19	0
58	1 239	0	-	0.1	0
60	2 674	0	-	0.22	0
61	24 445	0	-	2.02	0
62	213	0	-	0.02	0
64	195	0	-	0.02	0
65	186	0	-	0.02	0
66	869	0	-	0.07	0
67	416	0	-	0.03	0
69	4 911	0	-	0.41	0
70	2 379	0	-	0.2	0
73	822	0	-	0.07	0
74	6 768	0	-	0.56	0
75	619	0	-	0.05	0
76	1 193	0	-	0.1	0
79	2 968	0	-	0.25	0
84	397	0	-	0.03	0
85	159	0	-	0.01	0
89	3 889	0	-	0.32	0
90	608	0	-	0.05	0
91	167	0	-	0.01	0
92	1 057	0	-	0.09	0
93	467	0	-	0.04	0
Total	1 208 200	1 741	Av. 694.0		

East Gippsland Stratification - Large Mammal Survey Site Analysis

Stratum	Area (Ha)	Sites	Ha / Site	Percent Total Area	Percent Total Sites

95	686	2	342.9	0.06	0.64
43	89 490	98	913.2	7.41	31.21
68	26 362	23	1 146.2	2.18	7.32
86	29 845	14	2 131.8	2.47	4.46
49	162 126	72	2 251.7	13.42	22.93
72	175 485	68	2 580.7	14.52	21.66
7	5 265	2	2 632.3	0.44	0.64
83	53 075	18	2 948.6	4.39	5.73
88	35 067	9	3 896.3	2.90	2.87
51	8 105	2	4 052.5	0.67	0.64
9	18 682	2	9 341.1	1.55	0.64
4	10 981	1	10 980.8	0.91	0.32
27	12 619	1	12 619.4	1.04	0.32
44	101 387	2	50 693.3	8.39	0.64
1	6 603	0	-	0.55	0
2	1 996	0	-	0.17	0
3	17 001	0	-	1.41	0
5	7 044	0	-	0.58	0
6	5 687	0	-	0.47	0
8	26 317	0	-	2.18	0
10	489	0	-	0.04	0
11	196	0	-	0.02	0
12	38 120	0	-	3.16	0
13	213	0	-	0.02	0
14	31 229	0	-	2.58	0
15	867	0	-	0.07	0
16	20 100	0	-	1.66	0
17	195	0	-	0.02	0
18	40 076	0	-	3.32	0
19	267	0	-	0.02	0
20	6 451	0	-	0.53	0
21	10 415	0	-	0.86	0
22	1 973	0	-	0.16	0
23	3 218	0	-	0.27	0
24	213	0	-	0.02	0
25	9 155	0	-	0.76	0
26	43 702	0	-	3.62	0
29	1 242	0	-	0.10	0
31	5 029	0	-	0.42	0
32	249	0	-	0.02	0
33	8 749	0	-	0.72	0
34	4 533	0	-	0.38	0
35	169	0	-	0.01	0
36	275	0	-	0.02	0
37	1 188	0	-	0.10	0
39	62 430	0	-	5.17	0
40	1 426	0	-	0.12	0
41	14 958	0	-	1.24	0
42	496	0	-	0.04	0
45	1 339	0	-	0.11	0
47	1 312	0	-	0.11	0

48	1 417	0	-	0.12	0
50	2 232	0	-	0.18	0
53	2 301	0	-	0.19	0
54	1 329	0	-	0.11	0
55	4 694	0	-	0.39	0
56	2 259	0	-	0.19	0
57	4 820	0	-	0.40	0
58	1 239	0	-	0.10	0
60	2 674	0	-	0.22	0
61	24 445	0	-	2.02	0
62	213	0	-	0.02	0
63	24608	0	-	2.04	0
64	195	0	-	0.02	0
65	186	0	-	0.02	0
66	869	0	-	0.07	0
67	416	0	-	0.03	0
69	4 911	0	-	0.41	0
70	2 379	0	-	0.20	0
71	2 948	0	-	0.24	0
73	822	0	-	0.07	0
74	6 768	0	-	0.56	0
75	619	0	-	0.05	0
76	1 193	0	-	0.10	0
79	2 968	0	-	0.25	0
84	397	0	-	0.03	0
85	159	0	-	0.01	0
87	856	0	-	0.07	0
89	3 889	0	-	0.32	0
90	608	0	-	0.05	0
91	167	0	-	0.01	0
92	1 057	0	-	0.09	0
93	467	0	-	0.04	0
Total	1 208 200	314	Av. 3 847.8		

East Gippsland Stratification - Small Ground-dwelling Mammal Survey Site Analysis

Stratum	Area (Ha)	Sites	Ha / Site	Percent Total Area	Percent Total Sites
95	686	10	68.6	0.06	0.34
50	2 232	27	82.7	0.18	0.92
51	8 105	71	114.2	0.67	2.43
37	1 188	9	132.0	0.10	0.31
41	14 958	109	137.2	1.24	3.73
57	4 820	29	166.2	0.40	0.99
2	1 996	12	166.3	0.17	0.41
43	89 490	442	202.5	7.41	15.13
6	5 687	28	203.1	0.47	0.96
34	4 533	22	206.0	0.38	0.75
62	213	1	212.5	0.02	0.03

71	2 948	13	226.7	0.24	0.44
44	101 387	321	315.8	8.39	10.99
14	31 229	98	318.7	2.58	3.35
86	29 845	93	320.9	2.47	3.18
49	162 126	500	324.3	13.42	17.11
26	43 702	134	326.1	3.62	4.59
72	175 485	496	353.8	14.52	16.97
39	62 430	173	360.9	5.17	5.92
27	12 619	33	382.4	1.04	1.13
68	26 362	65	405.6	2.18	2.22
87	856	2	428.0	0.07	0.07
9	18 682	43	434.5	1.55	1.47
33	8 749	15	583.3	0.72	0.51
83	53 075	88	603.1	4.39	3.01
88	35 067	28	1 252.4	2.90	0.96
20	6 451	5	1 290.2	0.53	0.17
45	1 339	1	1 338.7	0.11	0.03
40	1 426	1	1 426.4	0.12	0.03
3	17 001	10	1 700.1	1.41	0.34
7	5 265	3	1 754.9	0.44	0.10
16	20 100	10	2 010.0	1.66	0.34
53	2 301	1	2 301.1	0.19	0.03
31	5 029	2	2 514.6	0.42	0.07
21	10 415	3	3 471.7	0.86	0.10
61	24 445	5	4 889.1	2.02	0.17
4	10 981	2	5 490.4	0.91	0.07
63	24 608	4	6 152.0	2.04	0.14
18	40 076	6	6 679.4	3.32	0.21
5	7 044	1	7 044.1	0.58	0.03
25	9 155	1	9 154.8	0.76	0.03
12	38 120	3	12 706.7	3.16	0.10
8	26 317	2	13 158.7	2.18	0.07
1	6 603	0	-	0.55	0
10	489	0	-	0.04	0
11	196	0	-	0.02	0
13	213	0	-	0.02	0
15	867	0	-	0.07	0
17	195	0	-	0.02	0
19	267	0	-	0.02	0
22	1 973	0	-	0.16	0
23	3 218	0	-	0.27	0
24	213	0	-	0.02	0
29	1 242	0	-	0.10	0
32	249	0	-	0.02	0
35	169	0	-	0.01	0
36	275	0	-	0.02	0
42	496	0	-	0.04	0
47	1 312	0	-	0.11	0
48	1 417	0	-	0.12	0
54	1 329	0	-	0.11	0
55	4 694	0	-	0.39	0

56	2 259	0	-	0.19	0
58	1 239	0	-	0.10	0
60	2 674	0	-	0.22	0
64	195	0	-	0.02	0
65	186	0	-	0.02	0
66	869	0	-	0.07	0
67	416	0	-	0.03	0
69	4 911	0	-	0.41	0
70	2 379	0	-	0.20	0
73	822	0	-	0.07	0
74	6 768	0	-	0.56	0
75	619	0	-	0.05	0
76	1 193	0	-	0.10	0
79	2 968	0	-	0.25	0
84	397	0	-	0.03	0
85	159	0	-	0.01	0
89	3 889	0	-	0.32	0
90	608	0	-	0.05	0
91	167	0	-	0.01	0
92	1 057	0	-	0.09	0
93	467	0	-	0.04	0
Total	1 208 200	2 922	Av. 413.5		

East Gippsland Environmental Stratification - Bat Survey Site Analysis

Stratum	Area (Ha)	Sites	Ha / Site	Percent Total Area	Percent Total Sites
95	686	4	171.5	0.06	0.64
37	1 188	6	198.0	0.10	0.96
62	213	1	212.5	0.02	0.16
2	1 996	9	221.7	0.17	1.45
6	5 687	18	315.9	0.47	2.89
41	14 958	42	356.1	1.24	6.75
51	8 105	22	368.4	0.67	3.54
50	2 232	5	446.5	0.18	0.80
57	4 820	6	803.4	0.40	0.96
73	822	1	821.6	0.07	0.16
43	89 490	79	1 132.8	7.41	12.70
34	4 533	4	1 133.1	0.38	0.64
14	31 229	24	1 301.2	2.58	3.86
44	101 387	75	1 351.8	8.39	12.06
26	43 702	31	1 409.7	3.62	4.98
27	12 619	8	1 577.4	1.04	1.29
39	62 430	39	1 600.8	5.17	6.27
33	8 749	5	1 749.8	0.72	0.80
9	18 682	10	1 868.2	1.55	1.61
83	53 075	27	1 965.7	4.39	4.34
72	175 485	83	2 114.3	14.52	13.34
49	162 126	73	2 220.9	13.42	11.74
86	29 845	12	2 487.1	2.47	1.93

7	5 265	2	2 632.3	0.44	0.32
68	26 362	10	2 636.2	2.18	1.61
88	35 067	12	2 922.2	2.90	1.93
61	24 445	5	4 889.1	2.02	0.80
21	10 415	2	5 207.6	0.86	0.32
3	17 001	3	5 667.2	1.41	0.48
20	6 451	1	6 451.1	0.53	0.16
16	20 100	2	10 049.8	1.66	0.32
63	24 608	1	24 608.2	2.04	0.16
1	6 603	0	-	0.55	0
4	10 981	0	-	0.91	0
5	7 044	0	-	0.58	0
8	26 317	0	-	2.18	0
10	489	0	-	0.04	0
11	196	0	-	0.02	0
12	38 120	0	-	3.16	0
13	213	0	-	0.02	0
15	867	0	-	0.07	0
17	195	0	-	0.02	0
18	40 076	0	-	3.32	0
19	267	0	-	0.02	0
22	1 973	0	-	0.16	0
23	3 218	0	-	0.27	0
24	213	0	-	0.02	0
25	9 155	0	-	0.76	0
29	1 242	0	-	0.10	0
31	5 029	0	-	0.42	0
32	249	0	-	0.02	0
35	169	0	-	0.01	0
36	275	0	-	0.02	0
40	1 426	0	-	0.12	0
42	496	0	-	0.04	0
45	1 339	0	-	0.11	0
47	1 312	0	-	0.11	0
48	1 417	0	-	0.12	0
53	2 301	0	-	0.19	0
54	1 329	0	-	0.11	0
55	4 694	0	-	0.39	0
56	2 259	0	-	0.19	0
58	1 239	0	-	0.10	0
60	2 674	0	-	0.22	0
64	195	0	-	0.02	0
65	186	0	-	0.02	0
66	869	0	-	0.07	0
67	416	0	-	0.03	0
69	4 911	0	-	0.41	0
70	2 379	0	-	0.20	0
71	2 948	0	-	0.24	0
74	6 768	0	-	0.56	0
75	619	0	-	0.05	0
76	1 193	0	-	0.10	0

79	2 968	0	-	0.25	0
84	397	0	-	0.03	0
85	159	0	-	0.01	0
87	856	0	-	0.07	0
89	3 889	0	-	0.32	0
90	608	0	-	0.05	0
91	167	0	-	0.01	0
92	1 057	0	-	0.09	0
93	467	0	-	0.04	0
Total	1 208 200	622	Av. 1 942.4		

East Gippsland Stratification - Diurnal Bird Survey Site Analysis

Stratum	Area (Ha)	Sites	Ha / Site	Percent Total Area	Percent Total Sites
15	867	19	45.7	0.07	0.60
71	2 948	42	70.2	0.24	1.32
57	4 820	51	94.5	0.40	1.60
50	2 232	19	117.5	0.18	0.60
41	14 958	108	138.5	1.24	3.38
87	856	6	142.7	0.07	0.19
6	5 687	37	153.7	0.47	1.16
39	62 430	363	172.0	5.17	11.37
49	162 126	938	172.8	13.42	29.39
95	686	3	228.6	0.06	0.09
51	8 105	34	238.4	0.67	1.07
44	101 387	411	246.7	8.39	12.88
43	89 490	316	283.2	7.41	9.90
3	17 001	48	354.2	1.41	1.50
37	1 188	3	396.0	0.10	0.09
26	43 702	108	404.6	3.62	3.38
86	29 845	65	459.1	2.47	2.04
14	31 229	61	511.9	2.58	1.91
72	175 485	336	522.3	14.52	10.53
9	18 682	35	533.8	1.55	1.10
27	12 619	19	664.2	1.04	0.60
20	6 451	9	716.8	0.53	0.28
68	26 362	34	775.4	2.18	1.07
73	822	1	821.6	0.07	0.03
16	20 100	18	1 116.6	1.66	0.56
21	10 415	9	1 157.2	0.86	0.28
83	53 075	38	1 396.7	4.39	1.19
18	40 076	28	1 431.3	3.32	0.88
23	3 218	2	1 609.1	0.27	0.06
2	1 996	1	1 995.5	0.17	0.03
88	35 067	16	2 191.7	2.90	0.50
34	4 533	2	2 266.3	0.38	0.06
63	24 608	9	2 734.2	2.04	0.28
33	8 749	1	8 749.0	0.72	0.03

25	9 155	1	9 154.8	0.76	0.03
61	24 445	1	24 445.4	2.02	0.03
1	6 603	0	-	0.55	0
4	10 981	0	-	0.91	0
5	7 044	0	-	0.58	0
7	5 265	0	-	0.44	0
8	26 317	0	-	2.18	0
10	489	0	-	0.04	0
11	196	0	-	0.02	0
12	38 120	0	-	3.16	0
13	213	0	-	0.02	0
17	195	0	-	0.02	0
19	267	0	-	0.02	0
22	1 973	0	-	0.16	0
24	213	0	-	0.02	0
29	1 242	0	-	0.10	0
31	5 029	0	-	0.42	0
32	249	0	-	0.02	0
35	169	0	-	0.01	0
36	275	0	-	0.02	0
40	1 426	0	-	0.12	0
42	496	0	-	0.04	0
45	1 339	0	-	0.11	0
47	1 312	0	-	0.11	0
48	1 417	0	-	0.12	0
53	2 301	0	-	0.19	0
54	1 329	0	-	0.11	0
55	4 694	0	-	0.39	0
56	2 259	0	-	0.19	0
58	1 239	0	-	0.10	0
60	2 674	0	-	0.22	0
62	213	0	-	0.02	0
64	195	0	-	0.02	0
65	186	0	-	0.02	0
66	869	0	-	0.07	0
67	416	0	-	0.03	0
69	4 911	0	-	0.41	0
70	2 379	0	-	0.20	0
74	6 768	0	-	0.56	0
75	619	0	-	0.05	0
76	1 193	0	-	0.10	0
79	2 968	0	-	0.25	0
84	397	0	-	0.03	0
85	159	0	-	0.01	0
89	3 889	0	-	0.32	0
90	608	0	-	0.05	0
91	167	0	-	0.01	0
92	1 057	0	-	0.09	0
93	467	0	-	0.04	0
Total	1 208 200	3 192	Av. 378.5		

East Gippsland Stratification - Large Forest Owl Survey Site

Stratum	Area (Ha)	Sites	Ha / Site	Percent Total Area	Percent Total Sites
71	2 948	19	155.1	0.24	2.45
87	856	4	214.0	0.07	0.52
95	686	2	342.9	0.06	0.26
57	4820	12	401.7	0.40	1.55
49	162 126	254	638.3	13.42	32.73
6	5 687	6	947.8	0.47	0.77
43	89 490	90	994.3	7.41	11.60
44	101 387	101	1 003.8	8.39	13.02
39	62 430	48	1 300.6	5.17	6.19
86	29 845	20	1 492.2	2.47	2.58
72	175 485	115	1 526.0	14.52	14.82
51	8 105	5	1 621.0	0.67	0.64
83	53 075	32	1 658.6	4.39	4.12
68	26 362	15	1 757.5	2.18	1.93
27	12 619	7	1 802.8	1.04	0.90
41	14 958	5	2 991.5	1.24	0.64
14	31 229	10	3 122.9	2.58	1.29
88	35 067	8	4 383.4	2.90	1.03
3	17 001	3	5 667.2	1.41	0.39
9	18 682	3	6 227.4	1.55	0.39
26	43 702	7	6 243.1	3.62	0.90
20	6 451	1	6 451.1	0.53	0.13
18	40 076	5	8 015.2	3.32	0.64
63	24 608	3	8 202.7	2.04	0.39
16	20 100	1	20 099.5	1.66	0.13
1	6 603	0	-	0.55	0
2	1 996	0	-	0.17	0
4	10 981	0	-	0.91	0
5	7 044	0	-	0.58	0
7	5 265	0	-	0.44	0
8	26 317	0	-	2.18	0
10	489	0	-	0.04	0
11	196	0	-	0.02	0
12	38 120	0	-	3.16	0
13	213	0	-	0.02	0
15	867	0	-	0.07	0
17	195	0	-	0.02	0
19	267	0	-	0.02	0
21	10 415	0	-	0.86	0
22	1 973	0	-	0.16	0
23	3 218	0	-	0.27	0
24	213	0	-	0.02	0
25	9 155	0	-	0.76	0
29	1 242	0	-	0.10	0
31	5 029	0	-	0.42	0
32	249	0	-	0.02	0

33	8 749	0	-	0.72	0
34	4 533	0	-	0.38	0
35	169	0	-	0.01	0
36	275	0	-	0.02	0
37	1 188	0	-	0.10	0
40	1 426	0	-	0.12	0
42	496	0	-	0.04	0
45	1 339	0	-	0.11	0
47	1 312	0	-	0.11	0
48	1 417	0	-	0.12	0
50	2 232	0	-	0.18	0
53	2 301	0	-	0.19	0
54	1 329	0	-	0.11	0
55	4 694	0	-	0.39	0
56	2 259	0	-	0.19	0
58	1 239	0	-	0.10	0
60	2 674	0	-	0.22	0
61	24 445	0	-	2.02	0
62	213	0	-	0.02	0
64	195	0	-	0.02	0
65	186	0	-	0.02	0
66	869	0	-	0.07	0
67	416	0	-	0.03	0
69	4 911	0	-	0.41	0
70	2 379	0	-	0.20	0
73	822	0	-	0.07	0
74	6 768	0	-	0.56	0
75	619	0	-	0.05	0
76	1 193	0	-	0.10	0
79	2 968	0	-	0.25	0
84	397	0	-	0.03	0
85	159	0	-	0.01	0
89	3 889	0	-	0.32	0
90	608	0	-	0.05	0
91	167	0	-	0.01	0
92	1 057	0	-	0.09	0
93	467	0	-	0.04	0
Total	1 208 200	776	Av. 1 557.0		

East Gippsland Stratification - Reptile Survey Site Analysis

Stratum	Area (Ha)	Sites	Ha / Site	Percent Total Area	Percent Total Sites
95	686	6	114.3	0.06	0.59
43	89 490	197	454.3	7.41	19.39
51	8 105	16	506.6	0.67	1.57
86	29 845	45	663.2	2.47	4.43
72	175 485	244	719.2	14.52	24.02
49	162 126	193	840.0	13.42	19.00

14	31 229	34	918.5	2.58	3.35
68	26 362	27	976.4	2.18	2.66
39	62 430	57	1 095.3	5.17	5.61
44	101 387	87	1 165.4	8.39	8.56
57	4 820	4	1 205.0	0.40	0.39
83	53 075	41	1 294.5	4.39	4.04
27	12 619	9	1 402.2	1.04	0.89
20	6 451	4	1 612.8	0.53	0.39
9	18 682	10	1 868.2	1.55	0.98
26	43 702	22	1 986.4	3.62	2.17
71	2 948	1	2 947.7	0.24	0.10
88	35 067	10	3 506.7	2.90	0.98
33	8 749	2	4 374.5	0.72	0.20
34	4 533	1	4 532.6	0.38	0.10
63	24 608	3	8 202.7	2.04	0.30
16	20 100	2	10 049.8	1.66	0.20
61	24 445	1	24 445.4	2.02	0.10
1	6 603	0	-	0.55	0
2	1 996	0	-	0.17	0
3	17 001	0	-	1.41	0
4	10 981	0	-	0.91	0
5	7 044	0	-	0.58	0
6	5 687	0	-	0.47	0
7	5 265	0	-	0.44	0
8	26 317	0	-	2.18	0
10	489	0	-	0.04	0
11	196	0	-	0.02	0
12	38 120	0	-	3.16	0
13	213	0	-	0.02	0
15	867	0	-	0.07	0
17	195	0	-	0.02	0
18	40 076	0	-	3.32	0
19	267	0	-	0.02	0
21	10 415	0	-	0.86	0
22	1 973	0	-	0.16	0
23	3 218	0	-	0.27	0
24	213	0	-	0.02	0
25	9 155	0	-	0.76	0
29	1 242	0	-	0.10	0
31	5 029	0	-	0.42	0
32	249	0	-	0.02	0
35	169	0	-	0.01	0
36	275	0	-	0.02	0
37	1 188	0	-	0.10	0
40	1 426	0	-	0.12	0
41	14 958	0	-	1.24	0
42	496	0	-	0.04	0
45	1 339	0	-	0.11	0
47	1 312	0	-	0.11	0
48	1 417	0	-	0.12	0
50	2 232	0	-	0.18	0

53	2 301	0	-	0.19	0
54	1 329	0	-	0.11	0
55	4 694	0	-	0.39	0
56	2 259	0	-	0.19	0
58	1 239	0	-	0.10	0
60	2 674	0	-	0.22	0
62	213	0	-	0.02	0
64	195	0	-	0.02	0
65	186	0	-	0.02	0
66	869	0	-	0.07	0
67	416	0	-	0.03	0
69	4 911	0	-	0.41	0
70	2 379	0	-	0.20	0
73	822	0	-	0.07	0
74	6 768	0	-	0.56	0
75	619	0	-	0.05	0
76	1 193	0	-	0.10	0
79	2 968	0	-	0.25	0
84	397	0	-	0.03	0
85	159	0	-	0.01	0
87	856	0	-	0.07	0
89	3 889	0	-	0.32	0
90	608	0	-	0.05	0
91	167	0	-	0.01	0
92	1 057	0	-	0.09	0
93	467	0	-	0.04	0
Total	1 208 200	1 016	Av. 1 189.2		

East Gippsland Environmental Stratification - Amphibian Survey Site Analysis

Stratum	Area (Ha)	Sites	Ha / Site	Percent Total Area	Percent Total Sites
95	686	7	98.0	0.06	0.62
43	89 490	229	390.8	7.41	20.27
51	8105	16	506.6	0.67	1.42
72	175 485	288	609.3	14.52	25.49
86	29 845	46	648.8	2.47	4.07
68	26 362	35	753.2	2.18	3.10
49	162 126	199	814.7	13.42	17.61
83	53 075	60	884.6	4.39	5.31
14	31 229	34	918.5	2.58	3.01
39	62 430	59	1 058.1	5.17	5.22
44	101 387	87	1 165.4	8.39	7.70
57	4 820	4	1 205.0	0.40	0.35
27	12 619	9	1 402.2	1.04	0.80
20	6 451	4	1 612.8	0.53	0.35
9	18 682	10	1 868.2	1.55	0.88
26	43 702	22	1 986.4	3.62	1.95
71	2 948	1	2 947.7	0.24	0.09

88	35 067	11	3 187.9	2.90	0.97
33	8 749	2	4 374.5	0.72	0.18
34	4 533	1	4 532.6	0.38	0.09
63	24 608	3	8 202.7	2.04	0.27
16	20 100	2	10 049.8	1.66	0.18
61	24 445	1	24 445.4	2.02	0.09
1	6 603	0	-	0.55	0
2	1 996	0	-	0.17	0
3	17 001	0	-	1.41	0
4	10 981	0	-	0.91	0
5	7 044	0	-	0.58	0
6	5 687	0	-	0.47	0
7	5 265	0	-	0.44	0
8	26 317	0	-	2.18	0
10	489	0	-	0.04	0
11	196	0	-	0.02	0
12	38 120	0	-	3.16	0
13	213	0	-	0.02	0
15	867	0	-	0.07	0
17	195	0	-	0.02	0
18	40 076	0	-	3.32	0
19	267	0	-	0.02	0
21	10 415	0	-	0.86	0
22	1 973	0	-	0.16	0
23	3 218	0	-	0.27	0
24	213	0	-	0.02	0
25	9 155	0	-	0.76	0
29	1 242	0	-	0.10	0
31	5 029	0	-	0.42	0
32	249	0	-	0.02	0
35	169	0	-	0.01	0
36	275	0	-	0.02	0
37	1 188	0	-	0.10	0
40	1 426	0	-	0.12	0
41	14 958	0	-	1.24	0
42	496	0	-	0.04	0
45	1 339	0	-	0.11	0
47	1 312	0	-	0.11	0
48	1 417	0	-	0.12	0
50	2 232	0	-	0.18	0
53	2 301	0	-	0.19	0
54	1 329	0	-	0.11	0
55	4 694	0	-	0.39	0
56	2 259	0	-	0.19	0
58	1 239	0	-	0.10	0
60	2 674	0	-	0.22	0
62	213	0	-	0.02	0
64	195	0	-	0.02	0
65	186	0	-	0.02	0
66	869	0	-	0.07	0
67	416	0	-	0.03	0

69	4 911	0	-	0.41	0
70	2 379	0	-	0.20	0
73	822	0	-	0.07	0
74	6 768	0	-	0.56	0
75	619	0	-	0.05	0
76	1 193	0	-	0.10	0
79	2 968	0	-	0.25	0
84	397	0	-	0.03	0
85	159	0	-	0.01	0
87	856	0	-	0.07	0
89	3 889	0	-	0.32	0
90	608	0	-	0.05	0
91	167	0	-	0.01	0
92	1 057	0	-	0.09	0
93	467	0	-	0.04	0

Total	1 208 200	1 130	Av. 1 069.2

Appendix E: Rare or Threatened Plants

Summary Information on East Gippsland Plants that are Nationally Endangered or Vulnerable or Listed Under the Victorian Flora and Fauna Guarantee

Key to assessment of importance of threatening processes in East Gippsland

1 Minor threat, which by itself is unlikely to lead to broad scale decline of the species.
2 Moderate threat, which is likely to lead to some decline of the species, especially if other processes are operating, or be locally important, though by itself it is unlikely to threaten the East Gippsland population of the species.
3 Major threat, which if not checked poses a significant risk to the persistence of the species in East Gippsland.

Austral Cornflower Stemmacantha australis
Austral Toad-flax Thesium australe
Bantam Bush-pea Pultenaea parrisiae ssp. parrisiae
Bent Pomaderris Pomaderris sericea
Buff Hazelwood Symplocos thwaitesii
Clover Glycine Glycine latrobeana
Clustered Kerrawang Rulingia dasyphylla
Cotoneaster Pomaderris Pomaderris cotoneaster
Dwarf Brunoniella Brunoniella pumilio
Fairy Bluebell Wahlenbergia densifolia
Hairy Anchor Plant Discaria pubescens
King Greenhood Pterostylis baptistii
Leafless Tongue-orchid Cryptostylis hunteriana
Leafy Greenhood Pterostylis cucullata
Lemon-scented Zieria Zieria sp. D
Limestone Blue Wattle Acacia caerulescens
Maiden's Wattle Acacia maidenii
Maroon Leek-orchid Prasophyllum frenchii
Mignonette Leek-orchid Prasophyllum morganii
Mountain Cress Drabastrum alpestre
Orange-blossom Orchid Sarcochilus falcatus
Prickly Tree-fern Cyathea leichhardtiana
Prostrate Cone-bush Isopogon prostratus
Rock Orchid Dendrobium speciosum var. speciosum
Rock Poa Poa saxicola
Rough Eyebright Euphrasia scabra
Slender Myoporum Myoporum floribundum
Slender Parrot-pea Almaleea capitata
Slender Tree-fern Cyathea cunninghamii
Spiral Sun-orchid Thelymitra matthewsii
Tough Psoralea Psoralea tenax
Yellow Elderberry Sambucus australasica
References

Austral Cornflower Stemmacantha australis

Family: Asteraceae

Description: Herb with a basal rosette of leaves and an erect flowering stem.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Presumed extinct
- ESP: Not listed
- FFG: Has not been nominated

Distribution: 2 records in Victoria over a 70 km range.

Habitat: Fertile lowlands.

Reproduction: Regeneration from seed. Disturbance requirements and post-fire response are unknown.

Issues and Status in East Gippsland

Presumed extinct.

Austral Toad-flax Thesium australe

Family: Santalaceae

Description: Perennial herb to 0.6m high.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Endangered
- ESP: Listed
- FFG: Is listed, with an Action Statement (Scarlett et al. 1994)

Distribution: 55 records in Victoria over a 488 km range, between 200 and 1700 metres altitude. Widespread but rare in Queensland, NSW and Victoria. In Victoria it is confined to five populations between Limestone Creek in the Alpine National Park (Cobberas - Tingaringy Unit) and Gillingal Station (private property) in East Gippsland.

Habitat: Grasslands, grassy woodlands, and subalpine grassy heathlands.

Reproduction: Regenerates from seed. Commonly regenerates well following fire but observed to regenerate following light grazing disturbance.

Issues and Status in East Gippsland

Threatening processes: Clearing of habitat is responsible for current conservation status. Major threat may now be insufficient firing to maintain suitably open habitat.

Threat	Ranking
Inappropriate fire regimes	3
Small population size	2

Reservation: Four of the five extant populations are within the Alpine National Park (Cobberas - Tingaringy Unit). The fifth and largest is on private land.

Management: An Action Statement has been prepared which includes a program of site assessment, experimental burning, monitoring, training of DNRE field staff, consultation with private landowners, cultivation and community liaison (Scarlett et al. 1994).

Bantam Bush-pea Pultenaea parrisiae ssp. parrisiae

Family: Fabaceae

Description: Low shrub <1m tall. Conservation status:

- ROTAP: Vulnerable
- VROTS: Vulnerable
- ESP: Listed
- FFG: Has not been nominated

Distribution: Re-located at two sites near the head of the Tuross River in Wadbilliga National Park in NSW, and near Buldah in north-east Gippsland in Victoria.

Habitat: Low open wet-heath and herbfields in or on the margins of eucalypt woodland.

Reproduction: Regeneration from seeds but may be limited to a few seasons. Requires disturbance (fire) to establish and spread. All (or nearly all) plants killed by fire.

Issues and Status in East Gippsland

Threatening processes need to be evaluated.

Bent Pomaderris Pomaderris sericea

Family: Rhamnaceae

Description: Shrub 1 - 4m tall.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Vulnerable
- ESP: Listed
- FFG: Is listed, but has no Action Statement

Distribution: 9 records in Victoria over a 118 km range, at 250 metres altitude. Rare in NSW and confined to a few populations in the upper Genoa River valley in Victoria.

Habitat: Poorly known.

Reproduction: Regeneration from seed. Not thought to require disturbance for regeneration. All (or nearly all) plants killed by fire.

Issues and Status in East Gippsland

Threatening processes: May be threatened by severe fire or by weed invasion (willows).

Threat	Ranking
Weed competition	3
Small population size	2
Natural disasters	2

Reservation: All known sites within Coopracambra National Park.

Management: No specific management arrangements.

Buff Hazelwood Symplocos thwaitesii

Family: Symplocaceae

Description: Small rainforest tree to 20m tall.

Conservation status:

- ROTAP:
- VROTS: Endangered
- ESP: Not listed
- FFG: Is listed, with an Action Statement (Pollack and Taylor 1996)

Distribution: 14 records in Victoria over a 9 km range, between 20 and 100 metres altitude. Widespread along coastal NSW and Queensland. In Victoria there are only two small populations both at Woods Point on the Lower Snowy River, East Gippsland.

Habitat: Warm Temperate Rainforest at low elevation.

Reproduction: Regeneration from seed. Requires long periods without major disturbance for survival and establishment. All (or nearly all) plants killed by fire. Often re-establish only via recolonisation from unburnt sites.

Issues and Status in East Gippsland

Threatening processes: Weeds invading the rainforest understorey and preventing successful regeneration are the greatest threat to this species.

Threat	Ranking
Grazing pressure (Sambar deer)	1
Weed competition	3
Small population size	2
Recreational pressure	1
Natural disasters	2

Reservation: All known populations in Woods Point Flora Reserve. The surrounding land is part of the Snowy River Heritage corridor.

Management: An Action Statement has been prepared which includes a program of cultivation, monitoring, weed control and consultation over other management activities (Pollack and Taylor 1996).

Clover Glycine Glycine latrobeana

Family: Fabaceae

Description: Herb forming open mats to low bushes.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Vulnerable
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 108 records in Victoria over a 758 km range, between 15 and 1400 metres altitude.

Habitat: Fertile lowlands, Lowlands and Box Ironbark.

Reproduction: Regeneration from seed. Not thought to be dependent on disturbance for regeneration. All (or nearly all) plants killed by fire. Abundance of post-fire seedling regeneration is unknown.

Issues and Status in East Gippsland

Population is remote and has not been relocated since 1963. Presence of *Glycine latrobeana* in East Gippsland needs to be confirmed.

Clustered Kerrawang Rulingia dasyphylla
Family: Sterculiaceae

Description: Low shrub <1m tall.

Conservation status:

- ROTAP:
- VROTS: Rare
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: Small population in the Stony Peak Forest Block.

Habitat: Lowland rocky outcrops.

Reproduction: Regeneration from seed but may be limited to a few seasons. Not thought to be dependent on disturbance for regeneration. All (or nearly all) plants killed by fire.

Issues and Status in East Gippsland

Threatening processes need to be evaluated.

Cotoneaster Pomaderris Pomaderris cotoneaster
Family: Rhamnaceae

Description: Shrub 1 - 4m tall.

Conservation status:

- ROTAP: Endangered
- VROTS: Endangered
- ESP: Listed
- FFG: Is listed, but has no Action Statement

Distribution: Occurs rarely in NSW south of Mittagong. Recorded from 3 sites in the upper Genoa River valley, but has not been relocated since the original siting in 1951.

Habitat: Poorly known.

Reproduction: Regenerates from seed but not thought to depend on disturbance for regeneration. All (or nearly all) plants killed by fire.

Issues and Status in East Gippsland

Threatening processes: Population(s) may be extinct. May be threatened by severe fire or by weed invasion (willows).

Threat	Ranking
Weed competition	3
Small population size	3
Natural disasters	3

Reservation: Only known site within Coopracambra National Park.

Management: No specific management arrangements.

Dwarf Brunoniella Brunoniella pumilio

Family: Acanthaceae

Description: A sprawling herb forming open mats to low bushes.

Conservation status:

- ROTAP:
- VROTS: Endangered
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 5 records in Victoria over a 12 km range. Occurs in sandstone areas in NSW. It reaches its southern-most extent in East Gippsland, where it is confined to two small populations near a roadside in Croajingolong National Park.

Habitat: Lowland forest. Specific habitat poorly known.

Reproduction: Regenerates from seed. Thought to require disturbance for regeneration. All (or nearly all) plants killed by fire.

Issues and Status in East Gippsland

Threatening processes: At risk of inadvertent damage due to roadworks or gravel extraction. Populations occur near some old gravel pits.

Threat	Ranking
Inappropriate fire regimes	2
Small population size	2
Roadworks	3
Natural disasters	2

Reservation: Both populations within Croajingolong National Park.

Management: Plan specifies liaison with Shire of East Gippsland to prevent damage from roadworks, exclusion of fuel reduction burning, and an assessment of weed invasion potential.

Fairy Bluebell Wahlenbergia densifolia

Family: Campanulaceae

Description: Prostrate broad-leaved herb

Conservation status:

- ROTAP:
- VROTS: Vulnerable
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: Endemic to Victoria. Recorded from 13 sites, over a 125 km range, between 1060 and 1540 metres altitude in East Gippsland.

Habitat: Subalpine - Alpine open grasslands or herbfields.

Reproduction: Reproduction from seed and asexual occurs commonly. Requires long periods without major disturbance for survival and establishment.

Issues and Status in East Gippsland

Threatening processes: Grazing by rabbits is thought to be the major threat. Cattle graze in the area but there is no data to indicate whether plants are threatened. The species is vulnerable to disturbance or degradation of habitat because of the limited availability of suitable habitat in Victoria together with small populations consisting mainly of small scattered colonies (there are few large stands).

Threat	Ranking
Grazing pressure	3
Weed competition	1
Small population size	2

Reservation: The six populations recorded for East Gippsland all occur within the Nunniong Plains Natural features and Scenic Reserve.

Management: No specific management arrangements.

Hairy Anchor Plant Discaria pubescens

Family: Rhamnaceae

Description: Low shrub <1m tall.

Conservation status:

- ROTAP: Rare
- VROTS: Vulnerable
- ESP: Not listed
- FFG: Is listed, with an Action Statement (Humphries 1993)

Distribution: Formerly widespread in all eastern Australian States, but now extinct in Queensland and endangered in Tasmania. In Victoria it is restricted to small populations in the Eastern Highlands and to the west of Melbourne. 77 records in Victoria over a 561 km range, and between 100 and 1980 metres altitude. In East Gippsland Discaria pubescens occurs in the Alpine National Park (Cobberas - Tingaringy Unit), in State Forest, and on private land and roadsides around Bendoc, Delegate River and Wombargo Creek.

Habitat: Montane and subalpine open woodlands.

Reproduction: Reproduces from seed although very few young seedlings observed in the wild. Most plants survive fire and resprout from dormant buds. Likely to require occasional disturbance to establish and spread.

Issues and Status in East Gippsland

Threatening processes: Populations on roadsides and on private agricultural land are most at risk. Dense weeds or alternatively grazing pressure may inhibit seedling recruitment. Roadside populations are also at risk from roadworks.

Threat	Ranking
Inappropriate fire regimes	1
Grazing pressure	2
Weed competition	2
Roadworks	2
Small population size	2

Reservation: Most populations in Alpine National Park (Cobberas - Tingaringy Unit).

Management: Park management plan specifies that consideration be given to the species when assessing carrying capacity for grazing. All State Forest populations protected in Special Management Sites.

An Action Statement has been prepared which specifies a program of site assessment, monitoring, research, cultivation and re-introduction, and community liaison (Humphries 1993).

King Greenhood Pterostylis baptistii

Family: Orchidaceae

Description: A geophyte: Perennating organ (e.g. bulb, corm, tuber) below ground level.

Conservation status:

- ROTAP:
- VROTS: Vulnerable
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 5 records in Victoria over a 129 km range. Widespread in coastal regions of NSW and Queensland. In Victoria confined to a few sites in the lowlands of East Gippsland.

Habitat: Moist flats at low elevations.

Reproduction: Regeneration from seed and commonly reproduces asexually. Tolerates but may not require disturbance for regeneration. Most plants survive fire and resprout from dormant buds. Abundance of post-fire seedling regeneration is unknown.

Issues and Status in East Gippsland

Threatening processes: Weed competition may be the major threat to this species where it occurs at sites where introduced grasses also thrive. Grazing pressure is a threat, especially to those populations on private property where cattle have ready access to remaining patches.

Threat	Ranking
Grazing pressure	2
Weed competition	2
Small population size	2
Roadworks	1
Over collection	1

Reservation: Populations in Alfred National Park, Lake Curlip Wildlife Reserve and Maramingo Flora Reserve.

Management: All State Forest populations (2) included in Special Protection Zone. Precise locations of plants are kept confidential to prevent illegal collection.

Leafless Tongue-orchid Cryptostylis hunteriana

Family: Orchidaceae

Description: A geophyte: Perennating organ (e.g. bulb, corm, tuber) below ground level.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Endangered
- ESP: Listed
- FFG: Has been nominated

Distribution: 30 records in Victoria over a 113 km range between Orbost and Mallacoota and between 25m and 185m altitude. Coastal plains of NSW and Victoria. In Victoria it is known only from a few colonies and perhaps only several hundred plants.

Habitat: Occurs mostly in coastal heathlands (Wet Heath and Clay Heathland) with some records from Lowland Forest.

Reproduction: Regeneration is dependent on disturbance (fire). The plants may appear to be absent between such events. Most plants survive fire and resprout from dormant buds, either along the stems, at ground level or from underground. Also significant re-establishment from seed germination.

Issues and Status in East Gippsland

Threatening processes: Being leafless and dormant for most of the year, and flowering for a relatively short period the species is difficult to find. Most of its habitat is also remote and inaccessible. It is potentially at risk from collection and weed invasion in some localised areas close to roads and settlements.

Threat	Ranking
Inappropriate fire regimes	2
Weed competition	1
Roadworks	1
Over collection	1
Timber harvesting	1

Reservation: It occurs in one National Park, two flora reserves and in State Forest.

Management: Croajingolong National Park management plan specifies fire regime and monitoring program. In State Forest, heathlands are protected by 40m buffers. All other localities in State forest are included in the Special Protection Zone or Special Management Sites. Management of fire regimes for this species is covered by the Heathland Management Plan (Avis 1993). More intensive management is undertaken at the William Hunter Flora Reserve in Marlo which is subject to localised threats. Precise locations of plants are kept confidential to prevent illegal collection.

Leafy Greenhood Pterostylis cucullata

Family: Orchidaceae

Description: A geophyte: Perennating organ (e.g. bulb, corm, tuber) below ground level.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Vulnerable
- ESP: Listed
- FFG: Is listed, with an Action Statement (Bramwells 1993)

Distribution: 27 records in Victoria over a 741 km range, between 20 and 780 metres altitude. Occurs in Victoria, South Australia, and islands off the north-east coast of Tasmania. In Victoria it occurs in coastal and inland areas at low elevations. Known from two sites in East Gippsland.

Habitat: Coasts; Riparian; Sandy outwash plains and dune; Dry foothills.

Reproduction: Regeneration from seed and asexual reproduction and establishment occurs commonly. Many plants survive fire and resprout from dormant buds. Minimal re-establishment from seed germination after fire; plants occurring in habitats that are only rarely burnt.

Issues and Status in East Gippsland

Threatening processes: Major threat is from weed invasion where East Gippsland populations occur. Threat of illegal collection is also high.

Threat	Ranking
Weed competition	3
Small population size	2
Over collection	1

Reservation: Not recorded in any conservation reserves in East Gippsland.

Management: Species has an Action Statement which specifies a program of monitoring, site assessment, weed and pest animal control, and community liaison (Bramwells 1993).

East Gippsland populations are in the Buchan Caves Reserves and those in State Forest are included in the Special Protection Zone. Precise locations of plants are kept confidential to prevent illegal collection.

Lemon-scented Zieria Zieria sp. D

Family: Rutaceae

Description: Low shrub <1m tall.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Vulnerable
- ESP: Not listed
- FFG: Has not been nominated

Distribution: 0 records in Victoria.

Habitat: Dry foothills; Subalpine - Alpine.

Reproduction: Regeneration from seed but may be limited to only a few seasons. Not thought to be dependent on disturbance for regeneration. Many plants survive fire and resprout from dormant buds, either along the stems at ground level or from underground.

Issues and Status in East Gippsland

Precise location of *Zieria sp. D* in East Gippsland and threatening processes need to be evaluated.

Limestone Blue Wattle Acacia caerulescens

Family: Mimosaceae

Description: Small predominantly single trunked tree with canopy cover >70%.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Vulnerable
- ESP: Not listed
- FFG: Not listed

Distribution: 18 records in Victoria over a 76 km range, between 2 and 30 metres altitude. Endemic to Victoria and confined to small populations in Gippsland. The largest population is in Lake Tyers State Park and other populations occur on private land and adjacent roadsides in the Buchan - Murrindal and Tambo River areas.

Habitat: Confined to Eucalyptus melliodora grassy woodlands and Eucalyptus bauerana - Eucalyptus globulus ssp. pseudoglobulus open forest on clay limestone soils.

Reproduction: Regenerates from seed. Not thought to be dependent on disturbance for regeneration. All (or nearly all) plants killed by fire. May re-establish only via recolonisation from unburnt sites.

Issues and Status in East Gippsland

Threatening processes: Roadside and private land populations are smallest and most vulnerable.

Threat	Ranking
Inappropriate fire regimes	2
Grazing pressure	2
Weed competition	2
Small population size	2
Roadworks	3
Natural disasters	1

Reservation: Best population in Lake Tyers State Park. Other areas on roadsides and private land.

Management: No specific management arrangements.

Maiden's Wattle Acacia maidenii

Family: Mimosaceae

Description: Small to medium bushy tree to 15m tall.

Conservation status:

- ROTAP:
- VROTS: Endangered
- ESP: Not listed
- FFG: Listed, with an Action Statement (Thompson 1992a)

Distribution: 9 records in Victoria. Extends from south-eastern Queensland to Nowra in NSW. A gap of approximately 400 km between Nowra and its southern-most occurrence near Orbost, where four populations are confined to a 6 km range.

Habitat: Wetter forests and rainforest margins. In East Gippsland it is confined to tertiary sediments on the escarpment at the edge of the Snowy River floodplain.

Reproduction: Regenerates from seed. Requires disturbance (fire) to establish and spread. All (or nearly all) plants killed by fire.

Issues and Status in East Gippsland

Threatening processes:

Threat	Ranking
Inappropriate fire regimes	1
Grazing pressure	1
Weed competition	2
Small population size	1
Roadworks	3
Natural disasters	1

Reservation: Road reserves and private land.

Management: Species has an Action Statement which specifies a program of cultivation, enrichment planting of existing populations, fencing, weed control, public education and liaison with local authorities (Thompson 1992a).

Maroon Leek-orchid Prasophyllum frenchii

Family: Orchidaceae

Description: A geophyte: Perennating organ (e.g. bulb, corm, tuber) below ground level.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Endangered
- ESP: Listed
- FFG: Was nominated, but rejected

Distribution: NSW, Victoria and Tasmania. Widespread in Victoria recorded from 15 sites, over a 623 km range, between 20 and 470 metres altitude. Only known from around Mallacoota in East Gippsland.

Habitat: Sandy coastal heathlands, and open forest at lower elevations.

Reproduction: Depends on disturbance for regeneration. May appear to be absent between disturbance events. Most plants survive fire and resprout from dormant buds. Also significant re-establishment from seed germination.

Issues and Status in East Gippsland

Threatening processes: May be threatened by inappropriate fire regimes or by weeds, illegal collection, roadworks and recreation in accessible areas.

Threat	Ranking
Inappropriate fire regimes	3
Weed competition	3
Small population size	1
Roadworks	1
Over collection	1
Recreational pressure	1

Reservation: All known sites in Croajingolong National Park.

Management: Park plan includes known populations in Special Protection Areas.

Mignonette Leek-orchid Prasophyllum morganii

Family: Orchidaceae

Description: A geophyte: Perennating organ (e.g. bulb, corm, tuber) below ground level.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Endangered
- ESP: Listed
- FFG: Has not been nominated

Distribution: 4 records in Victoria.

Habitat: Moist foothills; Subalpine - Alpine

Reproduction: Not thought to be dependent on disturbance for regeneration. Most plants survive fire and resprout from dormant buds. Also significant re-establishment from seed germination.

Issues and Status in East Gippsland

Presence of *Prasophyllum morganii* in East Gippsland needs to be confirmed.

Mountain Cress Drabastrum alpestre

Family: Bassicaceae

Description: Shrub with woody stem base but non-woody stems.

Conservation status:

- ROTAP: Rare
- VROTS: Vulnerable
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 9 records in Victoria over a 173 km range, between 370 and 1500 metres altitude.

Habitat: Rainshadow woodlands; Subalpine - Alpine.

Reproduction: Regeneration from seed. Not thought to be dependent on disturbance for regeneration. All (or nearly all) plants killed by fire. May re-establish only via recolonisation from unburnt sites.

Issues and Status in East Gippsland

Only known from an early collection in East Gippsland. Presence of *Drabastrum alpestre* in East Gippsland needs to be confirmed.

Orange-blossom Orchid Sarcochilus falcatus

Family: Orchidaceae

Description: A flowering epiphyte: Flowering aerial plant with no direct connection to the ground and not parasitic on the host.

Conservation status:

- ROTAP:
- VROTS: Endangered
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 10 records in Victoria over a 154 km range, between 240 and 280 metres altitude. Occurs in rainforests of NSW and Queensland. In Victoria it is confined to a few sites in East Gippsland between Cann River and the NSW border.

Habitat: Epiphytic in Warm Temperate Rainforest trees in near coastal ranges.

Reproduction: Regenerates from seed and requires long periods without major disturbance for survival and establishment.

Issues and Status in East Gippsland

Threatening processes: Significant threats are fire and illegal collection.

Threat	Ranking
Small population size	2
Over collection	3
Natural disasters	3

Reservation: Major population in Croajingolong National Park.

Management: Population in National Park is included in a Special Protection Area. Only known State Forest population is in Special Protection Zone. Precise locations of plants are kept confidential to prevent illegal collection.

Prickly Tree-fern Cyathea leichhardtiana

Family: Cyatheaceae

Description: Tall slender tree-fern >0.5m tall.

Conservation status:

- ROTAP:
- VROTS: Vulnerable
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 27 records in Victoria over a 228 km range, between 20 and 360 metres altitude. Widespread in rainforests of NSW and Queensland. At its southern-most extent in Victoria, where it is confined to a few sites in East Gippsland and one site near Bruthen just outside the East Gippsland CRA Region.

Habitat: Warm Temperate Rainforest.

Reproduction: Regeneration from spores. Requires long periods without major disturbance for survival and establishment (e.g. no fires, floods). All (or nearly all) plants killed by fire. Likely to re-establish only via recolonisation from unburnt sites.

Issues and Status in East Gippsland

Threatening processes: Major risk is very intense wildfires that penetrate habitat. Possibly at risk from invasion of habitat by blackberries and other environmental weeds.

Threat	Ranking
Weed competition	1
Small population size	2
Natural disasters	3

Reservation: Most populations in Croajingolong National Park.

Management: All populations in Croajingolong National Park included in Special Protection Areas. All State Forest populations included in Special Protection Zones. Areas where the species occurs are also recognised as sensitive in the fire protection plan.

Prostrate Cone-bush Isopogon prostratus

Family: Proteaceae

Description: Prostrate shrub <0.1m tall.

Conservation status:

- ROTAP:
- VROTS: Endangered
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 10 records in Victoria over a 286 km range, at 60 metres altitude. Widespread but rare in NSW. In Victoria confined to two areas; one highly vulnerable population on a railway line between Providence Ponds and Fernbank (Gippsland) and one in Howe Range, Croajingolong National Park (East Gippsland).

Habitat: Lowland forest, scrubby heaths on sandy outwash plains and dunes.

Reproduction: Regeneration depends on disturbance (from fire). Most plants survive fire and resprout from dormant buds, either along the stems, at ground level or from underground. Also significant re-establishment from seed germination.

Issues and Status in East Gippsland

Threatening processes: Population is remote and has not been relocated since 1963. The population may be vulnerable due to its small size or inappropriate fire regimes.

Threat	Ranking
Inappropriate fire regimes	2
Small population size	1

Reservation: Only population in East Gippsland is in Croajingolong National Park.

Management: Croajingolong National Park Plan includes population in a Special Protection Area.

Rock Orchid Dendrobium speciosum var. speciosum

Family: Orchidaceae

Description: A lithophyte: Plant largely restricted to growing on rock or in rocky declivities.

Conservation status:

- ROTAP:
- VROTS: Endangered
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: Widespread in sandstone areas of NSW. Reaches its southern-most extent in East Gippsland where there have been 8 records in the Mallacoota area over a 21 km range and between 60 and 240 metres altitude.

Habitat: Rock outcrops sheltered from fire at low elevations. Grows on rainforest trees in NSW.

Reproduction: Reproduces from seed and requires long periods without major disturbance for survival and establishment (no fires, floods).

Issues and Status in East Gippsland

Threatening processes: Key threats are intense wildfires and illegal collection in accessible areas.

Threat	Ranking
Small population size	2
Over collection	3
Natural disasters	2

Reservation: Most populations in Croajingolong National Park.

Management: All populations in State Forest included in Special Protection Zones or Special Management sites. Precise locations of plants are kept confidential to prevent illegal collection.

Rock Poa Poa saxicola
Family: Poaceae

Description: Small tussock-grass <0.5m tall.

Conservation status:

- ROTAP:
- VROTS: Vulnerable
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 14 records in Victoria over a 164 km range, between 1270 and 1850 metres altitude. Known from NSW, Victoria and Tasmania (where it is widespread on mountain summits). In Victoria there is one population near the summit of Mt. Tingaringy in the Alpine National Park (Cobberas - Tingaringy Unit), and two populations in the Cobberas Mountains.

Habitat: Subalpine - Alpine, rocky grassland or open shrubland.

Reproduction: Regeneration mainly from seed (asexual reproduction and establishment occurs occasionally). Requires long periods without major disturbance for survival and establishment.

Issues and Status in East Gippsland

Threatening processes: Stands in the Cobberas may be subject to grazing by cattle. The impact of brumbies requires evaluation. Other threats probably relate to human activities on mountain tops such vehicle access, installation and maintenance of communication facilities, and camping.

Threat	Ranking
Weed competition	1
Small population size	1
Recreational pressure	2
Other (site disturbance)	2
Grazing pressure	2

Reservation: Alpine National Park (Cobberas - Tingaringy Unit).

Management: Park management plan includes Mt. Tingaringy summit in a Special Protection Area.

State Forest population is included in a Special Management Zone.

Rough Eyebright Euphrasia scabra

Family: Scrophulariaceae

Description: An erect, semi-parasitic annual herb to 50 cm high.

Conservation status:

- ROTAP: Poorly known
- VROTS: Endangered
- ESP: Not listed
- FFG: Is listed, with an Action Statement (Thompson 1992b)

Distribution: Previously recorded from NSW, Tasmania and Western Australia but now severely depleted or extinct in those States. Euphrasia scabra is best known from Victoria where there are only seven populations still extant (40 records). These occur between 920 and 1540 metres altitude across a 928 km range. In East Gippsland there are three populations: one in Little Bog Creek Flora Reserve, one in State Forest on Mundy Plain and one on public land water frontage in the headwaters of the Delegate River (East Branch).

Habitat: Seasonally inundated subalpine herbfields or grasslands.

Reproduction: Reproduces annually from seed. Being semi-parasitic it requires the presence of suitable host species (thought to be grasses). May require some disturbance (probably grazing) to reduce competition from grasses.

Issues and Status in East Gippsland

Threatening processes: Main issues for East Gippsland are continued monitoring to establish desirable disturbance regime and to identify and control weeds.

Threat	Ranking
Grazing pressure	1
Weed competition	3
Small population size	2

Reservation: Only one of the three East Gippsland populations is in a conservation reserve (Little Bog Creek Flora Reserve).

Management: The two populations outside conservation reserves are included in the Special Protection Zone.

An Action Statement has been prepared which specifies a program of monitoring, field searches, weed control, propagation, and planning (Thompson 1992b).

An area of private land was purchased by DNRE to protect the Delegate River population.

Slender Myoporum Myoporum floribundum

Family: Myoporaceae

Description: Erect spindly shrub 2 - 3m tall.

Conservation status:

- ROTAP: Rare
- VROTS: Endangered
- ESP: Not listed
- FFG: Is listed, with an Action Statement (Ross 1992)

Distribution: 17 records in Victoria. Confined to a few small populations in Victoria and NSW. In Victoria there are three small populations (each comprising less than 50 individuals) in the upper Snowy and Deddick River valleys over a 43 km range and between 260 and 900 metres altitude.

Habitat: Steep, gravelly, north facing slopes in Rainshadow Woodland.

Reproduction: Regeneration from seed. Disturbance not considered necessary for regeneration. All (or nearly all) plants killed by fire. May re-establish only via recolonisation from unburnt sites.

Issues and Status in East Gippsland

Threatening processes: Key threat is from roadworks. All three populations are on roadsides.

Threat	Ranking
Small population size	2
Roadworks	3
Natural disasters	2

Reservation: Two largest populations are in the Alpine National Park (Cobberas - Tingaringy Unit) and the third is on private land.

Management: Species has an Action Statement which specifies a program of survey, monitoring, community liaison, research and propagation (Ross 1992).

Slender Parrot-pea Almaleea capitata

Family: Fabaceae

Description: Low shrub <1m tall.

Conservation status:

- ROTAP: Rare
- VROTS: Rare
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 34 records in Victoria over a 165 km range, between 525 and 3500 metres altitude. Endemic to Victoria and currently known from six localities. Five are in the Alpine National Park, Cobberas - Tingaringy Unit, the fifth also in the Alpine National Park near Mt Howitt.

Habitat: Confined to the ecotone between swamp and forest in subalpine areas.

Reproduction: Regenerates from seed. Requires disturbance (fire) to establish and spread. All (or nearly all) plants killed by fire. Abundance of post-fire seedling regeneration is unknown.

Issues and Status in East Gippsland

Threatening processes: Grazing and trampling by horses (brumbies) and cattle thought to be most significant threat.

Threat	Ranking
Grazing pressure	2
Weed competition	1
Small population size	2

Reservation: East Gippsland populations confined to Alpine National Park (Cobberas - Tingaringy Unit).

Management: All populations are included in a Special Protection Area in the National Park. Park management plan specifies that sites are to be monitored.

Slender Tree-fern Cyathea cunninghamii

Family: Cyatheaceae

Description: Tall slender tree-fern >0.5m tall.

Conservation status:

- ROTAP: Rare
- VROTS: Rare
- ESP: Not listed
- FFG: Is listed, with a Draft Action Statement (Gutowski 1996)

Distribution: Restricted distribution in other States. Best represented in Victoria where it occurs in widely dispersed small populations. It has been recorded from 175 sites, over a 700 km range, between 20 and 730 metres altitude (note that this includes multiple records of single populations). Recorded from the Goolengook River headwaters and around Mt. Drummer in East Gippsland.

Habitat: Confined to sites in wetter forests and rainforest that are well protected from fire, and with an ample water supply. Often in the steep headwaters of small streams where it is protected from floods and wind.

Reproduction: Regeneration from spores. Requires long periods without major disturbance for survival and establishment (e.g. no fires, floods). All (or nearly all) plants killed by fire. Likely to re-establish only via recolonisation from unburnt sites.

Issues and Status in East Gippsland

Threatening processes: Major risk is very intense wildfires that penetrate habitat. Possibly at risk from invasion of habitat by blackberries. Road construction through creek headwaters where the species occurs poses a significant risk to individuals and the possibility of introducing blackberries. Although generally confined to well protected gullies, isolated individuals on slopes could be at risk during logging operations.

Threat	Ranking
Weed competition	2
Roadworks	1
Timber harvesting	2
Natural disasters	3
Small population size	2

Reservation: Best populations in Errinundra National Park. Historical population on Mt. Drummer in Alfred National Park may be extinct due to 1983 wildfire although species persists in the vicinity.

Management: All populations in State Forest included in Special Protection Zone or Special Management Sites. An Action statement is in preparation (Gutowski 1996).

Spiral Sun-orchid Thelymitra matthewsii

Family: Orchidaceae

Description: A geophyte: Perennating organ (e.g. bulb, corm, tuber) below ground level.

Conservation status:

- ROTAP: Vulnerable
- VROTS: Vulnerable
- ESP: Listed
- FFG: Is listed, but has no Action Statement

Distribution: 5 records in Victoria over a 296 km range. Western Australia (rare) and Victoria where it is scattered in south-western and far eastern districts. In East Gippsland it is known from three small populations.

Habitat: Sandy or gravelly ground in open areas of Lowland Forest. Reproduction: Regeneration from seed and dependant on fire to create suitable conditions. Most plants survive fire and resprout from dormant buds. Also significant re-establishment from seed germination.

Issues and Status in East Gippsland

Threatening processes: Major threats are inadvertent damage from roadworks, or illegal collection. Insufficiently frequent fire and weed invasion following disturbance may also threaten the species.

Threat	Ranking
Inappropriate fire regimes	2
Weed competition	2
Small population size	2
Roadworks	3
Over collection	2

Reservation: Not recorded from any conservation reserves.

Management: All known populations are in State Forest and are included in Special Management Sites to prevent accidental damage from roadworks etc. Precise locations of plants are kept confidential to prevent illegal collection.

Tough Psoralea Psoralea tenax

Family: Fabaceae

Description: Broad-leaved herb arising from a tussock.

Conservation status:

- ROTAP:
- VROTS: Endangered
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 15 records in Victoria over a 460 km range, between 40 and 245 metres altitude.

Habitat: Fertile lowlands; Mallee.

Reproduction: Regenerates from seed but may be limited to a few seasons. All (or nearly all) plants killed by fire. Fire promoted germination or establishment.

ISSUES and STATUS IN EAST GIPPSLAND

Presence of *Psoralea tenax* in East Gippsland needs to be confirmed.

Yellow Elderberry Sambucus australasica

Family: Caprifoliaceae

Description: Shrub 1 - 4m tall.

Conservation status:

- ROTAP:
- VROTS: Vulnerable
- ESP: Not listed
- FFG: Is listed, but has no Action Statement

Distribution: 11 records in Victoria over a 158 km range, between 2 and 280 metres altitude. Common in rainforests of NSW and Queensland. In Victoria it is confined to river flats along the Snowy and Brodribb Rivers, and along Ti-Tree Creek near Orbost, and a site on private land east of Mallacoota.

Habitat: Warm Temperate Rainforest on alluvial soils at low elevations.

Reproduction: Regenerates from seed and requires long periods without major disturbance for survival and establishment.

ISSUES and STATUS IN EAST GIPPSLAND

Threatening processes: Main threats relate to disturbance and weed invasion of rainforest stands in accessible areas (e.g. Lochend on lower Snowy River). One significant site on private land is potentially threatened.

Threat	Ranking
Weed competition	3
Roadworks	3
Recreational pressure	2
Small population size	1

Reservation: Cabbage Tree Creek Flora Reserve, Lake Corringle - Lake Wat Wat Wildlife Reserve, 1st and 2nd Island Flora Reserve

Management: Implementation of management plans for wetlands, rainforest and water frontages on the lower Snowy River by DNRE should see a general improvement in the habitat of this species. A program of weed control, rationalisation of public access, revegetation and site protection works is ongoing.

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Appendix F: Rare or Threatened Fauna In East Gippsland Index

Aquatic Fauna

- Eastern Freshwater Prawn Australatya striolata
- Mallacoota Burrowing Crayfish Engaeus mallacoota
- Alpine Spiny Crayfish Euastacus crassus
- Orbost Spiny Crayfish Euastacus diversus
- River Blackfish Gadopsis marmoratus
- Mountain Galaxias Galaxias olidus
- Spotted Galaxias Galaxias truttaceus
- Pouched Lamprey Geotria australis
- Striped Gudgeon Gobiomorphus australis
- Cox's Gudgeon Gobiomorphus coxii
- Empire Gudgeon Hypseleotris compressa
- Australian Bass Macquaria novemaculeata
- Freshwater Herring Potamalosa richmondia
- Australian Grayling Prototroctes maraena

Eastern Freshwater Prawn Australatya striolata

RARITY
a) Geographic Range

- Classification of range size: Small
- Range size within region: Single site Proportion of region occupied (%): 0.4% (1 site out of 275 sites)
- Certainty: Low
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI
- Source: T. Raadik, pers. comm.

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Raadik, 1992a, 1995

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends
Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI
- Measured rate of change: NI
- Certainty: Low
- Source: T. Doeg, pers. comm.

b) Dependence on management

- Classification of dependence on management: Not dependent
- Certainty: Low
- Source: Raadik 1995

SPATIAL DYNAMICS
a) Population variability
Classification of population variability: NI
b) Powers of dispersal
Classification of powers of dispersal: NI

LIFE HISTORY PARAMETERS
a) Reproductive output - NI
Classification of reproductive output: NI
b) Longevity

- Classification of life span: NI
- Average life span: NI
- Maximum life span: NI
- Body size: 2 - 5 cm total body length
- Source: T. Doeg, pers. comm.

THREATENING PROCESSES
1. Predation: Predation by introduced species on juveniles and adults.

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: Destruction of known habitat by wildfire.

- Certainty: Low
- Ranking: 1
- Source: Olive and Rieger 1987

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Nothing is known specifically about the biology and ecology of the Eastern Freshwater Prawn. It is classified as insufficiently known in Victoria (CNR 1995) and has been recommended for listing under the *Flora and Fauna Guarantee Act* 1988. It has only been found at one site in the Snowy River system (Raadik, 1995). However, predation by introduced

fish and habitat disturbance through natural disasters may pose a threat if the population is not more widespread.

Mallacoota Burrowing Crayfish Engaeus mallacoota

RARITY
a) Geographic Range

- Classification of range size: Small
- Range size within region: Subcatchment Proportion of region occupied (%): NI
- Certainty: Low
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI
- Source: Horwitz 1990

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Horwitz 1990

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends
Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI
- Measured rate of change: NI

b) Dependence on management

- Classification of dependence on management: NI

SPATIAL DYNAMICS
a) Population variability
Classification of population variability: NI
b) Powers of dispersal

- Classification of powers of dispersal: Low
- Certainty: Low
- Average distance dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: T. Doeg, pers. comm

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: NI
- Mean clutch/litter size: NI
- Age at first breeding: NI
- Mean number of litters per year: NI

b) Longevity

- Classification of life span: NI
- Average life span: NI
- Maximum life span: NI
- Body size: NI

THREATENING PROCESSES
1. Predation: No
2. Altered hydrology: Siltation of spawning area and habitat. Reduction in flow in small streams. Changes to riparian microclimate.

- Certainty: Low
- Ranking: 2
- Source: Campbell and Doeg 1989, T. Doeg, pers. comm.

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: Use as food or bait

- Certainty: Low
- Ranking: 1
- Source: T. Doeg, pers. comm

9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Nothing is known specifically about the biology and ecology of the Mallacoota Burrowing Crayfish. Only recently discovered (Horwitz 1990), they burrow into the banks near rivers. While only known from the Croajingolong National Park, Horwitz (1990) states that suitable habitat may exist elsewhere, and so that forest activities may have an impact on the species. Being partially dependent on riparian habitat, the changes in microclimate due to forest harvesting may make certain habitats unsuitable, but this is not proven.

Alpine Spiny Crayfish Euastacus crassus

RARITY
a) Geographic Range

- Classification of range size: Small
- Range size within region: Subcatchment Proportion of region occupied (%): 0.7% (2 sites out of 275 sites)
- Certainty: Low
- Source: Raadik 1992a, 1992b, 1995, Morgan 1986

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Raadik, 1992a, 1995

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends.
Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI
- Measured rate of change: NI

b) Dependence on management

- Classification of dependence on management: Not dependent
- Certainty: Medium
- Source: Raadik 1995

SPATIAL DYNAMICS
a) Population variability
Classification of population variability: NI
b) Powers of dispersal

- Classification of powers of dispersal: Low
- Certainty: Low
- Average distance dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: T. Raadik and T. Doeg, pers. comm.

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: NI
- Mean clutch/litter size: NI
- Age at first breeding: NI
- Mean number of litters per year: NI

b) Longevity

- Classification of life span: NI
- Average life span: NI
- Maximum life span: NI
- Body size: NI

THREATENING PROCESSES

1. Predation: Predation by introduced species on juveniles and adults.

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: Use as food or bait

- Certainty: Low
- Ranking: 1
- Source: T. Doeg, pers. comm

9. Altered successional states: No
10. Natural disasters: Destruction of known habitat by wildfire.

- Certainty: Low
- Ranking: 1
- Source: Olive and Rieger 1987

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Nothing is known specifically about the biology and ecology of the Alpine Spiny Crayfish. It has only been found at two sites high in the Alpine National Park (Raadik 1995). The only perceived threats to the species in this area are predation by introduced fish, collection by humans, and total habitat destruction through the influence of natural disasters.

Orbost Spiny Crayfish Euastacus diversus

RARITY

a) Geographic Range

- Classification of range size: Small
- Range size within region: Subcatchment
- Proportion of region occupied (%): 2.2% (6 sites out of 275 sites)
- Certainty: Medium

- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Raadik, 1992a, 1995

OBSERVED DYNAMICS

Population Trend in Last Decade

Increasing, stable or declined: NI available to identify trends

Increasing and Stable Species

a) Population trend since discovery by Europeans

- Classification of population trend: NI, but probably reduced.
- Measured rate of change: NI
- Certainty: Low
- Source: T. Raadik, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Prevention of siltation from forest practices
- Certainty: Low
- Source: Campbell and Doeg 1989

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: NI

b) Powers of dispersal

- Classification of powers of dispersal: Low
- Certainty: Low
- Average distance dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: T. Doeg, pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: NI
- Age at first breeding: NI
- Mean number of litters per year: NI

b) Longevity

- Classification of life span: NI
- Average life span: NI
- Maximum life span: NI
- Body size: NI

THREATENING PROCESSES

1. Predation: Predation by introduced species on juveniles and adults.

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: Siltation of spawning area and habitat. Reduction in flow in small streams

- Certainty: Low
- Ranking: 2
- Source: Campbell and Doeg 1989, T. Doeg, pers. comm.

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: Use as food or bait

- Certainty: Low
- Ranking: 1
- Source: T. Doeg, pers. comm

9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Nothing is known specifically about the biology and ecology of the Orbost Spiny Crayfish. It is classified as vulnerable in Victoria and is listed under the *Flora and Fauna Guarantee Act* 1988. It has only been found at six locations in the Brodribb River system (T. Raadik, pers. comm.), but there is an unconfirmed report of a site in the Queensborough River system. All sites are within State Forest so that siltation associated with road construction for timber production is potential threat to the species, with less important threats being predation by introduced fish, hydrological changes following harvesting (for some populations) and collection.

River Blackfish Gadopsis marmoratus

RARITY

a) Geographic Range

- Classification of range size: Medium

- Range size within region: 3 catchments Proportion of region occupied (%): 22.9% (63sites out of 275 sites)
- Certainty: Medium
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI
- Source: T. Raadik, pers. comm.

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Koehn and O'Connor 1990b, Raadik, 1992a, 1995

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends
Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI
- Measured rate of change: NI

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Prevention of siltation
- Certainty: Low
- Source: Campbell and Doeg 1989

SPATIAL DYNAMICS
a) Population variability
Classification of population variability: NI
b) Powers of dispersal

- Classification of powers of dispersal: Low
- Certainty: High
- Average distance dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: Koehn and O'Connor 1990b

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: High
- Mean clutch/litter size: 170 eggs
- Age at first breeding: 3 years
- Mean number of litters per year: 1
- Source: Koehn and O'Connor 1990b

b) Longevity

- Classification of life span: Long lived
- Certainty: Medium
- Average life span: 15 years
- Maximum life span: NI
- Body size: 30 cm total length
- Source: Koehn and O'Connor 1990b

THREATENING PROCESSES

1. Predation: Predation by introduced species on juveniles.

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: Siltation of spawning habitat.

- Certainty: Low
- Ranking: 2
- Source: Campbell and Doeg 1989

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: A considerable amount is known about the biology or ecology of the River Blackfish, mainly from studies in central Victoria. The species is classified as insufficiently known in Victoria (CNR 1995). There is no migration, spawning in or near the adult habitats, with a small number of eggs laid inside a hollow log (Koehn and O'Connor 1990b). It has been recorded from a variety of sites in the Snowy, Brodribb and Bemm catchments (but not further east), including State Forest and National Parks (Raadik 1992). Siltation from roads associated with timber harvesting activities upstream may interfere with the spawning sites, but predation by introduced species on juveniles may also be a threat to this species.

Mountain Galaxias Galaxias olidus

RARITY

a) Geographic Range

- Classification of range size: Medium
- Range size within region: Multiple catchments (3/7 catchments) Proportion of region occupied (%): 5.8% (16 sites out of 275 sites)
- Certainty: Medium
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Koehn and O'Connor 1990b, Raadik, 1992a, 1995

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI
- Measured rate of change: NI

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Prevention of sedimentation from forest practices
- Certainty: Low
- Source: Campbell and Doeg 1989

SPATIAL DYNAMICS
a) Population variability
Classification of population variability: NI
b) Powers of dispersal

- Classification of powers of dispersal: Low
- Certainty: High
- Average distance dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: Koehn and O'Connor 1990b

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: 300 eggs
- Age at first breeding: 3 years
- Mean number of litters per year: 1
- Source: Koehn and O'Connor 1990b

b) Longevity

- Classification of life span: Medium (long lived)
- Certainty: Low
- Average life span: 7 years

- Maximum life span: NI
- Body size: 6 - 8 cm snout-tail base length
- Source: Koehn and O'Connor 1990b

THREATENING PROCESSES
1. Predation: Predation by introduced species on adults.

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: Siltation of spawning area and habitat.

- Certainty: Low
- Ranking: 1
- Source: Campbell and Doeg 1989

3. Disease: No
4. Competition: Competition with introduced species.

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Comparatively little is known about the biology or ecology of the Mountain Galaxias. The species is classified as Insufficiently known in Victoria (CNR 1995). There is no migration, spawning in or near the adult habitats, although the exact location of egg deposition is unclear (Koehn and O'Connor 1990b). It has been recorded from a variety of high altitude sites in East Gippsland catchments, including State Forest and National Parks (Raadik 1992). Siltation from timber harvesting activities upstream may interfere with the spawning sites, but predation and competition from introduced species may be the major threat to this species.

Spotted Galaxias Galaxias truttaceus

RARITY
a) Geographic Range

- Classification of range size: Medium
- Range size within region: 2 catchments
- Proportion of region occupied (%): 2.9% (8 sites out of 275 sites)
- Certainty: Low
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Koehn and O'Connor 1990b, Raadik, 1992a, 1995

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trend
Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI
- Measured rate of change: NI

b) Dependence on management

- Classification of dependence on management: Not dependant
- Certainty: Low
- Source: Koehn and O'Connor 1990b, T. Raadik, pers. comm.

SPATIAL DYNAMICS
a) Population variability

- Classification of population variability: NI

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: High
- Average distance dispersed: NI
- Maximum distance dispersed: Total catchment length
- Immigration rates: NI
- Source: Koehn and O'Connor 1990b

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: NI
- Mean clutch/litter size: 5,500 eggs
- Age at first breeding: 2 years
- Mean number of litters per year: 1
- Source: Koehn and O'Connor 1990b

b) Longevity

- Classification of life span: NI
- Average life span: NI
- Maximum life span: NI
- Body size: 10 cm snout-tail base length

- Source: Koehn and O'Connor 1990b

THREATENING PROCESSES
1. Predation: Predation by introduced species on juveniles

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: Barriers to migration

- Certainty: High
- Ranking: 1
- Source: Koehn and O'Connor 1990a

3. Disease: No
4. Competition: Competition with introduced species

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Comparatively little is known about the biology or ecology of the Spotted Galaxias. The species is classified as rare in Victoria (CNR 1995). Unlike the Mountain Galaxias, larvae are washed to the sea following spawning, followed by an upstream migration of juveniles (Koehn and O'Connor 1990b). It has been recorded primarily from the low altitude coastal catchments in Croajingolong National Park, but also from two sites in the mid reaches of the Snowy River (Raadik 1992). Predation and competition from introduced species may be the major threat to this species.

Pouched Lamprey Geotria australis

RARITY
a) Geographic Range

- Classification of range size: Small
- Range size within region: 2 of 7 Catchments
- Proportion of region occupied (%): 2.5 (7 sites out of 275 sites)
- Certainty: Medium
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:
Classification of habitat specificity: Narrow

- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: 2/7 Catchments
- Certainty: High
- Source: Koehn and O'Connor 1990b, Raadik 1992a

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends
Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI
- Certainty: Medium
- Source: T. Raadik, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Prevention of siltation from forest practices
- Certainty: Low
- Source: Campbell and Doeg 1989, Koehn and O'Connor 1990b, T. Raadik, pers. comm

SPATIAL DYNAMICS
a) Population variability
Classification of population variability: NI
b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: High
- Average distance dispersed: NI
- Maximum distance dispersed: Total catchment length
- Immigration rates: NI
- Source: Koehn and O'Connor 1990b, Raadik, 1992a

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: High
- Certainty: Medium
- Mean clutch/litter size: 58,000 eggs
- Age at first breeding: NI
- Mean number of litters per year: 1
- Source: Koehn and O'Connor 1990b

b) Longevity

- Classification of life span: NI
- Average life span: NI (3 - 4 years in freshwater, unknown length marine phase)
- Maximum life span: NI
- Body size: 45 - 50 cm total length
- Source: Koehn and O'Connor 1990b

THREATENING PROCESSES
1. Predation: Predation by introduced species on juveniles.

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: Siltation of spawning areas and habitat from forestry practices.

- Certainty: Low
- Ranking: 2
- Source: Campbell and Doeg 1989

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Relatively little is known about the biology or ecology of the Pouched Lamprey. The species is classified as rare in Victoria (CNR 1995). It is known to spawn in the upper catchment after an upstream migration (Koehn and O'Connor 1990b). It has only been recorded in the Brodribb River at a few sites (Raadik 1992) and at one site in the Bemm River catchment (Raadik 1995). All sites are within State Forest. Siltation from timber harvesting activities may interfere with spawning sites (described as "nests of stones" by Koehn and O'Connor 1990b). Predation by introduced species may also be a problem for the species, although there is no firm data for predation in this species.

Striped Gudgeon Gobiomorphus australis

RARITY
a) Geographic Range

- Classification of range size: Large
- Range size within region: 3 catchments
- Proportion of region occupied (%): 2.5% (7 sites out of 275 sites)
- Certainty: Low
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:
Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI

- Certainty: High
- Source: Koehn and O'Connor 1990b, Raadik, 1992a, 1995

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends.
Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI
- Measured rate of change: NI

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Prevention of siltation
- Certainty: Low
- Source: Campbell and Doeg 1989

SPATIAL DYNAMICS
a) Population variability
Classification of population variability: NI
b) Powers of dispersal

- Classification of powers of dispersal: Low
- Certainty: Low
- Average distance dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: Koehn and O'Connor 1990b

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: NI
- Mean clutch/litter size: NI
- Age at first breeding: NI
- Mean number of litters per year: NI

b) Longevity

- Classification of life span: NI
- Average life span: NI
- Maximum life span: NI
- Body size: 12 cm total length
- Source: Koehn and O'Connor 1990b

THREATENING PROCESSES
1. Predation: Predation by introduced species on juveniles and adults.

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: Siltation of spawning habitat.

- Certainty: Low
- Ranking: 2
- Source: Campbell and Doeg 1989

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Little detailed data are available on the biology and ecology of the Striped Gudgeon. The species is classified as rare in Victoria (CNR 1995). A migratory species, spawning occurs upstream and larvae are washed down to the estuary (Allen 1989). Juvenile fish then move upstream (Koehn and O'Connor 1990b). It has been recorded from three widespread catchments from low altitude sites (Raadik 1992), but it is uncertain how far the species penetrates into fresh water (Allen 1989). Migration barriers are probably not important as fish have been observed to climb wet rock faces (Koehn and O'Connor 1990b; Allen 1989), but predation by introduced species and siltation from forestry practices may be major threats to this species.

Cox's Gudgeon Gobiomorphus coxii

RARITY
a) Geographic Range

- Classification of range size: Small
- Range size within region: Subcatchment
- Proportion of region occupied (%): 1.1% (3 sites out of 275 sites)
- Certainty: Medium
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Koehn and O'Connor 1990b, Raadik, 1992a, 1995

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends

Increasing and Stable Species

a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI
- Certainty: Low
- Source: T. Raadik, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: prevention of siltation from forest practices
- Certainty: Low
- Source: Campbell and Doeg 1989

SPATIAL DYNAMICS

a) Population variability

Classification of population variability: NI

b) Powers of dispersal

- Classification of powers of dispersal: NI
- Average distance dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: NI
- Mean clutch/litter size: NI
- Age at first breeding: NI
- Mean number of litters per year: NI

b) Longevity

- Classification of life span: NI
- Average life span: NI
- Maximum life span: NI
- Body size: 15 cm total length
- Source: Koehn and O'Connor 1990b

THREATENING PROCESSES

1. Predation: Predation by introduced species on juveniles.

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: Siltation of spawning area and habitat.

- Certainty: Low
- Ranking: 2
- Source: Campbell and Doeg 1989

3. Disease: No
4. Competition: Competition with introduced species.

- Certainty: Low
- Ranking: 1
- Source: Koehn and O'Connor 1990a

5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Little detailed data are available on the biology and ecology of Cox's Gudgeon. The species is classified as vulnerable in Victoria (CNR 1995) and is listed under the *Flora and Fauna Guarantee Act* 1988. Like the Striped Gudgeon, Cox's Gudgeon is a migratory species, with spawning occurring upstream and larvae washed down to the estuary (Allen 1989). Juvenile fish then move upstream (Koehn and O'Connor 1990b). It has been recorded from three low altitude sites (Raadik 1992), but may also penetrate inland to altitudes of approximately 700m (Allen 1989). Migration barriers are probably not important as fish have been observed out of the water and can climb wet rock faces (Allen 1989), but siltation of spawning sites and predation from introduced species may be major threats to this species.

Empire Gudgeon Hypseleotris compressa

RARITY
a) Geographic Range

- Classification of range size: Small
- Range size within region: Site
- Proportion of region occupied (%): 0.4% (1 site out of 275 sites)
- Certainty: Medium
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Koehn and O'Connor 1990b, Raadik, 1992a, 1995

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends
Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI
- Measured rate of change: NI

b) Dependence on management
Classification of dependence on management: NI

SPATIAL DYNAMICS
a) Population variability
Classification of population variability: NI
b) Powers of dispersal

- Classification of powers of dispersal: NI
- Average distance dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: 3,000 eggs
- Age at first breeding: NI
- Mean number of litters per year: 1
- Source: Allen 1989

b) Longevity

- Classification of life span: NI
- Average life span: NI
- Maximum life span: NI
- Body size: 10 cm snout-tail base length
- Source: Allen 1989

THREATENING PROCESSES
1. Predation: No
2. Altered hydrology: Siltation of spawning area and habitat.

- Certainty: Low
- Ranking: 1
- Source: Campbell and Doeg 1989

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Only recently recorded from Victorian waters (T. Raadik, unpublished data), little detailed information is available on the biology and ecology of the Empire Gudgeon. No details are available for migration (Koehn and O'Connor 1990b, Allen 1989) and the current known distribution is from a single site in far East Gippsland.

Australian Bass Macquaria novemaculeata

RARITY

a) Geographic Range

- Classification of range size: Large
- Range size within region: All catchments
- Proportion of region occupied (%): 9.1% (25 sites out of 275 sites)
- Certainty: Medium
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Koehn and O'Connor 1990b, Raadik, 1992a, 1995

OBSERVED DYNAMICS

Population Trend in Last Decade

Increasing, stable or declined: NI available to identify trends.

Increasing and Stable Species

a) Population trend since discovery by Europeans

- Classification of population trend: NI
- Measured rate of change: NI

b) Dependence on management

- Classification of dependence on management: Not dependent
- Certainty: Low
- Source: T. Raadik, pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: NI

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: High
- Average distance dispersed: NI
- Maximum distance dispersed: Total catchment length

- Immigration rates: NI
- Source: Koehn and O'Connor 1990b

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: High
- Certainty: Medium
- Mean clutch/litter size: 440,000 eggs
- Age at first breeding: 3 - 6 years
- Mean number of litters per year: 1
- Source: Koehn and O'Connor 1990b

b) Longevity

- Classification of life span: Long lived
- Certainty: Medium
- Average life span: 25 years
- Maximum life span: NI
- Body size: 35 cm snout-tail base length
- Source: Koehn and O'Connor 1990b

THREATENING PROCESSES
1. Predation: Predation by introduced species on migrating larvae

- Certainty: Low
- Ranking: 2
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: Barriers to migration

- Certainty: High
- Ranking: 2
- Source: Koehn and O'Connor 1990a

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Little detailed data are available on the biology and ecology of Australian Bass. The species is classified as rare in Victoria (CNR 1995). A highly migratory species, adults move downstream to estuaries to spawn, then move upstream. The larvae or juveniles also migrate upstream after hatching (Koehn and O'Connor 1990b). It has been recorded primarily from low altitude sites, but also from two sites in the mid and upper reaches of the Snowy River (Raadik 1992a). Migration barriers are important threats, but predation from introduced species may also be a major threat to this species.

Freshwater Herring Potamalosa richmondia

RARITY

a) Geographic Range

- Classification of range size: Small
- Range size within region: Single Site
- Proportion of region occupied (%): 0.4% (1 site out of 275 sites)
- Certainty: Medium
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Koehn and O'Connor 1990b, Raadik, 1992a, 1995

OBSERVED DYNAMICS

Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends
Increasing and Stable Species

a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI
- Certainty: Low
- Source: T. Raadik, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Prevention of siltation from forest practices
- Certainty: Low
- Source: T. Raadik, pers. comm.

SPATIAL DYNAMICS

a) Population variability

Classification of population variability: NI

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: High
- Average distance dispersed: NI
- Maximum distance dispersed: Total catchment length
- Immigration rates: NI
- Source: Koehn and O'Connor 1990b

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: NI
- Mean clutch/litter size: NI
- Age at first breeding: NI
- Mean number of litters per year: NI

b) Longevity

- Classification of life span: NI
- Average life span: NI
- Maximum life span: NI
- Body size: 15 cm total length
- Source: Koehn and O'Connor 1990b

THREATENING PROCESSES
1. Predation: No
2. Altered hydrology: Siltation of habitat from forestry practices and barriers to migration

- Certainty: Low and High respectively
- Ranking: 2
- Source: Campbell and Doeg 1989, Koehn and O'Connor 1990a

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: Destruction of known habitat by wildfire.

- Certainty: Low
- Ranking: 1
- Source: Olive and Rieger 1987

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Almost nothing is known about the biology or ecology of the Freshwater Herring. The species is classified as endangered in Victoria (CNR 1995) and is listed under the Flora and Fauna Guarantee Act 1988. It is believed to spawn in the lower catchment after an downstream migration, but the movement of the species is unclear (Allen, 1989, Koehn and O'Connor 1990b). It has only been recorded at a single site in Croajingolong National Park in the far east of Gippsland (Raadik 1992). Siltation from timber harvesting activities upstream may interfere with the site. The impact of wildfire may also cause significant changes to all of the habitats in the known distribution.

Australian Grayling Prototroctes maraena

RARITY
a) Geographic Range

- Classification of range size: Large
- Range size within region: Multiple Catchments (6/7 catchments)

- Proportion of region occupied (%): 8% (22 sites out of 275 sites)
- Certainty: Medium
- Source: Raadik 1992a, 1992b, 1995

b) Abundace

- Classification of abundance: NI
- Density: NI

c) Habitat specificity:

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rivers and streams
- Proportion of available habitats used: NI
- Certainty: High
- Source: Koehn and O'Connor 1990b, Raadik, 1992a, 1995

OBSERVED DYNAMICS

Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends
Increasing and Stable Species

a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI
- Certainty: Medium
- Source: T. Raadik, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Prevention of sedimentation from forest practices
- Certainty: Low
- Source: Campbell and Doeg, 1989

SPATIAL DYNAMICS

a) Population variability

Classification of population variability: NI

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: High
- Average distance dispersed: NI
- Maximum distance dispersed: Total catchment length
- Immigration rates: NI
- Source: Koehn and O'Connor 1990b

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: High
- Certainty: Medium
- Mean clutch/litter size: 47,000 eggs
- Age at first breeding: 2 years
- Mean number of litters per year: 1
- Source: Koehn and O'Connor 1990b

b) Longevity

- Classification of life span: Medium (long lived)
- Certainty: Low
- Average life span: 4 years
- Maximum life span: NI
- Body size: 17 - 19 cm total length
- Source: Koehn and O'Connor 1990b

THREATENING PROCESSES

1. Predation: Predation by introduced species on juveniles.

- Certainty: Low
- Ranking: 3
- Source: Koehn and O'Connor 1990a

2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): Siltation of spawning habitat.

- Certainty: Low
- Ranking: 1
- Source: Campbell and Doeg 1989

Barriers to migration

- Certainty: High
- Ranking: 2
- Source: Koehn and O'Connor 1990b

8. Harvesting by humans: No
9. Altered successional states: No
10. Natural disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Compared to many other rare fish, a considerable amount is known about the biology or ecology of the Australian Grayling. The species is classified as vulnerable in Victoria (CNR 1995) and is listed under the *Flora and Fauna Guarantee Act*1988. It is believed to spawn in the lower catchment upstream of the estuary, after which the young drift to the sea. Mature adults then move upstream (some to the upper catchment), then downstream again to spawn, laying eggs in the gravel interstices (Koehn and O'Connor 1990b). It has been recorded from a variety of sites in most East Gippsland catchments, including State Forest and National Parks (Raadik 1992). Siltation from timber harvesting activities upstream may interfere with the spawning site and in-stream barriers may affect the upstream migration.

Birds

- Grey Goshawk Accipiter novaehollandiae
- Glossy Black-Cockatoo Calyptorhyncus lathami
- King Quail Coturnix chinensis
- Eastern Bristlebird Dasyornis brachypterus
- White-bellied Sea-Eagle Haliaeetue leucogaster
- Swift Parrot Lathamus discolor
- Square-tailed Kite Lophoictinia isura
- Turquoise Parrot Neophema pulchella
- Barking Owl Ninox connivens
- Powerful Owl Ninox strenua
- Ground Parrot Pezoporus wallicus
- Lewin's Rail Rallus pectoralis
- Masked Owl Tyto novaehollandiae
- Sooty Owl Tyto tenebricosa
- Regent Honeyeater Xanthomyza phrygia

Grey Goshawk
Accipiter novaehollandiae

Rarity
a) Geographic Range

- Classification of range size: Medium

- Range size within region (ha): Insufficient sightings to establish regional range size. Approx. 12 records sparsely distributed across several 10,000's ha. Proportion of region occupied (%): Unknown. Possibly 5 - 20%
- Certainty: Low
- Source: Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Low. Very few records despite extensive survey indicates extremely small population.
- Density: NI for East Gippsland. Breeding density estimate from Tasmania of 2 - 3 pair per 100 km2 not a realistic extrapolation for East Gippsland.
- Certainty: Low
- Source: Atlas of Victorian Wildlife, Mooney 1986

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Number of habitats used in the region: Coastal and subcoastal forest and wooded lands, particularly, rainforest, riparian forest and open forest (especially that dominated by Eucalyptus cypellocarpa). Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: Marchant and Higgins 1993

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: NI. Possibly stable.
- Certainty: Low

- Source: S. Henry, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI. Possibly declined due to broadscale habitat clearance particularly in range outside of East Gippsland.
- Measured rate of change: NI
- Certainty: Low
- Source: S. Henry and J. Westaway, pers. comm.

b) Dependence on management

- Classification of dependence on management: NI

Spatial Dynamics
a) Population variability

- Classification of population variability: NI. Possibly low
- Certainty: Low
- Number of estimates of density: Nil for East Gippsland. Breeding density estimate for Tasmania.
- TIme period for estimates of density: NI
- Coefficient of variation in density: NI
- Source: Mooney 1986

b) Powers of dispersal

- Classification of powers of dispersal: High potential, but species is sedentary.
- Certainty: Medium
- Average distances dispersed: NI, but probably 10's km as non-established individuals and immatures are dispersive.
- Maximum distance dispersed: NI
- Immigration rates: Low. Established pairs resident, with some dispersal during autumn/winter outside of breeding range.
- Source: Marchant and Higgins 1993

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: 3 eggs (range 2 - 4)
- Age at first breeding (yrs): Unknown. Possibly 2
- Mean no of litters per year: Single
- Source: Schodde and Tidemann (eds) 1986

b) Longevity

- Classification of lifespan: Long lived
- Certainty: Low
- Average lifespan: NI. Possibly 10 - 30 years
- Maximum lifespan (yrs): NI from wild
- Body size (gm): Male - 350, female - 680
- Source: Schodde and Tidemann (eds) 1986

Threatening Processes
1. Predation: No
2. Altered hydrology:
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): Unlikely to be relevant for East Gippsland.

Source: Mooney 1987, Marchant and Higgins 1993
6. Fragmentation: Effects unclear but in Otways the species has nested in forest remnants as small as 10 hectares.

Source: Marchant and Higgins 1993
7. Partial habitat removal (timber harvesting): Effects unclear but apparently tolerant of selective logging in Tasmania.

Source: Mooney 1987
8. Harvesting by humans: Goshawks have been culled in agricultural districts by shooting and trapping in the past and this continues today to some degree. Also birds will desert the nest following severe human disturbance.

Certainty: Medium
Ranking: 1
Source: Mooney 1987, Marchant and Higgins 1993
9. Altered successional states: The species is dependent upon mature forest for breeding and rarely uses regrowth forest < 30 years of age.

Certainty: Medium
Ranking: 1
Source: Marchant and Higgins 1993
10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: Secondary poisoning especially by organophosphates (e.g. after eating dingo baits) may kill goshawks.

Certainty: Medium
Ranking: 1
Source: Hyem 1936
13. Grazing or trampling by stock: No
14. Other: No

Comments: The Grey Goshawk is rarely observed in East Gippsland and the status of the regional population (which may consist of only few to several pair) requires investigation. It occurs in coastal and subcoastal forests and hunts mostly small mammals and birds, often below the canopy, but also from nearby open areas. The species depends upon mature forest for breeding and rarely uses forest regrowth less than thirty years of age. Further threats to the species in East Gippsland include killing and disturbance at the nest by humans and secondary poisoning by consumption of feral predator baits.

Glossy Black-Cockatoo
Calyptorhyncus lathami

Rarity
a) Geographic Range

- Classification of range size: Medium
- Range size within region: Approximately 250,000 ha Proportion of region occupied (%): Approximately 21%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, Emison et al. 1987

b) Abundace

- Classification of abundance: Low
- Density: Total Victorian population below or up to low 100's.
- Certainty: Low
- Source: S. Henry, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Lowland forest, dry shrubby forest, rain-shadow woodland, coastal banksia woodland. Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: Emison et al. 1987

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Unclear. Difficult to assess due to longevity of species and time-lag of effects.
- Certainty: Low
- Source: Brouwer and Garnett 1990

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined. Historically, (last century) species declined, but has probably been stable in Victoria over last decade.
- Measured rate of change: NI
- Certainty: Low
- Source: Blakers et al. 1984, Clout 1989

b) Dependence on management

- Classification of dependence on management: Not dependent
- Certainty: Low
- Source: Clout 1989

Spatial Dynamics
a) Population variability

- Classification of population variability: NI. Probably low.
- Certainty: Low
- Number of estimates of density: Nil

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Medium
- Average distances dispersed: Recorded travelling 40 km to feed.
- Maximum distance dispersed: Species moves up to several 100's kms in East Gippsland and SE NSW especially in autumn/winter.
- Immigration rates: NI
- Source: Emison et al. 1987

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: 1 egg
- Age at first breeding (yrs): Unknown. Possibly 2
- Mean no of litters per year: 1
- Source: Forshaw and Cooper 1981

b) Longevity

- Classification of lifespan: Long lived
- Certainty: Medium
- Average lifespan (yrs): NI from wild
- Maximum lifespan (yrs): > 30
- Body size (gm): female 422, male 430
- Source: Forshaw and Cooper 1981

Threatening Processes
1. Predation: No
2. Altered hydrology: No
3. Disease: No
4. Competition: Unknown. Possibly interspecific competition from Yellow-tailed Black-Cockatoos for tree hollows as nest sites.

- Certainty: Low
- Ranking: 1
- Source: Joseph 1982

5. Total Habitat Removal (Clearing): Historically the clearing of coastal forest but of minor significance today.

- Certainty: Low
- Ranking: 1

6. Fragmentation: Unknown
7. Partial habitat removal (timber harvesting): Logging of lowland forest, especially where Allocasuarina are present, may cause a reduction in nest sites and food resource.

- Certainty: High
- Ranking: 1
- Source: Brouwer and Garnett 1990

8. Harvesting by humans: For live bird trade.

- Certainty: Low
- Ranking: 1

9. Altered successional states: Allocasuarina can regenerate successfully following fire, but successive fires within a ten year period could prevent the species from producing seed.

- Certainty: High
- Ranking: 2
- Source: Garnett 1993, Clout 1989

10. Natural Disasters: Widespread extensive wildfire, causing the loss of food and nest resources.

- Certainty: Medium

- Ranking: 1
- Source: Clout 1989

11. Loss of organism the species depends on: Birds rely on adequate and consistent supply of seeds from the cones of Allocasuarina, specifically A. littoralis in East Gippsland.

- Certainty: Medium
- Ranking: 1
- Source: Clout 1989

12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: This large cockatoo has contracted in range and its Victorian range is now almost confined to East Gippsland where it occurs at low population density. It is a long lived bird with a low reproductive output and thus changes in population demographics will not be evident in the short term. The bird has specialised habitat requirements and may be vulnerable to timber harvesting and burning that results in a loss of large tree cavities for nesting and a reduction in the abundance of its near exclusive food item, the seeds of Allocasuarina littoralis.

King Quail
Coturnix chinensis

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region (ha): Only 3 isolated records for East Gippsland. Species probably does not occupy specific range in East Gippsland. Proportion of region occupied (%): < 1%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, Emison et al. 1987

b) Abundace

- Classification of abundance: Low
- Density: < 100
- Certainty: Low
- Source: Atlas of Victorian Wildlife, S. Henry, pers. comm. 1987

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Recorded from coastal heath and damp forest in East Gippsland.
- Proportion of available habitats used (%): Minimal
- Certainty: Low
- Source: Emison et al. 1987

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: NI specific to East Gippsland. Victorian range has declined and southern Australian populations have declined in abundance.

- Certainty: Medium
- Source: Miller 1938, Emison et al. 1987

Declining species
Classification of rate of decline in past 10 years or three generations: NI

Spatial Dynamics
a) Population variability

- Classification of population variability: NI. Population fluctuations recorded at sites in Australia where species is resident. However possibly only spring- summer visitor to East Gippsland.
- Certainty: Low
- Number of estimates of density: NI

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Low
- Average distances dispersed: Unknown. Possibly small.
- Maximum distance dispersed: NI
- Immigration rates: NI. Species probably resident through most of its normal (core) range with some local movements
- Source: Marchant and Higgins 1993

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Relatively high
- Certainty: High
- Mean clutch/litter size: 4 - 7 eggs
- Age at first breeding (yrs): 1
- Mean no of litters per year: 1 or 2
- Source: Tarr 1948

b) Longevity

- Classification of lifespan: Relatively short lived
- Certainty: Low
- Average lifespan (yrs): NI for wild populations
- Maximum lifespan (yrs): NI for wild populations
- Body size (gm): 35 - 40
- Source: Tarr 1948

Threatening Processes
1. Predation: Unknown
2. Altered hydrology: No.
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): Historically, draining and clearing of preferred habitat (i.e. swampy heathlands and densely vegetated freshwater swamps). No longer relevant in East Gippsland.

- Certainty: Medium
- Ranking: Historically (3), Current (1)
- Source: Marchant and Higgins 1993

6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: No
9. Altered successional states: Frequent burning for fire management/control, and the grazing and trampling of cattle can degrade habitat by reducing protective cover and food availability.

- Certainty: Medium
- Ranking: 2
- Source: Cooper 1974, McFarland 1988

10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: Increased salinity of wetlands.

- Certainty: Low
- Ranking: Probably insignificant
- Source: Marchant and Higgins 1993

13. Grazing or trampling by stock: No
14. Other: No

Comments: Small cryptic bird of dense swamps and heaths with few Victorian occurrences outside of French Island. Isolated East Gippsland records suggest irregular visitor or vagrant. Main serious threats are drainage and clearance of wetland habitat and loss of protective cover and food availability through burning and grazing/trampling of wetlands. The impact in East Gippsland of these threats on the overall conservation of King Quail are probably not significant as the species may be of vagrant status.

Eastern Bristlebird
Dasyornis brachypterus

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: <1000 ha Proportion of region occupied (%): Approximately 0.08%
- Certainty: High
- Source: M. Bramwell, pers. comm.

b) Abundace

- Classification of abundance: Low
- Density: Total population estimate 200 - 500 individuals.
- Certainty: Medium
- Source: M. Bramwell, pers. comm., Reichelt, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Wet heath, riparian scrub, warm temperate rainforest and adjacent coastal woodland and lowland forest with tussocky understorey. Confined to coastal areas east of Mallacoota (Howe Flat).
- Proportion of available habitats used (%): Very small (<5%).

- Certainty: High
- Source: Bramwell (in prep)

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Declined
- Certainty: High
- Source: Bramwell (in prep)

Declining species
a) Rate of decline in last decade
Classification of rate of decline in past 10 years or three generations: Medium

- Certainty: Medium
- Measured rate of decline: Three of the four recently known populations appear to have become extinct.
- Year decline first noted: 1980's
- Source: NRE Bairnsdale (unpublished data), Bramwell (in prep)

b) Spatial pattern of decline

- Spatial pattern of decline: See above
- Certainty: Medium
- Source: NRE Bairnsdale (unpublished data),
  b) Temporal pattern of decline
  Temporal pattern of decline: NI

Spatial Dynamics
a) Population variability

- Classification of population variability: Low
- Certainty: Low
- Number of estimates of density: Single. 1.1 to 2/ha at Barren Grounds (NSW).
- TIme period for estimates of density: Several years
- Coefficient of variation in density: NI
- Source: Emison et al. 1987

b) Powers of dispersal

- Classification of powers of dispersal: Low. Species has restricted habitat and does not fly well.
- Certainty: Medium
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: M. Bramwell, pers. comm.

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: High
- Mean clutch/litter size: 2
- Age at first breeding (yrs): Unknown. Possibly 1
- Mean no of litters per year: 1
- Source: Schodde and Tidemann (eds) 1986

b) Longevity

- Classification of lifespan: NI
- Body size (gm): 210 - 220 mm
- Source: Schodde and Tidemann (eds) 1986

Threatening Processes
1. Predation: Yes. Species is preyed on by feral cats. Terrestrial habit likely to increase vulnerability.

- Certainty: Medium
- Ranking: 2
- Source: Reichelt, pers. comm.

2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: No
9. Altered successional states: Yes. Management of fire regime likely to be very significant. Fire frequency which is too high or too low likely to lead to alteration of structure and composition of optimal habitat.

- Certainty: Medium
- Ranking: 3
- Source: Brouwer and Garnett 1990

10. Natural Disasters: Yes. Severe wildfire could potentially extirpate isolated populations of this essentially ground-dwelling bird.

- Certainty: Low
- Ranking: 3
- Source: Garnett 1993

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: Yes. Isolation of population lowers genetic variability and predisposes species to inbreeding and local extinction.

Comments: The Eastern Bristlebird has a discontinuous and disjunct national distribution with the only Victorian population being in far East Gippsland. This ground feeding insectivore occupies small permanent territories and has limited mobility . Its restricted habitat is mostly in National and other Parks, but the species appears to be declining and has suffered a serious range contraction. The major threatening process for the Eastern Bristlebird in East Gippsland is probably inappropriate fire regimes which alter the structure and composition of its optimal habitat. Additional threats include the populations vulnerability to stochastic perturbation, inbreeding, feral predation, wildfire and human disturbance.

White-bellied Sea-Eagle
Haliaeetus leucogaster

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: Approximately 100,000 ha
- Proportion of region occupied (%): Approximately 8%
- Certainty: High, as species is very conspicuous
- Source: Atlas of Victorian Wildlife, Emison et al. 1987

b) Abundace

- Classification of abundance: Low
- Density: 10 - 20 pairs in East Gippsland. Approximately 100 breeding pairs in Victoria including approximately 25 pairs in nearby Gippsland Lakes district.
- Certainty: High
- Source: Emison et al. 1987

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Coast, estuaries and rivers.
- Proportion of available habitats used (%): 90 - 100%
- Certainty: Medium
- Source: Atlas of Victorian Birds

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Medium
- Source: S. Henry, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI
- Certainty: Medium
- Source: Bilney and Emison 1983

b) Dependence on management

- Classification of dependence on management: Not dependent. Passive management only.
- Certainty: Low
- Source: Clunie 1994

Spatial Dynamics
a) Population variability

- Classification of population variability: Low
- Certainty: Medium
- Number of estimates of density: NI for East Gippsland. Density estimates exist for other areas of Victoria (e.g Murray River and Gippsland Lakes) but vary greatly between areas.
- Source: Bilney and Chatto 1986, Bilney and Emison 1983

b) Powers of dispersal

- Classification of powers of dispersal: High. Immature birds disperse widely.

- Certainty: Medium
- Average distances dispersed: Large
- Maximum distance dispersed: NI
- Immigration rates: NI. If an individual of a breeding pair dies it is replaced from the pool of unpaired birds.
- Source: Favaloro 1944

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low. Birds pair for life.
- Certainty: Medium
- Mean clutch/litter size: 1 or 2, usually 2
- Age at first breeding (yrs): 6 years
- Mean no of litters per year: 1
- Source: Bilney and Emison 1983

b) Longevity

- Classification of lifespan: Long lived
- Certainty: Low
- Average lifespan (yrs): 10's of years
- Maximum lifespan (yrs): NI
- Body size (gm): 2.4 - 3.3 kg
- Source: Bilney and Emison 1983

Threatening Processes
1. Predation: No
2. Altered hydrology: No.
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): Some loss of habitat components, most importantly nest sites around estuaries due to human settlements and coastal development.

- Certainty: Medium
- Ranking: 1
- Source: Bilney and Emison 1983

8. Harvesting by humans: A protected species but probably culled in the early to mid 1900s. Nest sites are vulnerable to disturbance and destruction. Birds may desert nests if disturbed by humans.

- Certainty: Medium
- Ranking: 1
- Source: Hunt and Mooney 1983

9. Altered successional states: No
10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: Mercury and pesticides (notably DDT and Dieldrin) may accumulate in their life-cycle through predation of contaminated fish and poisoned small mammals respectively.

- Certainty: Medium
- Ranking: 1
- Source: Bilney and Emison 1983, Newton 1979, Olsen and Olsen 1969

13. Grazing or trampling by stock: No
14. Other: No

Comments: This large sedentary raptor has a limited number of breeding pairs resident along East Gippsland coastline, major lowland rivers and associated estuaries. Sea-Eagles are susceptible to contamination through the poisoning of their prey base, particularly mercury in fish and organophosphates in mammals. A reduction in nest site availability through coastal development and human disturbance at the nest are further potential threats.

Swift Parrot
Lathamus discolor

Rarity
a) Geographic Range

- Classification of range size: Medium
- Range size within region: Approximately 200,000 ha
- Proportion of region occupied (%): Approximately 17%
- Certainty : Medium
- Source: Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Low
- Density: Flocks of up to approximately 100 visit coastal forests and dry forests of East Gippsland in some winters.
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, Henry and Murray 1993

c) Habitat Specificity

- Classification of habitat specificity: Wide generally, though specialist nectivore of winter flowering eucalypts.
- Number of habitats used in the region: Lowland forest, box/ironbark forests, coastal woodlands, dry forest, rainshadow woodland.
- Proportion of available habitats used (%): NI
- Certainty: Low
- Source: Atlas of Victorian Wildlife, S. Henry pers. obs.

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: NI. Declined nationally.
- Certainty: Low
- Source: Brouwer and Garnett 1990

Spatial Dynamics
a) Population variability
Classification of population variability: High. Species is apparently sporadic winter visitor in response to flowering patterns of eucalypts.

- Certainty: Low
- Number of estimates of density: Nil for East Gippsland. National population estimate from Tasmania is 1300 breeding pairs.
- Source: Emison et al. 1987, Brown 1989

b) Powers of dispersal

- Classification of powers of dispersal: High. Species is extremely mobile.
- Certainty: High
- Average distances dispersed: Species migrates from Tasmania to south eastern mainland each winter.
- Maximum distance dispersed: 100's km
- Immigration rates: High. Entire population migrates annually to breeding areas in Tasmania.
- Source: Emison et al. 1987, Brown 1989

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Medium
- Certainty: High
- Mean clutch/litter size: 4 (4 - 5) eggs
- Age at first breeding (yrs): Unknown. Possibly 1
- Mean no of litters per year: 1
- Source: Schodde and Tidemann (eds) 1986, Brown 1989

b) Longevity

- Classification of lifespan: Unknown. Possibly long lived
- Certainty: Low
- Body size (gm): 65
- Source: Schodde and Tidemann (eds) 1986, Brown 1989

Threatening Processes
1. Predation: Peregrine falcon. Impact insignificant.
2. Altered hydrology: No
3. Disease: No
4. Competition: Interspecific competition for nectar with honeyeaters monopolising resources.

- Certainty: Low
- Ranking: 1
- Source: Brown 1989

5. Total Habitat Removal (Clearing): Clearing of box/ironbark forests and woodlands of major importance elsewhere. Probably not a major threat in East Gippsland.

- Certainty: Low
- Ranking: 1

6. Fragmentation: As above
7. Partial habitat removal (timber harvesting): Selective removal of the parrots preferred eucalypts may reduce winter nectar supply and thus lower an area's suitability.

- Certainty: Medium
- Ranking: 1
- Source: Brown 1989, Garnett 1990

8. Harvesting by humans: No
9. Altered successional states: No.
10. Natural Disasters: No
11. Loss of organism the species depends on: No.
12. Contamination of life cycle: No

13. Grazing or trampling by stock: No
14. Other: No

Comments: The Swift Parrot is a gregarious arboreal nectivore, and an occasional winter visitor to East Gippsland. Most preferred habitat is in reserves or is uneconomic to harvest, but some is subject to timber harvesting. Past timber harvesting practices of selectively removing box and ironbark species for their durable timbers may have decreased the abundance of winter nectar resources. The impact of this threatening process in East Gippsland on the overall conservation of the Swift Parrot is not likely to be significant relative to its impact across the core of the species mainland range.

Square-tailed Kite
Lophoictinia isura

Rarity
a) Geographic Range

- Classification of range size: Large
- Range size within region: Approximately 500,000 ha
- Proportion of region occupied (%): Approximately 41%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, Emison et al. 1987

b) Abundace

- Classification of abundance: Low
- Density: < 10 pairs visit East Gippsland. 1 pair per 1,200 km2. < 50 pairs in Victoria.
- Certainty: Medium
- Source: Debus and Silveira 1989, S. Henry, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Number of habitats used in the region: Most forest and woodland ecological vegetation classes.
- Proportion of available habitats used (%): Unknown. Probably most, >70%.
- Certainty: Medium
- Source: S. Henry, pers. comm.

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Unknown but probably stable.
- Certainty: Low
- Source: S. Henry, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI specific to East Gippsland. Australian population declined overall.
- Measured rate of change: NI
- Certainty: Low
- Source: Debus and Czechura 1989

b) Dependence on management

- Classification of dependence on management: Not dependent
- Certainty: low
- Source: S. Henry, pers. comm.

Spatial Dynamics
a) Population variability

- Classification of population variability: NI

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Medium
- Average distances dispersed: Capable of moving 100's of km.
- Maximum distance dispersed: NI
- Immigration rates: NI, summer visitor to East Gippsland from northern Australia.
- Source: Debus and Silveira 1989, Emison et al. 1987

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: 2 - 3 eggs
- Age at first breeding (yrs): 2. May breed in sub-adult plumage.
- Mean no of litters per year: 1
- Source: Marchant and Higgins 1993

b) Longevity

- Classification of lifespan: Long lived
- Certainty: Medium
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): > 15
- Body size (gm): 500 - 635
- Source: Marchant and Higgins 1993

Threatening Processes
1. Predation: No
2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): Loss of suitable habitat through forest and woodland clearing elsewhere in species range. Probably not a current threat in East Gippsland.
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): Species highly sensitive to removal or disturbance of critical habitat components such as tall eucalypts, shrub layers and a passerine prey base of sufficient density and consistent reliability.

- Certainty: Medium
- Ranking: 1
- Source: Debus and Czechura 1989

8. Harvesting by humans: Egg collecting. Shooting especially in farming areas.

- Certainty: Medium
- Ranking: 1
- Source: Jolly 1989

9. Altered successional states: Unknown
10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: This raptor occurs at very low densities throughout its distribution and requires extensive home ranges in which to hunt. Little is known of its population dynamics but the species is expected to have a low recovery potential. It is a summer migrant to East Gippsland, with a local population of only several pairs. The species relies on an adequate availability and density of its passerine prey base and tall trees for nesting. The species also exhibits a high level of fidelity, returning to the same nest trees for many years. Protection of known nest sites from disturbance is probably the most important issue for East Gippsland. (eg. timber harvesting and egg collectors). Smoke from fuel reduction burns conducted in the breeding season are also a potential threat.

Turquoise Parrot
Neophema pulchella

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: Approximately 50,000 ha
- Proportion of region occupied (%): Approximately 4%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Low
- Density: Unknown. Possibly < 100 to low 100's
- Certainty: Low
- Source: S. Henry, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow. Requires tree hollows for nesting.
- Number of habitats used in the region: Heathlands and adjacent lowland forest and coastal woodlands.
- Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: Henry and Murray 1993

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Possibly increasing
- Certainty: Low
- Source: Garnett 1993

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Decline in late 1800's to early 1900's followed by recovery from 1970's. Population appears to have established in East Gippsland lowlands in last few decades and may be increasing.
- Measured rate of change: NI
- Certainty: Medium
- Source: North 1912, Campbell 1916, Forshaw and Cooper 1981, Frith 1952

b) Dependence on management

- Classification of dependence on management: Not dependent
- Certainty: Low
- Source: S. Henry, pers. comm.

Spatial Dynamics
a) Population variability

- Classification of population variability: Unknown. Possibly high
- Certainty: Low
- Number of estimates of density: Nil for East Gippsland. Estimates of numbers in north-east Victoria only (e.g. approximately 480 individuals for Chiltern Park).
- TIme period for estimates of density: 1 year
- Coefficient of variation in density: NI
- Source: Quin and Baker-Gabb 1993, Forshaw and Cooper 1981

b) Powers of dispersal

- Classification of powers of dispersal: High (presumably)
- Certainty: Low
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: J. Westaway, pers. comm.

Life History Parameters
a) Reproductive output

- Classification of reproductive output: High
- Certainty: Medium
- Mean clutch/litter size: 4 - 5 eggs
- Age at first breeding (yrs): Unknown. Possibly 1
- Mean no of litters per year: 1
- Source: Forshaw and Cooper 1981, Quin and Baker-Gabb 1993

b) Longevity

- Classification of lifespan: NI

Threatening Processes
1. Predation: Predation at the nest by tree goannas and red foxes.

- Certainty: Medium
- Ranking: 1
- Source: Quin and Baker-Gabb 1993

2. Altered hydrology: No
3. Disease: No
4. Competition: Competition for favoured food items such as grass seeds with herbivores, especially rabbits.

- Certainty: Low
- Ranking: 1
- Source: Quin 1990

5. Total Habitat Removal (Clearing): Previously significant in other parts of Victoria but not in East Gippsland.
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): Logging could reduce the number of suitable hollows available for nesting although areas of good habitat are generally marginal or unsuitable for timber production

- Certainty: Low
- Ranking: 1
- Source: Henry and Murray 1993, Garnett 1993

8. Harvesting by humans: Egg collecting for aviary trade. May not be significant in East Gippsland.

- Certainty: Low
- Ranking: 1

9. Altered successional states: Inappropriate fire regimes could alter the structure and floristics of the heathland and forest habitats utilised.

- Certainty: Low
- Ranking: 2
- Source: Meredith 1988

10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: This grass parrot is a generalist feeder but requires tree hollows for nest sites. It has a small resident population in East Gippsland but little is known of its specific ecological requirements in this part of its range. Its population dynamics are not known. Processes threatening the species in its core Victorian distribution are likely to be of little pressure in East Gippsland, as habitat components appear not to be limiting.

Barking Owl
***Ninox connivens*Rarity**
a) Geographic Range

- Classification of range size: Small
- Range size within region (ha): Only 3 or 4 widely spaced reliable records for East Gippsland. Residency in the region is uncertain, probably visitor only.
- Proportion of region occupied (%): NI
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Extremely low. Few records only. Very rare.
- Density: NI
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

c) Habitat Specificity

- Classification of habitat specificity: Wide habitat specificity generally but typical habitat not well represented in East Gippsland.
- Number of habitats used in the region: Insufficient local records to determine precise habitat use has been recorded from wet forest in East Gippsland. Elsewhere species prefers dry forest and woodland and treed farmland.
- Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: Henry and Murray 1993

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Species may not be resident in the area or is very rare.
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

Spatial Dynamics
a) Population variability

- Classification of population variability: NI
- Number of estimates of density: Not applicable to East Gippsland records. Single pair/200 ha in southern Queensland; other estimates of territory size are 200 ha or more.
- Source: Hollands 1991

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Low
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: 2 - 3 eggs
- Age at first breeding (yrs): Unknown. Possibly 1
- Mean no of litters per year: 1
- Source: Hollands 1991

b) Longevity

- Classification of lifespan: Long lived
- Certainty: Low
- Average lifespan (yrs): NI

- Maximum lifespan (yrs): NI
- Body size (gm): 425 - 510
- Source: Hollands 1991

Threatening Processes
1. Predation: No
2. Altered hydrology: No.
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): Areas of suitable habitat in East Gippsland are not subject to timber harvesting.
8. Harvesting by humans: No
9. Altered successional states: Unknown
10. Natural Disasters: No
11. Loss of organism the species depends on: Unknown
12. Contamination of life cycle: Contamination of life cycle by consumption of poisoned prey, particularly rabbits (see Masked Owl).

- Certainty: Low
- Ranking: 1
- Source: Czechura, pers. comm. in Garnett 1993

13. Grazing or trampling by stock: No
14. Other: No

Comments: The Barking Owl is typically a bird of drier country and is extremely rare in East Gippsland and probably not resident. It would be valuable to establish whether the species is an irregular visitor to the region or if there are small resident populations. Processes that threaten the species over its normal geographic range include the loss of tree hollow nest sites through timber harvesting and the indirect contamination of its life cycle through poisoned prey. The operation of these threatening processes in East Gippsland is not likely to influence the overall conservation of the species due to its probable 'irregular visitor' status.

Powerful Owl
Ninox strenua

Rarity
a) Geographic Range

- Classification of range size: Large
- Range size within region: Approximately 700,000 ha = 7,000 km2
- Proportion of region occupied (%): Approximately 58%
- Certainty: High
- Source: McIntyre and Bramwell (in prep), Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Low
- Density: Approx. 60 locations in the area, some with multiple records. Population estimate of 102 - 182 pairs. Therefore median of 140 pair (280 individuals) = 1 bird per 2,500 ha = 1 bird per 0.04 km2.
- Certainty: Medium
- Source: McIntyre and Henry (in prep), McIntyre and Bramwell (in prep)

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Number of habitats used in the region: Many including the following ecological vegetation classes: montane forest, montane woodland, wet forest, damp forest, dry forest, riparian forest, lowland forest and coastal woodland. Older age classes are preferred and species nests in large tree hollows.
- Proportion of available habitats used (%): Unknown. Possibly > 50
- Certainty: Medium
- Source: Henry and Murray 1993

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Low
- Source: S. Henry, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Probably decrease
- Measured rate of change: NI
- Certainty: Low
- Source: S. Henry, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Reservation of known sites and reservation of large samples of preferred forest types.
- Certainty: Low
- Source: S. Henry, pers. comm.

Spatial Dynamics
a) Population variability

- Classification of population variability: Low
- Certainty: Medium
- Number of estimates of density: 1 for East Gippsland. Several elsewhere.
- TIme period for estimates of density: 5 years
- Coefficient of variation in density: NI
- Source: McIntyre and Bramwell (in prep), Brouwer and Garnett 1990, Debus and Chafer 1994

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Medium
- Average distances dispersed: Young adults generally disperse and probably capable of dispersing 100's of km.
- Maximum distance dispersed: NI
- Immigration rates: Low. Breeding pairs sedentary and separated by 5 - 20 km2.
- Source: Schodde and Mason 1980

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: High
- Mean clutch/litter size: 2 eggs
- Age at first breeding (yrs): NI
- Mean no of litters per year: 1
- Source: Hollands 1991

b) Longevity

- Classification of lifespan: Long lived
- Certainty: Medium
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): 1100 - 1700
- Source: Hollands 1991

Threatening Processes
1. Predation: No
2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): Clearing of forested areas for agriculture in the past with some low level of clearing continuing.

- Certainty: Medium
- Ranking: Historically (3), Current (1)
- Source: S. Henry, pers. comm.

6. Fragmentation: Unknown, possibly.

- Certainty: Low
- Ranking: 1
- Source: S. Henry, pers. comm.

7. Partial habitat removal (timber harvesting): Logging, especially clearfelling, removes essential habitat components such as large hollow bearing trees and subsequent regrowth is likely to be less suitable.

- Certainty: Medium
- Ranking: 2
- Source: Brouwer and Garnett 1990

8. Harvesting by humans: No
9. Altered successional states: No.
10. Natural Disasters: Extensive severe wildfire can potentially eliminate local prey populations and destroy essental habitat components.

- Certainty: Medium
- Ranking: 1
- Source: Garnett 1993

11. Loss of organism the species depends on: Powerful Owls prey on a range of smaller animals and arboreal mammals (particularly greater gliders and ringtail possums). Aboreal mammal populations may be lost or reduced as a result of clearfell logging.

- Certainty: Medium
- Ranking: 2
- Source: Debus and Chafer 1994

12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: This largest of the forest owls is a sedentary bird that defends an extensive home range (> 800 ha). It is widespread but uncommon in East Gippsland. Loss of hollow-bearing trees and habitat alteration as a result of logging operations may exert a detrimental impact upon this species through reductions in arboreal marsupial populations and a reduction in availability of suitable nest sites.

Ground Parrot
Pezoporus wallicus

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: 11,000 ha
- Proportion of region occupied (%): 0.9%
- Certainty: High
- Source: Meredith 1983, Meredith and Jaremovic 1990

b) Abundace

- Classification of abundance: Low
- Density: Average 0.2 birds per ha (range 0.05 - 0.3 birds per ha) = 1 individual per 20 km2. Total Victorian population estimated to be 1,500 - 2,000 individuals.
- Certainty: Medium
- Source: Meredith 1983

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Wet heathland, clay heathland, especially those dominated by the Cyperaceae and Epacridaceae.
- Proportion of available habitats used (%): Approximately 70% of heath. Some heaths too old or too young to support ground parrots.
- Certainty: Medium
- Source: Meredith 1983

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Medium
- Source: S.Henry, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Slight decline due to loss of habitat
- Measured rate of change: NI
- Certainty: Medium
- Source: Blakers et al. 1984

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Fire management of heaths
- Certainty: Medium
- Source: Meredith and Jaremovic 1990

Spatial Dynamics
a) Population variability

- Classification of population variability: High
- Certainty: Medium
- Number of estimates of density: Several
- TIme period for estimates of density: NI
- Coefficient of variation in density: NI
- Source: NRE Orbost (unpublished data - Yeerung State Forest survey report), Meredith 1983, Emison et al. 1987, also density estimates from Tasmania.

b) Powers of dispersal

- Classification of powers of dispersal: Unknown. Possibly low.
- Certainty: Medium
- Maximum distance dispersed: 120 km recorded
- Immigration rates: High. Movement into different seral regeneration stages of heath over time, also post-breeding dispersal of young.
- Source: Meredith 1983

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low. Adults mate for life.
- Certainty: Medium
- Mean clutch/litter size: 3 (2 - 5) eggs
- Age at first breeding (yrs): 1 - 2
- Mean no of litters per year: 1
- Source: Meredith 1983

b) Longevity

- Classification of lifespan: Unknown. Possibly long lived
- Certainty: Low
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): 71 - 76 gm
- Source: Meredith 1983, Forshaw and Cooper 1981

Threatening Processes
1. Predation: By feral cats and red foxes.

- Certainty: High
- Ranking: 2
- Source: Garnett 1993

2. Altered hydrology: No
3. Disease: No
4. Competition: Unknown

5. Total Habitat Removal (Clearing): Some clearing of heaths in 1960's especially Marlo Plains. Low level of clearing still occurs.

- Certainty: High
- Ranking: 1

6. Fragmentation: Probably not important as habitat is naturally heterogeneous, ie there exists a mosaic distribution of optimal habitat.
7. Partial habitat removal (timber harvesting): No.
8. Harvesting by humans: No
9. Altered successional states: Particular seral stages of heathland (young and old) are unsuitable habitat. Appropriate fire regimes are crucial.

- Certainty: High
- Ranking: 3
- Source: Meredith 1983, Jordan and Jordan 1984

10. Natural Disasters: Extensive wildfires can disrupt optimum age structure of heath mosaic.

- Certainty: High
- Ranking: 2
- Reference: Merideth 1983

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: The species is a specialist of dense, wet or clay coastal heathlands and has a restricted distribution in East Gippsland. A mosaic of post-fire regenerating heath is essential to the maintenance of ground parrots, thus proactive management is required for viable populations.

Lewin's Rail
Rallus pectoralis

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region (ha): Unknown. Approximately 10,000 ha
- Proportion of region occupied (%): Unknown. Approximately 0.8%
- Certainty: Low
- Source: Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Low
- Density: Few records for East Gippsland, but species particularly cryptic so probably underestimated.
- Certainty: Low (basically an informed guess)
- Source: Atlas of Victorian Wildlife, Emison et al. 1987

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Wetlands including lake fringes, swampy creeks, riparian scrubs, estuarine streams and margins, saltmarshes and coastal lagoons.
- Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: Emison et al. 1987

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: NI. Likely to be stable.
- Certainty: Low
- Source: S. Henry, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined across Victoria due to drainage and clearance of wetlands, but probably stable in East Gippsland in last decade.
- Measured rate of change: NI
- Certainty: Low
- Source: S. Henry, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant. Species may persist but decline in range and abundance if wetland areas were not protected.
- Type of intervention: Protection of wetland and riparian areas.
- Certainty: low
- Source: S. Henry, pers. comm.

Spatial Dynamics
a) Population variability

- Classification of population variability: NI
- Number of estimates of density: Nil

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Medium
- Average distances dispersed: NI for East Gippsland. Recorded travelling 12 km in Tasmania.
- Immigration rates: NI. Species may be partly migratory or even nomadic.
- Source: Milledge 1972, Emison et al. 1987

Life History Parameters
a) Reproductive output

- Classification of reproductive output: High
- Certainty: Low
- Mean clutch/litter size: 3 - 8 eggs
- Age at first breeding (yrs): Unknown. Possibly 1
- Mean no of litters per year: 1
- Source: Marchant and Higgins 1993

b) Longevity

- Classification of lifespan: NI
- Body size (gm): 75 - 100
- Source: Marchant and Higgins 1993

Threatening Processes
1. Predation: Of adults and chicks by feral cats and dogs.

- Certainty: Medium
- Ranking: 1
- Source: McKean 1983

2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): Draining and clearing of wetlands and swampy areas on alluvial flats.

- Certainty: Medium
- Ranking: Historically (3), Current (1)
- Source: Garnett 1993

6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No.
8. Harvesting by humans: No
9. Altered successional states: Burning of habitat for grazing.

- Certainty: Medium
- Ranking: 1
- Source: Garnett 1993

10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: Protective vegetation cover trampled by stock.

- Certainty: Medium
- Ranking: 1
- Source: Leicester 1960

14. Other: No

Comments: Species is a cryptic bird of both fresh and saline swamp and wetland habitats. The few isolated records for East Gippsland are probably a poor reflection of true distribution and abundance. The species is susceptible to drainage, clearance and other disturbance (e.g. burning and trampling) of its wetland habitat and also to predation by feral carnivores. Predition by feral carnivores is probably the most significant threat in East Gippsland.

Masked Owl
Tyto novaehollandiae

Rarity
a) Geographic Range

- Classification of range size: Large
- Range size within region: Approximately 500,000 ha
- Proportion of region occupied (%): Approximately 41%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Low
- Density: Estimated population of 85 - 275 pair; Therefore median of 180 pairs (360 individuals) = 1 bird per 1,389 ha or 0.072 birds per km2.
- Certainty: Medium
- Source: McIntyre and Bramwell (in prep)

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Ecological vegetation classes used include lowland forest, dry forest, coastal heathland and coastal woodlands. Species prefers edge areas where forest meets heath or other open areas.
- Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: McIntyre and Bramwell (in prep), S. Henry, pers. comm.

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Low
- Source: S. Henry, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI. Stable or declined.
- Measured rate of change: NI for East Gippsland. National population may have declined by 50% in formerly forested areas based on amount of clearing, but to a lesser extent in East Gippsland.
- Certainty: Low
- Source: S. Henry, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Protection of known sites and reservation of large samples of preferred habitat types.
- Certainty: Low
- Source: S. Henry, pers. comm.

Spatial Dynamics
a) Population variability

- Classification of population variability: Low
- Certainty: Low

- Number of estimates of density: One for East Gippsland (0.072/km2).
- TIme period for estimates of density: 2 - 3 years
- Coefficient of variation in density: NI
- Source: McIntyre and Bramwell (in prep)

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Low
- Average distances dispersed: NI. Probably capable of dispersing many 10's km.
- Maximum distance dispersed: NI
- Immigration rates: NI. Species mate for life and maintain large permanent territories.
- Source: Schodde and Mason 1980

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: 2 - 4 eggs, usually 3
- Age at first breeding (yrs): Unknown. Possibly 2
- Mean no of litters per year: 1
- Source: Schodde and Mason 1980

b) Longevity

- Classification of lifespan: Long lived
- Certainty: Low
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): 520 - 1260
- Source: Schodde and Mason 1980

Threatening Processes
1. Predation: No
2. Altered hydrology: No.
3. Disease: No
4. Competition: Unknown. Possibly some competition with foxes and feral cats for terrestrial mammal prey.

- Certainty: Low
- Ranking: 1

5. Total Habitat Removal (Clearing): Clearing of forests and woodlands for agriculture has been important historically especially in other parts of the species range. Probably not significant in East Gippsland now.
6. Fragmentation: Unknown
7. Partial habitat removal (timber harvesting): Effects of logging are unclear. The loss of tree hollows as potential nest sites may have a negative impact, however the creation of further 'edge' habitat may be beneficial to the species the short term as it appears that ecotonal habitat is utilised.

- Certainty: Medium
- Ranking: 1
- Source: Henry and Murray 1993

8. Harvesting by humans: No
9. Altered successional states: Effects of conversion of older forest age-classes to young regrowth unclear.

- Certainty: Medium
- Ranking: 1
- Source: Garnett 1993

10. Natural Disasters: Unknown. Possibly extensive severe wildfire

- Certainty: Medium
- Ranking: 1

11. Loss of organism the species depends on: Arboreal prey species may decline in abundance due to loss of hollow bearing trees in timber production areas.

- Certainty: Medium
- Ranking: 1
- Source: Henry and Murray 1993

12. Contamination of life cycle: Contamination of species life cycle through predation of poisoned rabbits along the farmland/forest edge.

- Certainty: Low
- Ranking: 1
- Source: Czechura, pers. comm. in Garnett 1993

13. Grazing or trampling by stock: No
14. Other: No

Comments: This large forest owl is widespread but uncommon in the lowland forests and woodlands of East Gippsland where it hunts for both terrestrial and arboreal prey, often exploiting the woodland/heath vegetation boundary. The species may be susceptible to timber harvesting resulting in a loss of large hollow trees required for nest sites and a reduction in the availability of arboreal mammalian prey. .

Sooty Owl
Tyto tenebricosa

Rarity
a) Geographic Range

- Classification of range size: Large
- Range size within region: Approximately 400,000 ha
- Proportion of region occupied (%): Approximately 33%
- Certainty: Medium
- Source: S. Henry, pers. comm., Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Low
- Density: Population range of 110 - 212 pairs. Therefore median 161 pairs (322 individuals) = 1 bird per 1,240 ha or 0.08 birds per km2.
- Certainty: Medium
- Source: McIntyre and Bramwell (in prep)

c) Habitat Specificity

- Classification of habitat specificity: Narrow. Widespread but limited by prey and nest site availability.
- Number of habitats used in the region: Several ecological vegetation classes used including cool temperate and warm temperate rainforest, wet forest, damp forest, riparian forest, montane forest and riparian scrub. However species prefers older forest classes, nests in large hollows and roosts in dense gullies.
- Proportion of available habitats used (%): Possibly 50% of available habitat used but extent of optimal habitat is much less.
- Certainty: Medium
- Source: Henry and Murray 1993

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Low
- Source: S. Henry, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI for East Gippsland. NSW population declined by at least 20% since European settlement.
- Certainty: Low
- Source: Debus 1994

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Reservation of known sites and reservation of large samples of preferred gully habitat.
- Certainty: Medium
- Source: S. Henry, pers. comm.

Spatial Dynamics
a) Population variability

- Classification of population variability: Low
- Certainty: Medium
- Number of estimates of density: One for East Gippsland = 0.08 per ha. Total national population estimated at <10,000 individuals.
- TIme period for estimates of density: 3 - 5 years
- Coefficient of variation in density: NI
- Source: McIntyre and Bramwell (in prep), Garnett 1993

b) Powers of dispersal

- Classification of powers of dispersal: Moderate (high)
- Certainty: Low
- Average distances dispersed: Probably capable of dispersing 10's of km, though species preferred habitat is limited.
- Maximum distance dispersed: NI
- Immigration rates: Low. Species is sedentary and territorial with estimated territory size of 200 - 800 ha.
- Source: Schodde and Mason 1980

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: Usually single egg, sometimes two.
- Age at first breeding (yrs): NI
- Mean no of litters per year: 1
- Source: Fleay 1968, Schodd and Mason 1990

b) Longevity

- Classification of lifespan: Long lived
- Certainty: Low
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): Male 500 - 700, female 750 - 1000
- Source: Fleay 1968, Schodd and Mason 1990

Threatening Processes
1. Predation: No
2. Altered hydrology: No
3. Disease: No
4. Competition: Unknown
5. Total Habitat Removal (Clearing): Clearing of river flats in East Gippsland in the late 1800's and early 1900's, currently not a significant threat.
6. Fragmentation: Disturbance to linear and other small-area-to-edge-ratio habitats utilised such as rainforest, riparian forest and gully vegetation.

- Certainty: Low
- Ranking: 1
- Source: Henry and Murray 1993

7. Partial habitat removal (timber harvesting): Logging of wet and damp forest types can result in the loss of tree hollows required for nesting and roosting.

- Certainty: Medium
- Ranking: 2
- Source: Debus 1994

8. Harvesting by humans: No
9. Altered successional states: Conversion of older forest age-classes to young regrowth.

- Certainty: Medium
- Ranking: 1
- Source: Henry and Murray 1993

10. Natural Disasters: Extensive severe wildfire can potentially eliminate local prey populations and destroy essential habitat components.

- Certainty: Low
- Ranking: 2
- Source: Garnett 1993

11. Loss of organism the species depends on: Populations of arboreal mammals, especially Sugar Gliders and Ring-tailed Possums, that comprise a large portion of the Sooty Owl diet may decline in abundance following habitat loss through timber harvesting.

- Certainty: Medium
- Ranking: 2
- Source: Debus and Chafer 1994

12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: The Sooty Owl is a specialist inhabitant of rainforests and usually tall open forests and occupies extensive home range areas. The species is vulnerable to the effects of timber harvesting in wet and damp forest communities since it requires old growth forest elements, particularly large tree hollows for nesting and roosting sites. Tree hollows are also important for most arboreal mammals which form a significant component of the Sooty Owl diet. Loss of hollow bearing trees in timber production areas may reduce prey availability

Regent Honeyeater
Xanthomyza phrygia

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: Approximately 100,000 ha
- Proportion of region occupied (%): Approximately 8%
- Certainty: Low
- Source: Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Low
- Density: Occasional visitors only. Virtually a vagrant to East Gippsland.
- Certainty: Medium
- Source: Atlas of Victorian Wildlife.

c) Habitat Specificity

- Classification of habitat specificity: Narrow. Displays high fidelity to a few key eucalypt species with high nectar flows.
- Number of habitats used in the region: Coastal forests, dry forest, treed pastoral land.
- Proportion of available habitats used (%): Unknown. Possibly low
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Declined
- Certainty: High
- Source: Franklin et al. 1989, Webster and Menkhorst 1992, Menkhorst 1993

Declining species
a) Rate of decline in last decade
Classification of rate of decline in past 10 years or three generations: Medium

- Certainty: Medium

- Measured rate of decline: NI
- Year decline first noted: Late 1970s
- Source: Franklin et al. 1989

b) Spatial pattern of decline
Spatial pattern of decline: Range size declines faster

- Certainty: Medium
- Source: Franklin et al. 1989

b) Temporal pattern of decline
Temporal pattern of decline: Decline rate decreases

- Certainty: Medium
- Source: Franklin et al. 1989

Spatial Dynamics
a) Population variability

- Classification of population variability: High
- Certainty: High
- Number of estimates of density: NI for East Gippsland. National population estimate 500 - 1,500 individuals.
- TIme period for estimates of density: 3 years
- Coefficient of variation in density: NI
- Source: Menkhorst 1993

b) Powers of dispersal

- Classification of powers of dispersal: Very high. Nomadic
- Certainty: High
- Average distances dispersed: 100's km
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: Franklin et al. 1989

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: 2 - 3 eggs
- Age at first breeding (yrs): 1
- Mean no of litters per year: 1
- Source: Menkhorst 1993

b) Longevity

- Classification of lifespan: Unknown. Possibly short lived
- Certainty: Low
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): 41 - 46
- Source: Menkhorst 1993

Threatening Processes

1. Predation: Natural predation by goshawks and falcons, impact insignificant.
2. Altered hydrology: No
3. Disease: No
4. Competition: Interspecific competition for nectar resources from aggressive honeyeaters. Noisy miners main competitor in central Victoria but not relevant to East Gippsland. Competition from other species (e.g. Wattlebird, Friarbird) unknown.
5. Total Habitat Removal (Clearing): Clearing for agriculture of some areas of prime habitat with key eucalypt species. Very important in central Victoria but unlikely to be significant in East Gippsland
6. Fragmentation: Fragmentation of habitat has lead to greater competition from agressive species. Probably not operating in East Gippsland but significant elsewhere in species range.
7. Partial habitat removal (timber harvesting): Removal of large-sized, mature individuals of the honeyeater's preferred high nectar yielding tree species (ironbark and box) from coastal forests may lower nectar supply.

- Certainty: Medium
- Ranking: 1
- Source: Garnett 1993

8. Harvesting by humans: No
9. Altered successional states: No
10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: This highly nomadic nectivore is an endangered species throughout its typically north-of-the-divide range and is an occasional visitor to East Gippsland. The Regent Honeyeater displays high fidelity to a few key eucalypt species with high nectar yields (ironbark and box species) and is almost certainly vulnerable to their removal. This threat is of greater significance across the species core range than in the marginal occurrences in East Gippsland.

Frogs

- Giant Burrowing Frog *Heleioporus australiacus*
- Large Brown Tree Frog *Litoria littlejohni*
- Southern Barred Frog *Mixophes balbus*
- Martin's Toadlet *Uperoleia martini*
- Tyler's Toadlet *Uperoleia tyleri*

Giant Burrowing Frog *Heleioporus australiacus*

RARITY
a) Geographic Range

- Classification of range size: Medium
- Range size within region: 100,000 - 300,000 ha
- Proportion of region occupied (%): Approx 8 - 25%
- Certainty: High
- Source: Atlas of Victorian Wildlife, G. Gillespie and P. Robertson, pers. comm.

b) Abundace

- Classification of abundance: Low
- Density: NI
- Certainty: Medium
- Source: Gillespie 1990

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Number of habitats used in the region: Montane riparian forest, montane sclerophyll woodland, riparian forest, wet sclerophyll forest, damp sclerophyll forest, dry sclerophyll forest.
- Proportion of available habitats used (%): NI
- Certainty: Low
- Source: Gillespie 1990

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: Declined

- Certainty: Medium
- Source: Mazzer 1994

Declining species
Classification of rate of decline in past 10 years or three generations: Insufficient records to identify trends.

SPATIAL DYNAMICS
a) Population variability
Classification of population variability: NI
b) Powers of dispersal
Classification of powers of dispersal: Medium. Not compared to a bird!

- Certainty: Medium

- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: Gillespie 1990

LIFE HISTORY PARAMETERS
a) Reproductive output
Classification of reproductive output: High

- Certainty: High
- Mean clutch/litter size: 775 - 1239 eggs/mass
- Age at first breeding (yrs): Unknown
- Mean no of litters per year: 1
- Source: Watson and Martin 1973

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): 86 mm snout-vent length
- Source: Watson and Martin 1973

THREATENING PROCESSES
1. Predation: Of eggs and larvae by trout and carp.

- Certainty: Low
- Ranking: 1
- Source: G. Gillespie, pers. comm.

2. Altered hydrology: Sedimentation of streams due to the construction of roads and tracks.

- Certainty: Low
- Ranking: 2
- Source: Gillespie 1990, Mazzer 1994

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): A reduction in litter and ground cover layers which harbour invertebrate food following timber harvesting and fuel reduction burning, and changes to steam flow and perenniality within catchments carrying substantial areas of regrowth forest due to intensive timber harvesting.

- Certainty: Low
- Ranking: 2
- Source: Gillespie 1990, Mazzer 1994

8. Harvesting by humans: No
9. Altered successional states: No
10. Natural Disasters: A reduction in litter and ground cover layers which harbour invertebrate food following extensive wildfire.

- Certainty: Low
- Ranking: 2
- Source: Mazzer 1994

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: The biology, distribution and habitat requirements of the Giant Burrowing Frog are very poorly known (Gillespie 1990). Within East Gippsland, records of this highly cryptic species are dispersed and it is unclear whether the species is widely spread at very low densities, or occurs in small isolated populations. The Giant Burrowing Frog appears to use small flowing streams as breeding sites and has been recorded substantial distances within forest from water, indicating the species utilises or at least disperses through forested areas (Gillespie 1990). Threatening processes within East Gippsland include those affecting breeding sites such as changes to water flow and quality or to streamside vegetation, or those affecting the wider forest environment such as removal of litter from the forest floor, and include timber harvesting, fuel reduction burning, road construction and wildfires (Mazzer 1994).

Large Brown Tree Frog *Litoria littlejohni*

RARITY
a) Geographic Range

- Classification of range size: Medium
- Range size within region: 100,000 - 300,000 ha
- Proportion of region occupied (%): Approximately 8 - 25%
- Certainty: High
- Source: Atlas of Victorian Wildlife, G. Gillespie, pers. comm.

b) Abundace

- Classification of abundance: Medium
- Density: NI
- Certainty: Medium
- Source: G. Gillespie and P. Robertson, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Number of habitats used in the region: Wet sclerophyll forest, damp sclerophyll forest, dry sclerophyll forest, lowland sclerophyll forest, cool temperate rainforest, montane forest, montane riparian forest.
- Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: Opie et al. 1984, Macfarlane et al. 1987, Horrocks et al. 1987, Chesterfield et al. 1988, Lobert et al. 1991

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends.

Increasing and Stable Species
a) Population trend since discovery by Europeans
Classification of population trend: NI.

SPATIAL DYNAMICS
a) Population variability Classification of population variability: NI
b) Powers of dispersal
Classification of powers of dispersal: NI

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: High
- Certainty: Medium
- Mean clutch/litter size: 30 eggs/cluster although total egg complement unknown.
- Age at first breeding (yrs): Unknown, possibly 3rd or 4th season.
- Mean no of litters per year: 50 - 100 clusters
- Source: Martin and Littlejohn (1966), P. Robertson, pers. comm.

b) Longevity

- Classification of lifespan: Unknown
- Body size (gm): 60 mm snout-vent length
- Source: Martin and Littlejohn (1966), P. Robertson, pers. comm.

THREATENING PROCESSES
1. Predation: No
2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): Loss of habitat, and a reduction in litter and ground cover layers which harbour invertebrate food following timber harvesting and regeneration burning.

- Certainty: Low
- Ranking: 1
- Source: G. Gillespie, pers. comm.

8. Harvesting by humans: No
9. Altered successional states: No
10. Natural Disasters: Loss of forest habitat resulting from severe wildfire.

- Certainty: Low
- Ranking: 1
- Source: G. Gillespie, pers. comm.

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: The Large Brown Tree Frog has been recorded by a number of fauna surveys within East Gippsland where it does not appear uncommon (Opie *et al.* 1984, Macfarlane *et al.* 1987, Horrocks *et al.* 1987, Chesterfield *et al.* 1988, Lobert *et al.* 1991). Little is known of the biology and habitat requirements of this terrestrial species, although it is known to breed in ephemeral water bodies including pools in logs, roadside puddles, drains and fire dams (Opie *et al.* 1984). Because the Large Brown Tree Frog occurs in modified habitats such as farmland and is able to breed in temporary water bodies, it is thought to be able to tolerate some disturbance (Opie *et al.* 1984). Possible threatening processes within East Gippsland include loss of habitat as a result of timber harvesting and wildfire, and a reduction in litter and ground

cover layers which harbour invertebrate food following timber harvesting and regeneration burning (G. Gillespie, pers. comm.).

Southern Barred Frog *Mixophes balbus*

RARITY
a) Geographic Range

- Classification of range size: Small
- Range size within region: 300 ha
- Proportion of region occupied (%): 0.02%
- Certainty: High
- Source: Atlas of Victorian Wildlife, G. Gillespie and S. Henry, pers. comm.

b) Abundace

- Classification of abundance: Low
- Density: NI
- Certainty: High
- Source: G. Gillespe and S. Henry, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Riparian forest, warm temperate rainforest, dry forest.
- Proportion of available habitats used (%): Unknown
- Certainty: Low
- Source: G. Gillespie and P. Robertson, pers. comm.

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: Declined

- Certainty: Medium
- Source: S. Henry, G. Gillespie and P. Robertson, pers. comm.

Declining species
Classification of rate of decline in past 10 years or three generations: Insufficient records to identify trends.

SPATIAL DYNAMICS
a) Population variability Classification of population variability: NI
b) Powers of dispersal
Classification of powers of dispersal: NI

LIFE HISTORY PARAMETERS
a) Reproductive output
Classification of reproductive output: High

- Certainty: Medium
- Mean clutch/litter size: 100 eggs

- Age at first breeding (yrs): Unknown, possibly 3 - 5 years
- Mean no of litters per year: 1
- Source: G. Gillespe and P. Robertson, pers. comm., Clutch counts of museum specimens

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): 80 mm snout-vent length
- Source: G. Gillespe and P. Robertson, pers. comm., clutch counts of museum specimens

THREATENING PROCESSES

1. Predation: Of eggs and larvae by trout and carp.

- Certainty: Low
- Ranking: 1
- Source: G. Gillespie, pers. comm.

2. Altered hydrology: Sedimentation of streams due to the construction of roads and tracks.

- Certainty: Low
- Ranking: 2
- Source: Gillespie et al. 1992

3. Disease: No

4. Competition: No

5. Total Habitat Removal (Clearing): No

6. Fragmentation: No

7. Partial habitat removal (timber harvesting): Changes to steam flow and perenniality within catchments carrying substantial areas of regrowth forest due to intensive . timber harvesting.

- Certainty: Low
- Ranking: 2
- Source: G. Gillespie, pers. comm., Henry and Murray 1993

8. Harvesting by humans: No

9. Altered successional states: Changes to habitat due to frequent low intensity fuel reduction burns.

- Certainty: Low
- Ranking: 1
- Source: G. Gillespie, pers. comm.

10. Natural Disasters: Changes to steam flow and perenniality within catchments carrying substantial areas of regrowth forest due to severe wildfire.

- Certainty: Low
- Ranking: 2

- Source: G. Gillespie, pers. comm., Henry and Murray 1993

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Very little is known about the biology or ecology of the Southern Barred Frog. There have been three records within East Gippsland. The species was not recorded in the last 10 years by pre-logging surveys, nor by recent targeted surveys of known historic localities and other areas of suitable habitat (G. Gillespie, pers. comm.). This species is dependent on streams for part of its life cycle and the major threatening processes are probably related to changes in streams due to sedimentation caused by the construction of roads and tracks (Campbell and Doeg 1989), and changes in stream flow due to intensive harvesting or severe wildfire (Henry and Murray 1993).

Martin's Toadlet *Uperoleia martini*

RARITY
a) Geographic Range

- Classification of range size: Small
- Range size within region: 10,000 - 30,000 ha
- Proportion of region occupied (%): Approximately 0.8 - 2.5%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, G. Gillespie, pers. comm.

b) Abundace

- Classification of abundance: Medium
- Density: NI
- Certainty: Medium
- Source: G. Gillespie and P. Robertson, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Coastal heathland, coastal banksia woodland, lowland forest.
- Proportion of available habitats used (%): NI
- Certainty: Low
- Source: NRE Orbost (unpublished data), Cogger 1992

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends
Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI
- Certainty: Low
- Source: P. Robertson, pers. comm.

b) Dependence on management

- Classification of dependence on management: Not dependent
- Certainty: Low
- Source: P. Robertson, pers. comm.

SPATIAL DYNAMICS
a) Population variability Classification of population variability: NI
b) Powers of dispersal

- Classification of powers of dispersal: Unknown but most likely high.
- Certainty: Low
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: G. Gillespie, pers. comm.

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Low
- Mean clutch/litter size: 50+45 eggs
- Age at first breeding (yrs): Unknown. Possibly 2nd season
- Mean no of litters per year: 1
- Source: G. Gillespie, pers. comm.

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): Males 30 - 33 mm snout-vent length
- Source: G. Gillespie, pers. comm.

THREATENING PROCESSES
1. Predation: No
2. Altered hydrology: Changes to hydrological regimes within heathland due to road construction..

- Certainty: Low
- Ranking: 1
- Source: G. Gillespie, pers. comm.

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting):
8. Harvesting by humans: No
9. Altered successional states: Changes to habitat due to frequent low interval fuel reduction burns.

- Certainty: Low
- Ranking: 2
- Source: G. Gillespie, pers. comm.

10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Very little is known about the biology, ecology, or status of Martin's toadlet. The species is known to breed in wet heathlands in shallow temporary ponds (Davies and Littlejohn 1986), and has been recorded in banksia woodland, lowland forest as well as coastal heathlands. The majority of banksia woodland in East Gippsland is reserved, with only minor areas in State Forest. The majority of lowland forest and over half the coastal heathlands within East Gippsland occur in State Forest (Davies and Thompson 1993). While heathlands and fringing forest areas in State forest are fairly secure, construction of roads (for timber harvesting) close to heathlands may affect hydrological regimes. Fire intervals of less than 8 - 10 years are known to reduce the floristic diversity of coastal heathlands (Meredith 1988). Although the impact of such changes on Martin's Toadlet are unknown, the species may be vulnerable to changes in its habitat caused by repeated low interval fuel reduction burns.

Tyler's Toadlet *Uperoleia tyleri*

RARITY
a) Geographic Range

- Classification of range size: Small
- Range size within region: 5,000 - 15,000 ha
- Proportion of region occupied (%): Approximately 0.4 - 1.2%
- Certainty: Medium
- Source: , G. Gillespie, pers. comm.

b) Abundace

- Classification of abundance: Low
- Density: NI
- Certainty: Medium
- Source: G. Gillespie and P. Robertson, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Coastal heathland
- Proportion of available habitats used (%): NI
- Certainty: Low
- Source: NRE Orbost (unpublished data)

OBSERVED DYNAMICS
Population Trend in Last Decade
Increasing, stable or declined: NI available to identify trends.
Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI
- Certainty: Low
- Source: P. Robertson, pers. comm.

b) Dependence on management

- Classification of dependence on management: Not dependent
- Certainty: Low
- Source: P. Robertson, pers. comm.

SPATIAL DYNAMICS
a) Population variability Classification of population variability: NI
b) Powers of dispersal

- Classification of powers of dispersal: Unknown but probably high.
- Certainty: Low
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: G. Gillespie, pers. comm.

LIFE HISTORY PARAMETERS
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Low
- Mean clutch/litter size: 50+45
- Age at first breeding (yrs): Unknown. Possibly 2nd season.
- Mean no of litters per year: 1
- Source: G. Gillespie, pers. comm.

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): Males 22 - 33 mm, females 26 - 34 mm snout-vent length
- Source: G. Gillespie, pers. comm.

THREATENING PROCESSES
1. Predation: No
2. Altered hydrology: Changes to hydrological regimes within heathland due to road construction.

- Certainty: Low
- Ranking: 1
- Source: G. Gillespie, pers. comm.

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: No
9. Altered successional states: Changes to habitat due to frequent low interval fuel reduction burns.

- Certainty: Low
- Ranking: 2
- Source: G. Gillespie, pers. comm.

10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No

13. Grazing or trampling by stock: No
14. Other: No

Comments: Very little is known about the biology, ecology, or status of Tyler's Toadlet. The species is suspected of being rare, vulnerable or endangered, but not definitely known to belong to any of these categories due to a lack of information (CNR 1995). There have been no records of Tyler's Toadlet in East Gippsland since 1985. All records of the species have been from coastal heathlands where it breeds in shallow, temporary ponds (Davies and Littlejohn 1986). Like Martin's Toadlet, threatening processes in East Gippsland include activities which may alter the hydrological regimes of the heathlands such as the construction of roads and tracks. In addition the species may be vulnerable to changes in its habitat due to frequent low interval fuel reduction burning.

Mammals

- Dingo Canis familiaris dingo
- Spot-tailed Quoll Dasyurus maculatus
- Eastern Wallaroo Macropus robustus robustus
- Broad-toothed Rat Mastacomys fuscus
- The Common Bent-wing Bat Miniopteris schreibersii
- Large-footed Myotis Myotis adversus
- Brush-tailed Rock-wallaby Petrogale penicillata
- Brush-tailed Phascogale Phascogale tapoatafa
- Long-footed Potoroo Potorous longipes
- Smoky Mouse Pseudomys fumeus
- Grey-headed Flying-fox Pteropus poliocephalus
- Eastern Horseshoe Bat Rhinolophus megaphylus
- Yellow-bellied Sheathtail-bat Saccolaimus flaviventris

Dingo
Canis familiaris dingo

Rarity
a) Geographic Range

- Classification of range size: Large
- Range size within region: 900,000 ha
- Proportion of region occupied (%): 74%
- Certainty: High
- Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Medium
- Density: 1000(200 estimated population in East Gippsland. Home range of 2.5 - 5 km2 NE NSW.
- Certainty: Low
- Source: S. Henry, pers. comm., Harden 1985

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Number of habitats used in the region: Virtually all, including farmland.
- Proportion of available habitats used (%): >90%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, Menkhorst 1995

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Medium
- Source: NRE Records

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Unclear in East Gippsland, but species has become locally extinct in most heavily settled areas and has declined elsewhere.
- Measured rate of change: NI
- Certainty: Medium
- Source: French 1888, Menkhorst 1995

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Dingo's are declared vermin and are culled on and around farmland and at selected endangered species sites. If culling ceased the population would probably increase slightly.
- Certainty: Medium
- Source: Menkhorst 1995, S. Henry, pers. obs.

Spatial Dynamics
a) Population variability

- Classification of population variability: Probably low
- Certainty: Low
- Number of estimates of density: 1 (NE NSW)
- Source: Harden 1985

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: High
- Average distances dispersed: Several km
- Maximum distance dispersed: Many km
- Immigration rates: NI
- Source: Harden 1985

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Medium
- Certainty: High
- Mean clutch/litter size: 5.5 (range 2 - 9 pups)
- Age at first breeding (yrs): 2 (range 1 - 4 yrs)
- Mean no of litters per year: 1
- Source: Jones and Stevens 1988

b)Longevity

- Classification of lifespan: Long lived
- Certainty: Medium
- Average lifespan (yrs): Unknown. Possibly 5 years.
- Maximum lifespan (yrs): Unknown. Possibly 10 years.
- Body size (gm): 15,000
- Source: Jones and Stevens 1988

Threatening Processes
1. Predation: No
2. Altered hydrology: No
3. Disease: No
4. Competition: There may be competition for food resources with red foxes as there exists considerable overlap in mammalian prey items.

Certainty: Low
Ranking: 2
Source: Brown and Triggs 1990

5. Total Habitat Removal (Clearing): The dramatic historic reduction in forest cover in Victoria may have had an impact on the abundance of the dingo but this process is not significant today in East Gippsland.

6. Fragmentation: No

7. Partial habitat removal (timber harvesting): No

8. Harvesting by humans: Yes. Species is culled on and adjacent to farmland by trapping, shooting and poisoning.

Certainty: High
Ranking: 2
Source: Menkhorst 1995

9. Altered successional states: No

10. Natural Disasters: No

11. Loss of organism the species depends on: No

12. Contamination of life cycle: No

13. Grazing or trampling by stock: No

14. Other: Yes. Genetic dilution through interbreeding with domestic dogs.

Certainty: Low
Ranking: 1
Source: Jones 1990

Comments: The Dingo is the largest terrestrial predator in Australia and is widespread and apparently common in East Gippsland, although difficult to accurately assess as feral dogs and hybrids also occur. Dingo's are actively culled on and adjacent to farmland but no longer culled on public land away from farmland except at a very few threatened species sites. The long term genetic integrity of East Gippsland population is questionable due to hybridisation with feral dogs. Genetic dilution appears to be the major long term threat though its potential may have been overestimated (Jones 1990).

Spot-tailed Quoll
Dasyurus maculatus

Rarity
a) Geographic Range

- Classification of range size: Large
- Range size within region: Approximately 600,000 ha
- Proportion of region occupied (%): Approximately 50%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Density: 200 (100 individuals within 1 population. About 10 individuals using several thousand hectares at Suggan Buggan. Likely to be less elsewhere. Density probably in the order of 1 per 10,000 ha.
- Certainty: Low
- Source: Belcher 1994

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Number of habitats used in the region: Most
- Proportion of available habitats used (%): NI. Possibly >50%
- Certainty: Low

- Source: Henry and Murray 1993.

Oobserved Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Not clear. Probably declined. Approximately 50% reduction in known Victorian range since European settlement.
- Certainty: Low
- Source: Atlas of Victorian Wildlife, Mansergh 1984

Declining species
a) Rate of decline in last decade
Classification of rate of decline in past 10 years or three generations: Low

- Certainty: Low
- Measured rate of decline: NI Year decline first noted: Early-mid 20th century
- Source: Menkhorst 1995

b) Spatial pattern of decline
Spatial pattern of decline: Range size declines faster.

- Certainty: Low
- Source: Mansergh and Belcher

c) Temporal pattern of decline
Temporal pattern of decline: Decline rate increases

- Certainty: Low
- Source: Mansergh 1995

Spatial Dynamics
a) Population variability

- Classification of population variability: Low
- Certainty: Low
- Source: Belcher 1995, Mansergh 1984

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Low
- Average distances dispersed: NI. Several km overnight.
- Maximum distance dispersed: 6 km
- Immigration rates: NI
- Source: Mansergh 1995, Belcher 1995

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Medium
- Certainty: Medium
- Mean clutch/litter size: 5 (up to 6)
- Age at first breeding (yrs): 1
- Mean no of litters per year: 1
- Source: Mansergh 1984

b)Longevity

- Classification of lifespan: NI
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): Unknown. Possibly 4 years
- Body size (gm): 4 - 7 kg
- Source: Mansergh 1984

Threatening Processes

1. Predation: Unknown. Foxes may prey on young.

Certainty: Low
Ranking: 1
Source: Mansergh 1984

2. Altered hydrology: No.

3. Disease: Disease possibly reduced populations in early 20th century.

Certainty: Low
Ranking: 1
Source: Mansergh 1984

4. Competition: With the introduced forest carnivores and scavengers - foxes and cats

Certainty: Medium
Ranking: 3
Source: Mansergh and Belcher 1992, Belcher 1994

5. Total Habitat Removal (Clearing): Clearing for agriculture - approximately 50% reduction in range due to habitat loss in Victoria.

Certainty: High
Ranking (current): 1
Source: Belcher 1994, Mansergh and Belcher 1992

6. Fragmentation: As for 5. Species requires very extensive home range for hunting.

Ranking (current): 1
Source: Belcher 1994, Mansergh and Belcher 1992

7. Partial habitat removal (timber harvesting): Timber harvesting, especially clearfelling. Effects unclear but may include reduction in den sites (e.g. hollow fallen logs) and disturbance to prey populations.

Certainty: Low
Ranking: 1
Source: Menkhorst 1995

8. Harvesting by humans: Some culling in early 20th century but contact with humans now rare. Also vulnerable to 1080 poisoning during fox and dog control campaigns. The latter still occurs.

Certainty: Medium
Ranking: 2
Source: Belcher 1995, McIlroy 1981, C. Belcher, pers. comm. in Menkhorst 1995

9. Altered successional states: No

10. Natural Disasters: No

11. Loss of organism the species depends on: No

12. Contamination of life cycle: Contamination of life cycle by predation of poisoned rabbits.

Certainty: Low
Ranking: 1

13. Grazing or trampling by stock: No

14. Other: No

Comments: The Spot-tailed Quoll is the largest marsupial carnivore (i.e. top predator) surviving in Australia and requires an extensive hunting range. In East Gippsland the species is widespread but very rare. The population is concentrated in the upper Snowy River Valley at very low density. A variety of threatening processes probably operate, the most serious being

incidental non-targeted poisoning and trapping, and competition for prey from foxes and cats. The effects of timber harvesting are unclear but threatening processes are likely to be exacerbated by habitat fragmentation. The majority of known sites are from National Park and the adjacent private land where there is no timber harvesting.

Eastern Wallaroo
Macropus robustus robustus

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: 30,000 ha
- Proportion of region occupied (%): 2.5%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Density: . 100(50 individuals within 1 population
- Certainty: Low
- Source: S. Henry, pers. comm., Menkhorst 1995

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Rainshadow woodland, dry forest, rocky outcrop shrubland.
- Proportion of available habitats used (%): NI
- Certainty: Low
- Source: Menkhorst 1995

Observed Dynamics- NI
Spatial Dynamics - NI

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Low
- Mean clutch/litter size: 1
- Age at first breeding (yrs): 1.5 - 2 years
- Mean no of litters per year: 1
- Source: Menkhorst 1995, Poole and Merchant 1987

b)Longevity

- Classification of lifespan: NI
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): 30 - 40 kg
- Source: Menkhorst 1995, Poole and Merchant 1987

Threatening Processes
1. Predation: Dingo, fox

Certainty: Low
Ranking: 1
Source: Taylor 1985
2. Altered hydrology: No
3. Disease: No
4. Competition: Unknown. Possibly from introduced herbivores such as goats and rabbits.

Certainty: Low
Ranking: 1
Source: Taylor 1985
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: No
9. Altered successional states: Unknown. Possibly from fire.

Certainty: Low
Ranking: 2
10. Natural Disasters: Population especially vulnerable due to its apparant isolation.

Certainty: Low
Ranking: 1
Source: Menkhorst 1995
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: The species is at limit of its range in East Gippsland and is common elsewhere in Australia. The East Gippsland population is the only one in Victoria, but is very poorly known, with almost NI on its status or the ecology. The entire population is within National Park. Threatening processes operating on the population, if any, are not clear.

Broad-toothed Rat
Mastacomys fuscus

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: 5,000 ha. The Cobberas and possibly near Cann River.
- Proportion of region occupied (%): 0.4%
- Certainty: Medium
- Source: Menkhorst 1995, Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Density: 500(300 individuals within 10 populations
- Certainty: Low
- Source: Happold 1995

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Montane, riparian and wet forest with dense grasses, sedges and herbs.
- Proportion of available habitats used (%): Unknown. Possibly <10%
- Certainty: Medium
- Source: Menkhorst 1995

Observed Dynamics - NI. Likely that population has declined in 20th century, but possibly stable in last decade.

Spatial Dynamics
a) Population variability

- Classification of population variability: Probably low.
- Certainty: Low
- Number of estimates of density: Nil
- TIme period for estimates of density: NI
- Coefficient of variation in density: NI
- Source: Carron 1985, Happold 1989

b) Powers of dispersal

- Classification of powers of dispersal: NI

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: 2 (1 - 3)
- Age at first breeding (yrs): 10 months - 1 year
- Mean no of litters per year: 2
- Source: Happold 1989

b)Longevity - NI
- Body size (gm): 122 gm
- Source: Happold 1989

Threatening Processes
1. Predation: Foxes and cats

Certainty: Medium
Ranking: 2
Source: Wallis *et al.* 1982
2. Altered hydrology: No
3. Disease: No
4. Competition: For food resources, particularly monocot plant material with *Rattus fuscipes*.

Certainty: Low
Ranking: 1
Source: Happold 1995
5. Total Habitat Removal (Clearing): Historically, land clearing; less important now, as most riparian habitat protected from clearance.
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural Disasters: No
11. Loss of organism the species depends on: No

12. Contamination of life cycle: No.
13. Grazing or trampling by stock: Cattle grazing. The range of preferred plant material often occurs concentrated in small or linear areas (e.g. highland swamps or riparian forest) and is susceptible to disturbance or loss if these areas are grazed.

Certainty: Medium
Ranking: 2
Source: Menkhorst 1995
14. Other: No

Comments: Broad-toothed Rats are restricted to the north-western corner East Gippsland. The ecology of the species is poorly known, but most sites are in National Park or are in areas not subject to timber harvesting. The influence of predation by foxes and cats is unclear but is likely to be significant. Cattle grazing and trampling of sedgeland in montane areas may also reduce the suitability of habitat.

The Common Bent-wing Bat
Miniopteris schreibersii

Rarity
a) Geographic Range

- Classification of range size: Large
- Range size within region: 800,000 ha
- Proportion of region occupied (%): 66%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: High
- Density: NI
- Certainty: High
- Source: Menkhorst and Lumsden 1995

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Most forested areas. Also known to forage along beaches.
- Proportion of available habitats used (%): NI
- Certainty: High
- Source: Menkhorst and Lumsden 1995

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Medium
- Source: L. Lumsden, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI

- Certainty: Medium
- Source: Davey and White 1986

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Protection of maternity caves and overwintering sites from human disturbance and predation by feral cats.
- Certainty: High
- Source: Menkhorst and Lumsden 1995, Dwyer 1995

Spatial Dynamics
a) Population variability

- Classification of population variability: Low
- Certainty: Medium
- Number of estimates of density: Counts at caves
- TIme period for estimates of density: NI
- Coefficient of variation in density: NI
- Source: L. Lumsden, pers. comm.

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: High
- Average distances dispersed: NI
- Maximum distance dispersed: Many hundreds of kms.
- Immigration rates: NI
- Source: Dwyer 1995

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: High
- Mean clutch/litter size: 1
- Age at first breeding (yrs): 2
- Mean no of litters per year: 1
- Source: Dwyer 1995, Menkhorst and Lumsden 1995

b)Longevity

- Classification of lifespan: Long lived
- Certainty: High
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): 20
- Body size (gm): 13 - 17
- Source: Dwyer 1995, Menkhorst and Lumsden 1995

Threatening Processes
1. Predation: Feral cat as bats exit cave.

Certainty: High
Ranking: 1
Source: L. Lumsden, pers. comm.
2. Altered hydrology: No.
3. Disease: No

4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: Disturbance of overwintering and maternity sites by visiters.

Certainty: High
Ranking: 2
Source: Davey and White 1986, L. Lumsden, pers. comm.
9. Altered successional states: No
10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: Pesticide build up from consumption of large numbers of insects.

Certainty: Low
Ranking: 1
Source: Davey and White 1986, L. Lumsden, pers. comm.
13. Grazing or trampling by stock: No
14. Other: No

Comments: The Common Bent-wing Bat is totally dependent on a few traditional breeding caves and a limited number of overwintering sites. One of the maternity sites is at Nargun's Cave near Nowa Nowa within East Gippsland. The species occupies different roost sites at different times of the year and colonies are established to meet certain physiological and social needs (Dwyer 1966). The major threatening process within East Gippsland relate to human disturbance of roosts used for hibernation, and of breeding colonies (Dwyer 1995, Menkhorst and Lumsden 1995), and predation at these sites by feral cats (L. Lumsden, pers. comm.). Other potential threats include the accumulation of toxic levels of insecticides (Menkhorst and Lumsden 1995).

Large-footed Myotis
Myotis adversus

Rarity
a) Geographic Range

- Classification of range size: Medium
- Range size within region: 300,000 ha
- Proportion of region occupied (%): 25%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, L. Lumsden, pers. comm.

b) Abundance

- Classification of abundance: Low
- Density: NI
- Certainty: Medium
- Source: L. Lumsden, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Range of vegetation communities associated with water bodies (riparian forest, wetlands, estuaries).
- Proportion of available habitats used (%): NI
- Certainty: High

- Source: L. Lumsden, pers. comm.

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Low
- Source: S. Henry, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI
- Certainty: Medium
- Source: L. Lumsden, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Protection of known maternity caves, ensure continual supply of hollow-bearing trees.
- Certainty: Low
- Source: Lumsden and Menkhorst 1995a

Spatial Dynamics
a) Population variability

- Classification of population variability: NI

b) Powers of dispersal

- Classification of powers of dispersal: NI, but no recorded long-distance movements.

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Medium
- Mean clutch/litter size: 1
- Age at first breeding (yrs): 1
- Mean no of litters per year: 1
- Source: Richards 1995a, Lumsden and Menkhorst 1995a

b)Longevity

- Classification of lifespan: Long lived
- Certainty: Medium
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): 7 - 2 (10)
- Source: Richards 1995a, Lumsden and Menkhorst 1995a

Threatening Processes
1. Predation: By feral cat at roost and foraging individuals by trout.

Certainty: Low
Ranking: 1
Source: L. Lumsden, pers. comm.

2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): Loss of hollow-bearing trees due to timber harvesting.

Certainty: Low
Ranking: 1
Source: L. Lumsden, pers. comm.

8. Harvesting by humans: Susceptible to disturbance by humans at roosts.

Certainty: Low
Ranking: 2
Source: L. Lumsden, pers. comm.

9. Altered successional states: No
10. Natural Disasters: Loss of hollow-bearing trees due to severe extensive wildfire.

Certainty: Low
Ranking: 1
Source: L. Lumsden, pers. comm.

11. Loss of organism the species depends on: No
12. Contamination of life cycle: Pesticide build up from consumption of large numbers of insects.

Certainty: Low
Ranking: 1
Source: Davey and White 1986, L. Lumsden, pers. Comm.

13. Grazing or trampling by stock: No
14. Other: No

Comments: The Large-footed Myotis feeds on aquatic insects and small fish from the surface of water, and its distribution is restricted to areas containing suitable permanent water bodies (Lumsden *et al.* 1991). The species usually only trapped when harp traps or mistnets are place over water so its distribution and abundance may be underestimated. However, the species has not been recorded at many apparently suitable sites (Lumsden *et al.* 1991). The Large-footed Myotis was originally thought to only utilise caves; in the 1960's it was recorded from caves within East Gippsland near Buchan which were subsequently abandoned although individuals may now be returning to the area (L. Lumsden, pers. comm.). It has also been recorded roosting in tree hollows, the relative dependence on caves versus tree hollows is unknown (Lumsden and Menkhorst 1995a). Main threatening processes within East Gippsland include human disturbance of roosts and loss of hollow-bearing trees due to timber harvesting or severe, extensive wildfire.

Brush-tailed Rock-wallaby
Petrogale penicillata

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: Approximately 500 ha
- Proportion of region occupied (%): 0.04%
- Certainty: High

- Source: J. Reside, pers. comm.

b) Abundance

- Classification of abundance: Low
- Density: Total Population = 50 (20
- Certainty: Medium
- Source: J. Reside, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow, but consumes foliage from a wide range of plants including grasses, herbs, ferns, shrubs and trees.
- Number of habitats used in the region: Rocky outcrop shrubland, rainshadow woodland. Occupies cliffs with mid-level ledges, caves, ledges with overhangs and loose piles of boulders containing subterranean holes and passageways.
- Proportion of available habitats used (%): < 10%
- Certainty: Medium
- Source: Strahan 1983, J. Reside, pers. comm.

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Declined
- Certainty: High
- Source: Norris and Belcher 1986, J. Reside, pers. comm.

Declining species
a) Rate of decline in last decade
Classification of rate of decline in past 10 years or three generations: Medium

- Certainty: Medium
- Measured rate of decline: NI
- Year decline first noted: 1907
- Source: Menkhorst 1995

b) Spatial pattern of decline
Spatial pattern of decline: Species has declined to a very small number of sites, from a formerly much more extensive distribution.

- Certainty: Medium
- Source: Menkhorst 1995

c) Temporal pattern of decline
Temporal pattern of decline: Rapid decline in early decades of 20th century. Rate of decline has slowed last decade. Decline continues.

- Certainty: Medium
- Source: Menkhorst 1995

Spatial Dynamics
a) Population variability

- Classification of population variability: Low, though populations naturally disjunct due to patchy nature of suitable habitat.
- Certainty: Medium
- Number of estimates of density: One

- TIme period for estimates of density: 5 years
- Coefficient of variation in density: NI
- Source: J. Reside, pers. comm.

b) Powers of dispersal

- Classification of powers of dispersal: Low
- Certainty: Medium
- Average distances dispersed: NI. Species probably disperses over a few km at most. Likely to be highly vulnerable to predation during this phase.
- Maximum distance dispersed: NI
- Immigration rates: NI. Both male and female leave natal home range within six months of vacating pouch.

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low. Potentially continuous embryonic diapause influenced by seasonal factors.
- Certainty: Medium
- Mean clutch/litter size: 1
- Age at first breeding (yrs): 1 - 2
- Mean no of litters per year: 1
- Source: Strahan 1983, Hill and Baker-Gabb 1991

b)Longevity

- Classification of lifespan: Medium (Long lived)
- Certainty: Medium
- Average lifespan (yrs): Unknown. Possibly 4 - 5 years
- Maximum lifespan (yrs): 8 - 10 for captive animals (Healsville sanctuary). NI from wild.
- Body size (gm): Average 7.5 kg; male - 7.9 (5.5 - 10.9) kg, female - 6.3 (4.9 - 8.2) kg
- Source: Strahan 1983, Hill and Baker-Gabb 1991

Threatening Processes
1. Predation: Yes. Red Fox and Feral Cat.

Certainty: High
Ranking: 3
Source: Short 1982, Lobert and Waters 1988
2. Altered hydrology: No
3. Disease: Toxoplasmosis, Hydatidosis

Certainty: Low
Ranking: 1
Source: Close 1984, Lobert 1988
4. Competition: Yes. Feral Goat and Rabbit.

Certainty: Medium
Ranking: 1
Source: Short and Milkovits 1990
5. Total Habitat Removal (Clearing): No
6. Fragmentation: Although habitat naturally fragmented, isolation of small populations renders them more susceptible to environmental perturbation and other threats.
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: Species was hunted in early 20th century but not currently due to remote location.
9. Altered successional states: Yes. Altered fire regime may be affecting availability of preferred food resources through floristic changes from grassy understorey to one dominated by sclerophyllous heath species.

Certainty: Medium
Ranking: 2
Source: Norris and Belcher 1986, Lobert 1988

10. Natural Disasters: Severe drought is likely to have a greater impact due to disjunct nature of populations.

Certainty: Medium
Ranking: 2

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: The Brush-tailed Rock-wallaby is now restricted to a number of sites in the Snowy River and Alpine National Parks. The total population is small (< 50) and probably declining. The major threatening process is predation by foxes and cats. Competition from goats and rabbits and altered fire regimes probably also affect the species.

Brush-tailed Phascogale
Phascogale tapoatafa

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: <50,000 ha
- Proportion of region occupied (%): <4.1%
- Certainty: Low
- Source: Atlas of Victorian Wildlife, Belcher 1994

b) Abundance

- Classification of abundance: Low
- Density: Estimated population 100 (80. Recent records of species in East Gippsland confined to hair in Spot-tailed Quoll scats at Suggan Buggan and unconfirmed sighting at McKillops Bridge.
- Certainty: Low
- Source: S. Henry, pers. obs.

c) Habitat Specificity

- Classification of habitat specificity: Unknown. Possibly narrow
- Number of habitats used in the region: Dry forest, rainshadow woodland.
- Proportion of available habitats used (%): <10%
- Certainty: Low
- Source: Menkhorst 1995

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: NI. Species has declined in eastern Victoria in 20th century, but population trend in last decade is not known.
- Certainty: Low
- Source: Fleay 1934, Menkhorst and Gilmore 1979, Ahern 1982

Declining species
a) Rate of decline in last decade
Classification of rate of decline in past 10 years or three generations: Unknown. Possibly medium

- Certainty: Low
- Measured rate of decline: NI
- Year decline first noted: Pre 1960
- Source: Atlas of Victorian Wildlife, Norris et al. 1983

b) Spatial pattern of decline
Spatial pattern of decline: NI
c) Temporal pattern of decline
Temporal pattern of decline: NI

Spatial Dynamics
a) Population variability

- Classification of population variability: High. Species is semelparous.
- Certainty: Medium
- Number of estimates of density: 1 (NE Victoria)
- TIme period for estimates of density: 3 yrs
- Coefficient of variation in density: NI
- Source: Soderquist 1994

b) Powers of dispersal

- Classification of powers of dispersal: Low for female (remain in maternal home range), but moderate dispersal for males.
- Certainty: Low
- Average distances dispersed: > 2 km for males
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: Menkhorst 1995

Life History Parameters
a) Reproductive output

- Classification of reproductive output: High
- Certainty: Medium
- Mean clutch/litter size: 6.6
- Age at first breeding (yrs): 1
- Mean no of litters per year: 1
- Source: Soderquist 1993

b)Longevity

- Classification of lifespan: Short lived
- Certainty: High
- Average lifespan (yrs): 1 yr (males), 1 - 2 yrs (female)
- Maximum lifespan (yrs): As above
- Body size (gm): 170 gm (199 male, 145 female)
- Source: Soderquist 1993

Threatening Processes
1. Predation: Yes. Fox, feral cat, lace monitor, owls.

Certainty: High
Ranking: 3
Source: Soderquist 1994

2. Altered hydrology: No

3. Disease: No

4. Competition: No

5. Total Habitat Removal (Clearing): Yes. Clearing for agriculture from late 19th century to mid 20th century removed extensive areas of suitable habitat, especially in central Victoria. Clearing has now virtually ceased.

Certainty: High
Ranking: 3 (historically), 1 (present).
Source: Menkhorst 1995

6. Fragmentation: Yes. Clearing probably fragmented populations (which intrinsically have low density) making them vulnerable to extinction. Effects of fragmentation probably still operating although process of fragmentation through clearing has largely ceased.

Certainty: Medium
Ranking: 1
Source: Menkhorst 1995

7. Partial habitat removal (timber harvesting): The loss through timber harvesting of tree hollows used as nesting sites. Very important in core portion of range (i.e. central Victoria) but species does not occur in timber production areas in East Gippsland.

Source: Soderquist 1993, Traill and Coates 1993

8. Harvesting by humans: No

9. Altered successional states: No

10. Natural Disasters: Yes. Small populations probably vulnerable to extensive severe wildfire and drought.

Certainty: Medium
Ranking: 2
Source: Menkhorst 1995

11. Loss of organism the species depends on: No

12. Contamination of life cycle: No

13. Grazing or trampling by stock: No

14. Other: No

Comment: The population of Brush-tailed Phascogales in East Gippsland is probably very small, and may be on the verge of extinction. No confirmed specimens have been recorded for several decades and the current status is unknown. This tree and ground dwelling carnivore occupies large home ranges, occurs at very low population densities and has a very short life cycle. As such phascogales are especially vulnerable to habitat fragmentation and environmental perturbations, including drought and severe wildfire. In East Gippsland they appear to be confined to dry woodland in the Upper Snowy River Valley. Predation by foxes and cats is probably the major threatening process which is still operating.

Long-footed Potoroo
Potorous longipes

Rarity
a) Geographic Range

- Classification of range size: Medium
- Range size within region: 160,000 ha
- Proportion of region occupied (%): 13%
- Certainty: Medium
- Source: Saxon et al. 1994

b) Abundance

- Classification of abundance: Low
- Density: Total population estimated to be 1000 (500; density at one 25 ha site (Bellbird Creek) estimated 0.057 individuals per ha.
- Certainty: Low
- Source: Saxon et al. 1994, Scotts and Seebeck 1989

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Number of habitats used in the region: Wet forest, damp forest, lowland forest, riparian forest, warm temperate rainforest.
- Proportion of available habitats used (%): 27%
- Certainty: Medium
- Source: Scotts and Seebeck 1989, Saxon et al. 1994, Action Statement No. 58, K. Green and T. Mitchell, pers. comm.

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable or declined
- Certainty: Low
- Source: Scotts and Seebeck 1989, Saxon et al. 1994, S. Henry, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI
- Measured rate of change: NI
- Certainty: Low
- Source: Saxon et al. 1994

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Predator control, protection of known populations from disturbance.
- Certainty: High
- Source: Saxon et al. 1994

c) Declining species

i) Rate of decline in last decade
Classification of rate of decline in past 10 years or three generations: Limited data biased as records have increased due to sampling new areas and new techniques.

- Certainty: Low
- Measured rate of decline: NI
- Year decline first noted: Noted to have probably disappeared in 1990 from known sites at Waratah Flat and Bellbird Hotel.
- Source: S. Henry, pers. comm.

ii) Spatial pattern of decline
Spatial pattern of decline: Cannot accurately assess as species occur at low density and captures are fortuitous.

- Source: Scotts and Seebeck 1989, Saxon et al. 1994

iii) Temporal pattern of decline
Temporal pattern of decline: Function of habitat loss and introduced predators both of which have increased over time.

- Source: Saxon et al. 1994

Spatial Dynamics
a) Population variability

- Classification of population variability: NI. Probably low.
- Certainty: Low
- Number of estimates of density: 2
- TIme period for estimates of density: Monthly estimates for 1 year; collation of data over 10 years.
- Coefficient of variation in density: NI
- Source: Scotts and Seebeck 1989, Green and Mitchell (in press)

b) Powers of dispersal

- Classification of powers of dispersal: Low
- Certainty: Medium
- Average distances dispersed: NI. Probably 100's metres.
- Maximum distance dispersed: About 3 km
- Immigration rates: NI
- Source: Green and Mitchell (in press)

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: High
- Mean clutch/litter size: 1
- Age at first breeding (yrs): 1
- Mean no of litters per year: Unknown. Possibly 1 - 2 in wild; potentially 2.5 - 3 in captivity.
- Source: Green and Mitchell in press; Seebeck 1995

b)Longevity

- Classification of lifespan: Short lived
- Certainty: Medium
- Average lifespan (yrs): Unknown. Possibly 2 - 3 years
- Maximum lifespan (yrs): Unknown. Possibly 4 - 5 years in wild; 8 - 10 in captivity.
- Body size (gm): Average 1900; female - 1764 to 1768, male - 1903 to 2100.
- Source: Green and Mitchell in press, Seebeck 1995

Threatening Processes
1. Predation: Yes. Fox,dog and possibly feral cat

Certainty: High
Ranking: 3
Source: Scotts and Seebeck 1989, Brown and Triggs 1990
2. Altered hydrology: No
3. Disease: No
4. Competition: Unknown. Possibly competition for hypogeal fungi with possums, bandicoots, long-nosed potoroo and even rodents.

Certainty: Low
Ranking: 1

5. Total Habitat Removal (Clearing): No
6. Fragmentation: Isolation of small populations leaves them more susceptible to loss from stochastic processes.

Certainty: Low
Ranking: 1
Source: Saxon *et al.* 1994
7. Partial habitat removal (timber harvesting): Yes. Clearfelling for timber harvesting makes areas unsuitable for a number of years. Timber harvesting may also reduce hypogeal fungi production.

Certainty: High
Ranking: 2
Source: Saxon *et al.* 1994
8. Harvesting by humans: No
9. Altered successional states: Unclear, but timber harvesting and fuel reduction burning may alter or lower eucalypt species diversity which may also reduce hypogeal fungal diversity.

Certainty: Low
Ranking: 1
Source: Griffiths and Muir 1991, Claridge 1992
10. Natural Disasters: Yes. Extensive severe wildfire.

Certainty: Low
Ranking: 2
Source: Thomas *et al*. 1994
11. Loss of organism the species depends on: Possibly, hypogeal fungal dynamics will be important

Certainty: Low
Ranking: 1
Source: Thomas *et al.* 1994
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: East Gippsland is highly significant for the Long-footed Potoroo as 90 % of the species distribution is represented there. The species occurs over a range of forest types between the Snowy and Bemm Rivers. It has been located at about 45 sites within this area though only two of these sites are within National Park. Threatening processes continuing to operate are predation by dogs, foxes and possibly cats, and timber harvesting and fire in areas where the species may occur, but is as yet unrecorded. The species is known to occur in regrowth forests and responds well to predator control.

Smoky Mouse
Pseudomys fumeus

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: Approximately 20,000 ha
- Proportion of region occupied (%): Approximately 1.7%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Density: Estimated 200 (100 individuals within 5 populations.
- Certainty: Low
- Source: Menkhorst 1995, Menkhorst and Seebeck 1981, S. Henry, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Coastal heaths, adjacent lowland and coastal forests and heathy woodlands.
- Proportion of available habitats used (%): < 10%
- Certainty: Low
- Source: Menkhorst 1995

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Declined. Severe reduction in overall distribution.
- Certainty: Medium
- Source: Cockburn 1983

Declining species
a) Rate of decline in last decade
Classification of rate of decline in past 10 years or three generations: Unknown. Possibly medium. A flush of Smoky Mice recorded early 1980's, between Marlo and Pt Hicks. Only one recent record (1990). Retrapping of previous sites in 1990 failed to detect species.

- Certainty: Low
- Measured rate of decline: NI
- Year decline first noted: Approx. 1990
- Source: NRE Orbost (unpublished data)

b) Spatial pattern of decline
Spatial pattern of decline: Range and numbers individuals decline simultaneously.

- Certainty: Low
- Source: S.Henry pers comm.

b) Temporal pattern of decline
Temporal pattern of decline: Decline rate increases

- Certainty: Low
- Source: S. Henry, pers. comm.

Spatial Dynamics
a) Population variability

- Classification of population variability: High
- Certainty: Medium
- Number of estimates of density: 2, (Grampians and Gippsland Lakes). None in East Gippsland.
- TIme period for estimates of density: 2 years
- Coefficient of variation in density: NI
- Source: Cockburn 1981, Norris et al. 1983

b) Powers of dispersal

- Classification of powers of dispersal: NI. Probably low. Species is sedentary in optimal habitat, others from sub-optimal habitat important in colonising new areas.
- Certainty: Low
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: Cockburn 1981

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Medium
- Certainty: High
- Mean clutch/litter size: 3 - 4
- Age at first breeding (yrs): 1
- Mean no of litters per year: 1 to 2
- Source: Cockburn 1981

b)Longevity

- Classification of lifespan: Short lived
- Certainty: High
- Average lifespan (yrs): 1 - 2
- Maximum lifespan (yrs): 2
- Body size (gm): 70g
- Source: Cockburn 1981

Threatening Processes
1. Predation: Cats and foxes.

Certainty: Low
Ranking: 2
Source: S. Henry, pers. comm.

2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): Some limited clearing of the Marlo Plains. Lack of heathy vegetation will preclude Smoky Mouse.

Certainty: Medium
Ranking: 3 (Historical), 1 (Current)
Source: S. Henry, pers. comm.

6. Fragmentation: No
7. Partial habitat removal (timber harvesting): Some timber harvesting within distribution; effects unclear but include mechanical disturbance to the understorey vegetation which may be detrimental.

Certainty: Low
Ranking: 1
Source: Menkhorst 1995

8. Harvesting by humans: No
9. Altered successional states: Prefers early successional stages after fire. Lack of fire may render habitat unsuitable. Apparent decline since 1980's may reflect response to vegetation succession.

Certainty: Medium
Ranking: 3
Source: Cockburn 1981, Menkhorst 1985

10. Natural Disasters: No
11. Loss of organism the species depends on: Timber harvesting and burning that alter

soil and plant litter conditions may reduce the production of fungal fruiting bodies that are an important seasonally component of the species diet.

Certainty: Low
Ranking: 1
Source: Cockburn 1983

12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: In East Gippsland the Smoky Mouse has a sparse and possibly declining population restricted to near coastal habitats. This small native rodent is a heath specialist and is dependent on understorey vegetation components strongly influenced by fire frequency and intensity. Populations appear to fluctuate in response to the vegetations successional stage. They appear to prefer early post-fire regeneration, which may relate to the availability of fungal sporocarps upon which they feed. The major threatening process operating may relate to fire regime.

Grey-headed Flying-fox
Pteropus poliocephalus

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: 5,000 ha
- Proportion of region occupied (%): Approximately 0.4%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, L. Lumsden, pers. comm.

b) Abundance

- Classification of abundance: Moderate
- Density: NI
- Certainty: High
- Source: Menkhorst 1995

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Warm temperate rainforest, lowland forest, coastal forest, domestic gardens.
- Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: Menkhorst 1995

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Medium
- Source: L. Lumsden, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI
- Certainty: Low
- Source: L. Lumsden, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Protection of Dowell Creek camp, protection of eucalypt species
- Certainty: Medium
- Source: L. Lumsden, pers. comm.

Spatial Dynamics
a) Population variability

- Classification of population variability: High
- Certainty: High
- Number of estimates of density: Have been several counts of Dowell Creek colony.
- TIme period for estimates of density: NI
- Coefficient of variation in density: NI
- Source: Menkhorst 1995, L. Lumsden, pers. comm.

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: High
- Average distances dispersed: 100s of kms
- Maximum distance dispersed: 1,000s of kms
- Immigration rates: NI
- Source: Tidemann 1995

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: High
- Mean clutch/litter size: 1
- Age at first breeding (yrs): 2
- Mean no of litters per year: 1
- Source: Tidemann 1995

b)Longevity

- Classification of lifespan: Short lived
- Certainty: Medium
- Average lifespan (yrs): 7 - 8
- Maximum lifespan (yrs): 15 years in captivity
- Body size (gm): 600 - 1,000 (700)
- Source: Tidemann 1995

Threatening Processes
1. Predation: By powerful and sooty owls.

Certainty: High
Ranking: 1
Source: L. Lumsden, pers. comm.
2. Altered hydrology: No
3. Disease: Equine morbillivirus, paralysis ticks.

Certainty: Low
Ranking: 5
Source: L. Lumsden, pers. comm.

4. Competition: No

5. Total Habitat Removal (Clearing): Clearing of rainforest and eucalypt forest important in NSW and Qld. Probably not relevant within East Gippsland.

6. Fragmentation: No

7. Partial habitat removal (timber harvesting): Loss or degradation of traditional camp site, or loss of eucalypts which supply flowers and nectar.

Certainty: Medium
Ranking: 1
Source: L. Lumsden, pers. comm.

8. Harvesting by humans: Species has been culled in NSW and Qld. Probably not relevant within East Gippsland.

9. Altered successional states: No

10. Natural Disasters: Severe wildfire could destroy main roosting area in rainforest east of Mallacoota.

Certainty: High
Ranking: 2
Source: S.Henry, pers. comm.

11. Loss of organism the species depends on: No

12. Contamination of life cycle: Pesticides, lead.

Certainty: Low
Ranking: 1
Source: Menkhorst 1995

13. Grazing or trampling by stock: No

14. Other: No

Comments: The Grey-headed Flying-fox is a regular seasonal visitor to the coastal plains of East Gippsland. Although the species has been recorded in a number of localities within East Gippsland, it traditionally congregates at one camp, at Dowell Creek on the Mallacoota Inlet. Because the it only roosts at this single site, it is vulnerable to the loss or degradation of this site which, although virtually surrounded by National Park, is mostly on private land (LCC 1985).

Eastern Horseshoe Bat
Rhinolophus megaphylus

Rarity
a) Geographic Range

- Classification of range size: Medium
- Range size within region: 200,000 ha
- Proportion of region occupied (%): 17%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Density: NI
- Certainty: Medium
- Source: Lumsden and Menkhorst 1995b

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Lowland forest, dry forest, coastal forest, rainshadow woodland, riparian forest.
- Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: S. Henry, pers. comm.

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Low
- Source: L. Lumsden, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined
- Measured rate of change: NI
- Certainty: Low
- Source: L. Lumsden, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant
- Type of intervention: Protection of maternity sites by visitor control, and control of predators.
- Certainty: High
- Source: Lumsden and Menkhorst 1995b

Spatial Dynamics
a) Population variability

- Classification of population variability: Low
- Certainty: Medium
- Number of estimates of density: NI
- TIme period for estimates of density: NI
- Coefficient of variation in density: NI
- Source: L. Lumsden, pers. comm.

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Medium
- Average distances dispersed: NI
- Maximum distance dispersed: Recorded movements of 200 km.
- Immigration rates: NI
- Source: Lumsden and Menkhorst 1995b

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: High
- Mean clutch/litter size: 1

- Age at first breeding (yrs): 2 - 3
- Mean no of litters per year: 1
- Source: Pavey and Young 1995, Lumsden and Menkhorst 1995

b)Longevity

- Classification of lifespan: Long lived
- Certainty: Low
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): 30 years
- Body size (gm): 7 - 14
- Source: Pavey and Young 1995, Lumsden and Menkhorst 1995b

Threatening Processes
1. Predation: Feral cats at caves

Certainty: High
Ranking: 1
Source: Lumsden and Menkhorst 1995b
2. Altered hydrology: No.
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: Fragmentation of forest surrounding caves.

Certainty: Low
Ranking: 1
Source: Pavey and Young 1995
7. Partial habitat removal (timber harvesting): No.
8. Harvesting by humans: Disturbance of roosting and breeding individuals at caves.

Certainty: High
Ranking: 2
Source: Lumsden and Menkhorst 1995b
9. Altered successional states: No
10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: Pesticide build up from consumption of large numbers of insects.

Certainty: Low
Ranking: 1
Source: L. Lumsden, pers. comm
13. Grazing or trampling by stock: No
14. Other: No

Comments: The Eastern Horseshoe Bat is known to breed at three sites within East Gippsland. The main site is at Nargun's Cave near Nowa Nowa. The species is susceptible to disturbance while at the roost, and the main threatening process within East Gippsland is disturbance of individuals by human visitors, particularly during winter hibernation and birthing and nursing periods (Lumsden and Menkhorst 1995b). Predation by feral cats has been recorded, with bats being taken as they exit the cave. This species rarely moves outside stands of forest or woodland when foraging or commuting to foraging areas (Pavey and Young 1995), and as a result fragmentation of forest in the vicinity of the caves is a potential threat.

Yellow-bellied Sheathtail-bat
Saccolaimus flaviventris

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region (ha): NI
- Proportion of region occupied (%): NI
- Certainty: Low
- Source: Atlas of Victorian Wildlife, Lumsden and Menkhorst 1995c

b) Abundance

- Classification of abundance: Low
- Density: NI
- Certainty: Low
- Source: Atlas of Victorian Wildlife, S. Henry and L. Lumsden, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: NI
- Proportion of available habitats used (%): NI
- Certainty: Low
- Source: L. Lumsden, pers. comm.

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: NI to identify trends.

Spatial Dynamics
a) Population variability

- Classification of population variability: NI

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Low
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: L. Lumsden, pers. comm.

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Low
- Mean clutch/litter size: 1
- Age at first breeding (yrs): Unknown. Probably either 1st or 2nd year.
- Mean no of litters per year: 1
- Source: Lumsden and Menkhorst 1995c

b)Longevity

- Classification of lifespan: Long lived
- Certainty: Low

- Average lifespan (yrs): 10 - 20
- Maximum lifespan (yrs): NI
- Body size (gm): 30 - 60 gm
- Source: Lumsden and Menkhorst 1995c

Threatening Processes
1. Predation: No
2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): Loss of hollow-bearing trees due to timber harvesting.

Certainty: Low
Ranking: 1
Source: L. Lumsden, pers. comm.
8. Harvesting by humans: No
9. Altered successional states: No
10. Natural Disasters: Loss of hollow-bearing trees due to extensive, severe wildfire.

Certainty: Low
Ranking: 1
Source: L. Lumsden, pers. comm.
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: The Yellow-bellied Sheathtail-bat has only been recorded twice within East Gippsland (Atlas of Victorian Wildlife). This species is a fast, high flyer, generally feeding above the forest canopy (Richards 1995b), and as a result is not often trapped (L. Lumsden, pers. comm.). It is possible this species is a vagrant with no resident population within East Gippsland (Lumsden and Menkhorst 1995c). The species normally roosts in tree hollows (Hall and Richards 1979) and threatening processes include timber harvesting, and extensive, severe wildfire.

Reptiles

- Eastern She-Oak Skink Cyclodomorphus michaeli
- Swamp Skink Egernia coventryi
- Alpine Water Skink Eulamprus kosciuskoi
- Glossy Grass Skink Leiolopisma rawlinsoni
- Diamond Python Morelia spilota spilota

Eastern She-Oak Skink
Cyclodomorphus michaeli

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: < 100,000 ha
- Proportion of region occupied (%): <8%. Coastal East Gippsland from border to Cann River, mostly east of Genoa River.
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, P. Robertson, pers. comm.

b) Abundace

- Classification of abundance: Low
- Density: Estimated population 600(400 individuals in less than 50 populations. Never found in large numbers in East Gippsland. Scattered records only.
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, P. Robertson, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Lowland forest, coastal heathland, banksia woodland. Prefers significant tussock grass component.
- Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: Jenkins and Bartell 1980, Wilson and Knowles 1988, Anon. 1995

Observed Dynamics - NI

Spatial Dynamics

a) Population variability - NI

b) Powers of dispersal

- Classification of powers of dispersal: Probably low
- Certainty: Low
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: P. Robertson, pers. comm.

Life History Parameters
a) Reproductive output

- Classification of reproductive output: High
- Certainty: Low
- Mean clutch/litter size: 4 - 16, average litter size 8.3
- Age at first breeding (yrs): NI
- Mean no of litters per year: 1
- Source: Shea 1995

b) Longevity - NI
Classification of lifespan: Long lived

- Certainty: Low
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): Max snout-vent length 174 mm
- Source: Shea 1995

Threatening Processes
1. Predation: No
2. Altered hydrology: No
3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): Clearing of forest for agriculuture. No longer significant in East Gippsland.

- Certainty: Low
- Ranking: Historically (3), Current (1)
- Source: Anon. 1995

6. Fragmentation: No
7. Partial habitat removal (timber harvesting): Possible habitat alteration associated with timber production. Utilises fallen timber (Cogger 1992) and likely to be affected by its removal. However habitat is generally unsuitable for timber harvesting.

- Certainty: Low
- Ranking: 1
- Source: Anon. 1995,

8. Harvesting by humans: No
9. Altered successional states: Habitat alteration resulting from inappropriate fire regimes.

- Certainty: Medium
- Ranking: 2
- Source: Anon. 1995

10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: All records of the Eastern She-Oak Skink contained in the Atlas of Victorian Wildlife are from lowland areas of East Gippsland, east of Wingan Inlet. Most sites are within reserved areas (Croajingolong National Park), others are from State Forest and private agricultural land. Very little is known about the habitat requirements of this species. Most records are from coastal heathlands, although it has been recorded from lowland sclerophyll forest and banksia woodland in areas where there is a dense layer of low vegetation (Anon. 1995). The major threatening process within East Gippsland is habitat alteration resulting from inappropriate fire regimes (Anon. 1995) . Other threats include possible habitat modification

associated with timber harvesting although only a small proportion of habitat is likely to be affected, as most records from State Forest are in areas not suitable for timber harvesting.

Swamp Skink
Egernia coventryi

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: <10,000 ha
- Proportion of region occupied (%): <0.8%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, NRE Orbost (unpublished data)

b) Abundace

- Classification of abundance: Medium
- Density: NI
- Certainty: High
- Source: Atlas of Victorian Wildlife, P. Robertson, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Paperbark swamps, tea-tree thickets, margins of wetlands, wet heaths, salt heaths, saltmarshes, estuaries and lowland forest with dense understorey.
- Proportion of available habitats used (%): NI
- Certainty: Low
- Source: NRE Orbost (unpublished data)

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: Stable
- Certainty: Low
- Source: P. Robertson, pers. comm.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: Declined (loss of habitat along water ways as a result of agricultural development).
- Measured rate of change: NI
- Certainty: Medium
- Source: P. Robertson, pers. comm.

b) Dependence on management

- Classification of dependence on management: Dependant on protection of preferred habitat on public land.
- Certainty: Low
- Source: P. Robertson, pers. comm.

Spatial Dynamics

a) Population variability: Unknown, but likely to be low

- Certainty: Low
- Number of estimates of density: NI
- TIme period for estimates of density: NI
- Coefficient of variation in density: NI
- Source: P. Robertson, pers. comm.

b) Powers of dispersal

- Classification of powers of dispersal: High
- Certainty: Low
- Average distances dispersed: NI
- Maximum distance dispersed: 200 m
- Immigration rates: NI
- Source: Robertson 1980

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Low
- Mean clutch/litter size: Up to 6 live young, usually 3
- Age at first breeding (yrs): 2 - 3 years
- Mean no of litters per year: 1
- Source: Wilson and Knowles 1988, Cogger et al. 1993, Robertson 1980, P. Robertson, pers. comm.

b) Longevity - NI Classification of lifespan: Probably long lived

- Certainty: Low
- Average lifespan (yrs): Approx 10 (guess)
- Maximum lifespan (yrs): NI
- Body size (gm): 100 mm snout-vent length
- Source: Wilson and Knowles 1988, Cogger et al. 1993, Robertson 1980, P. Robertson, pers. comm.

Threatening Processes
1. Predation: Natural predators (e.g. snakes) only
2. Altered hydrology: Altered hydrology due to road construction.

- Certainty: Low
- Ranking: 1

3. Disease: Not applicable
4. Competition: Not applicable
5. Total Habitat Removal (Clearing): Historically, some preferred habitat cleared for farming (Snowy Flats, Marlo Plains, Benn River, Mallacoota).

- Certainty: High
- Ranking: Historically (3), Current (1)
- Source: S. Henry and P. Robertson, pers. comm.

6. Fragmentation: Not applicable
7. Partial habitat removal (timber harvesting): No

8. Harvesting by humans: Not applicable
9. Altered successional states: Changes to habitat due to inappropriate fire regime.

- Certainty: Low
- Ranking: 2
- Source: Gillespie et al. 1992

10. Natural Disasters: Extensive severe wildfire.

- Certainty: Low
- Ranking: 1
- Source: Gillespie et al. 1992

11. Loss of organism the species depends on: Not known
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Few records of the Swamp Skink exist within East Gippsland (Atlas of Victorian Wildlife). It appears confined to densely vegetated areas usually associated with water, such as cane grass or heathy swamps and saltmarsh (Emison *et al.* 1975), melaleuca swamps (Robertson 1980), and tidal saltmarsh fringe (Schulz 1985). Within East Gippsland the preferred habitat is fairly widespread and occurs in reserved areas (Croajingolong National Park) and in State Forest. The species appears to be dependent on late successional stages of riparian scrub and coastal heathland and as a result inappropriate fire regimes and extensive, severe wildfire are potentially threatening processes (Gillespie *et al.* 1992). Road construction through or near this species habitat could alter hydrological regimes.

Alpine Water Skink
Eulamprus kosciuskoi

Rarity
a) Geographic Range

- Classification of range size: Small. Occurs only at altitudes > 1000m. Species confined to Cobberas unit of Alpine National Park in extreme NW of East Gippsland East Gippsland.
- Range size within region: <5,000 ha
- Proportion of region occupied (%): 0.04%
- Certainty: High
- Source: Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Low
- Density: NI
- Certainty: Medium
- Source: Meredith et al. (in prep a)

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Alpine bogs and streams, generally in sphagnum.
- Proportion of available habitats used (%): NI

- Certainty: Low
- Source: Cogger 1992

Observed Dynamics - NI Population Trend in Last Decade

- Increasing, stable or declined: Declined
- Certainty: Low
- Source: P. Robertson, pers. comm.

Declining species
Classification of rate of decline in past 10 years or three generations: Insufficient records to identify trends.

Spatial Dynamics

a) Population variability: Unknown but likely to be low

- Certainty: Low
- Number of estimates of density: NI
- TIme period for estimates of density: NI
- Coefficient of variation in density: NI
- Source: P. Robertson, pers. comm.

b) Powers of dispersal

- Classification of powers of dispersal: Probably low, given restricted habitat and mobility of the species.
- Certainty: Low
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: P. Robertson, pers. comm.

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Low
- Mean clutch/litter size: 2 - 5
- Age at first breeding (yrs): 2 - 3 years
- Mean no of litters per year: 1
- Source: Cogger et al. 1993, P. Robertson, pers. comm.

b) Longevity - NI Classification of lifespan: Probably long lived, based on sympatric species Eulamprus tympanum.
- Certainty: Low
- Average lifespan (yrs): NI
- Maximum lifespan (yrs): NI
- Body size (gm): 100 mm snout-vent length
- Source: Cogger *et al.* 1993, P. Robertson, pers. comm.

Threatening Processes
1. Predation: No
2. Altered hydrology: Damage to drainage lines and their associated vegetation caused by grazing and trampling by cattle and brumbies and by recreational uses including cross-country skiing, hiking, four-wheel driving and horse-riding.

- Certainty: Low

- Ranking: 2
- Source: Coventry and Robertson 1980, Mansergh 1982

3. Disease: No
4. Competition: With Southern Water Skink (*E. tympanum*). This species occurs in all adjacent habitats, changes to Alpine Water Skink habitat could make it more suitable to the Southern Water Skink which may exclude or reduce populations of the Alpine Water Skink.

- Certainty: Low
- Ranking: 1
- Source: Meredith et al. (in prep)

5. Total Habitat Removal (Clearing): No
6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: No
9. Altered successional states: Climate change may alter habitat. Altered fire regimes may also have an effect.

- Certainty: Low
- Ranking: 1
- Source: P. Robertson, pers. comm.

10. Natural Disasters: No
11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: The Alpine Water Skink is marginal to East Gippsland, and all habitat is in National Park. The moss bed and heathland habitats on drainage lines in which the species occurs are sensitive to physical damage to the vegetation and soil, and to alterations of hydrology (Meredith *et al.* (in prep a)). The major threatening processes within East Gippsland relate to activities which damage habitat, particularly grazing and trampling by cattle and by recreational users (Coventry and Robertson 1980, Mansergh 1982). Competition with the Southern Water Skink in altered habitat may also threaten populations of the Alpine Water Skink (Meredith *et al.* (in prep a)).

Glossy Grass Skink
Leiolopisma rawlinsoni

Rarity
a) Geographic Range

- Classification of range size: Small
- Range size within region: <10,000 ha
- Proportion of region occupied (%): <0.8%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, NRE Orbost (unpublished data)

b) Abundace

- Classification of abundance: Low. Estimated population.
- Density: NI
- Certainly: Low
- Source: NRE Orbost (unpublished data), P. Robertson, pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Number of habitats used in the region: Coastal heathlands, estuarine and wetland margins.
- Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: NRE Orbost (unpublished data), Hutchinson and Donnellan 1988

Observed Dynamics - NI. Species only recently described (1988). Probably stable.

Spatial Dynamics

a) Population variability - NI

b) Powers of dispersal - NI. Probably low, given habits and fragmented nature of preferred habitat.

- Certainty: Low
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: P. Robertson, pers. comm.

Life History Parameters
a) Reproductive output

- Classification of reproductive output: Low
- Certainty: Low
- Mean clutch/litter size: 4 - 8, mean 5.6
- Age at first breeding (yrs): NI
- Mean no of litters per year: Possibly 1
- Source: Hutchinson and Donnellan 1988, Cogger 1992

b) Longevity - Unknown, but probably short lived

- Certainty: Low
- Average lifespan (yrs): Approximately 5 years
- Body size (gm) 50 mm snout-vent length
- Source: Hutchinson and Donnellan 1988, Cogger 1992

Threatening Processes
1. Predation: No
2. Altered hydrology: Altered hydrology due to roasd construction.

- Certainty: Low
- Ranking: 1
- Source:

3. Disease: No
4. Competition: No
5. Total Habitat Removal (Clearing): Clearing of heathland on private land for grazing and agriculture, especially on the Marlo Plains, will have removed some habitat. .

- Certainty: High
- Ranking: Historically (3), Current (1)
- Source: S. Henry, pers. comm.

6. Fragmentation: No
7. Partial habitat removal (timber harvesting): No
8. Harvesting by humans: No
9. Altered successional states: Inappropriate fire regimes in heaths may be principle potential threatening process.

- Certainty: Low
- Ranking: 2
- Source: P. Robertson, pers. comm.

10. Natural Disasters: Wildfires may alter preferred vegetation structure.

- Certainty: Low
- Ranking: 1
- Source: P. Robertson, pers. comm.

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: The ecology of the Glossy Grass Skink is poorly known. The species is found in humid microclimates such as marshland and margins of creeks, swamps and lakes and in wet heathland (Hutchinson and Donnellan 1988, Cogger 1992). Within East Gippsland it has been recorded from coastal heathlands and the margins of estuaries and wetlands. There is no information on status of the population, other than it has been collected in low numbers. A large proportion of the species' preferred habitat is in reserves and the balance is managed in State Forest. Road construction through or near this species habitat could alter hydrological regimes. The species is usually found in habitats with a dense layer of ground vegetation (Hutchinson and Donnellan 1988) potentially threatened by inappropriate fire regimes and wildfire (P. Robertson, pers. comm.).

Diamond Python
Morelia spilota spilota

Rarity
a) Geographic Range

- Classification of range size: Medium
- Range size within region: 150,000 ha
- Proportion of region occupied (%): 12%
- Certainty: Medium
- Source: Atlas of Victorian Wildlife

b) Abundace

- Classification of abundance: Low
- Density: NI.
- Certainty: Medium
- Source: Atlas of Victorian Wildlife, Meredith et al. (in prep b)

c) Habitat Specificity

- Classification of habitat specificity: Narrow

- Number of habitats used in the region: Lowland, riparian and dry forest, coastal heathland, warm temperate rainforest.
- Proportion of available habitats used (%): NI
- Certainty: Medium
- Source: Wilson and Knowles 1988, Henry and Murray 1993

Observed Dynamics
Population Trend in Last Decade

- Increasing, stable or declined: NI to identify trends.

Increasing and Stable Species
a) Population trend since discovery by Europeans

- Classification of population trend: NI to identify trends.

Spatial Dynamics

a) Population variability-NI

b) Powers of dispersal

- Classification of powers of dispersal: Medium. Can move up to 500m/day during breeding.
- Certainty: Medium
- Average distances dispersed: NI
- Maximum distance dispersed: NI
- Immigration rates: NI
- Source: Slip and Shine 1988b

Life History Parameters
a) Reproductive output

- Classification of reproductive output: High
- Certainty: Medium
- Mean clutch/litter size: 9 - 54 with an average of 21
- Age at first breeding (yrs): 4 - 8 years
- Mean no of litters per year: <1
- Source: Cogger et al. 1993, Slip and Shine 1988a

b) Longevity

- Classification of lifespan: Long lived
- Certainty: Low
- Average lifespan (yrs): NI. Probably 10 - 20 years
- Maximum lifespan (yrs): NI
- Body size (gm): NI
- Source: Cogger et al. 1993, Slip and Shine 1988a

Threatening Processes
1. Predation: Foxes and cats may prey upon nesting females, eggs and juveniles.

- Certainty: Low
- Ranking: 1
- Source: Meredith et al. (in prep b)

2. Altered hydrology: Not applicable
3. Disease: Not applicable
4. Competition: For prey by introduced predators.

- Certainty: Low
- Ranking: 1
- Source: P. Robertson, pers. comm.

5. Total Habitat Removal (Clearing): Historically, land clearing, though this has been a fairly minor impact in East Gippsland and not currently a threat.
6. Fragmentation: Species has large home range and uses different parts of habitat at different times of the year, fragmentation may result in the loss or degradation of some these habitats. Fragmentation of habitat caused by road and track construction may lead to increased accidental deaths through roadkills.

- Certainty: Low
- Ranking: 1
- Source: Meredith et al. (in prep b)

7. Partial habitat removal (timber harvesting): Habitat alteration (of hollow trees and logs, reduction in litter) resulting from timber harvesting and regeneration burns.

- Certainty: Low
- Ranking: 1
- Source: Meredith et al. (in prep b)

8. Harvesting by humans: Poaching for pet trade, killing of individuals by misinformed public.

- Certainty: Low
- Ranking: 1
- Source: LCC 1985

9. Altered successional states: Inappropriate fire regime may remove litter necessary for nesting and may also kill individuals.

- Certainty: Medium
- Ranking: 2
- Source: Meredith et al. (in prep b)

10. Natural Disasters: Wildfires may remove litter necessary for nesting and may also kill individuals.

- Certainty: Low
- Ranking: 2
- Source: Meredith et al. (in prep b)

11. Loss of organism the species depends on: No
12. Contamination of life cycle: No
13. Grazing or trampling by stock: No
14. Other: No

Comments: Far East Gippsland supports the only population of the Diamond Python in Victoria, where it is at the southern extremity of its distribution (Coventry and Robertson 1991). There are few records (Atlas of Victorian Wildlife), and although the species is secretive and well camouflaged, making it difficult to detect, the low reporting rate is a likely reflection of its low abundance (Meredith *et al.* (in prep b)). Most of the species distribution is in conservation reserves. The major potentially threatening processes operating on the species in

East Gippsland are inappropriate fire regimes (too frequent fire), intense wildfire and predation by foxes and cats. Timber harvesting may adversely affect the species habitat by reducing the abundance of hollow trees and logs, and temporarily reducing the amount of litter and cover in harvested areas. In addition increased roading may increase the incidence of accidental road deaths. The impact of poaching is unclear but likely to be less important than other threatening processes (Meredith *et al.* (in prep b)).

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Appendix G: Ecological vegetation classes Index

Attachment 1: Ecological vegetation class nomenclature
Attachment 2
Ecological Vegetation Classes peer review

Attachment 1: Ecological vegetation class nomenclature

Attachment 1 to Appendix G- Examples of ecological vegetation class nomenclature from an extract of the Statewide Vegetation Typology (DNRE (in prep)).

Names in **bold** are those currently accepted by the Census, those in "quotation marks" are mosaics (a mapping unit), those in italics are floristic communities.

- **Alluvial Plains Shrubland** (Parkes et al.et al.)
- **Alluvial Terraces Herb-rich Woodland** (Muir et al.et al. 1995)
- **"Alluvial Terraces Herb-rich Woodland/Creekline Grassy Woodland Mosaic"**
- **"Alluvial Terraces Herb-rich Woodland/Heathy Dry Forest Mosaic"**
- **Banksia Woodland**
- **Belah Woodland** (Parkes et al.et al.)
- **Big Mallee** (this census) = Big Mallee Yellow Gum Woodland (Parkes et al.et al.)
- **Black Box Chenopod Woodland** (Parkes et al.et al.)
- **Box-Ironbark Forest** Muir et al.et al. (in press) = (in part) Grey Box (Eucalyptus microcarpa - Red Ironbark (

E. sideroxylon>/i>) dry sclerophyll forest Communities 1, 2, 3 and 4 McMahon and Carr (1988); (in part) Grey Box Yellow Gum (Eucalyptus microcarpa - Eucalyptus leucoxylon) Dry Sclerophyll Forest Carr et al.et al. (1989b); (in part) Eucalyptus polyanthemos (Red Box) - E. macrorhyncha (Red Stringybark) - E. microcarpa (Grey Box) Dry Sclerophyll Forest Todd and McMahon (1990)

- Box-Ironbark Forest (Northern Goldfields) Muir et al.et al. (1995) = Box Ironbark Forest Walsh (1987)
- Box-Ironbark Forest (Western Goldfields)) Muir et al.et al. (1995)
- Box-Ironbark Forest (North-eastern Victoria)) Muir et al.et al. (1995)
- Box-Ironbark Forest (Yarra Valley)) Muir et al.et al. (1995)
- **Box Woodland** (LCC 1991)
- **Brackish Sedgeland**(Woodgate et al.et al. 1994)
- **Broombush Mallee** (this census) = in part Sandstone-rise Broombush Mallee (Parkes et al.et al.)
- **Broombush Mallee (Goldfields)** Muir et al.et al. (1995)
- Buloke Herb-rich Woodland (this census) = (in part) Grey Box-Buloke Grassy Woodland Community 4 (Bedgood and McMahon 1992); Yellow Gum Grassy Woodland Sub-community 5.2 (Bedgood and McMahon (1992)
- **Chenopod Mallee** (Parkes et al.et al.)
- **Clay Heathland**
- **Closed Heathland** (Duncan et al.et al.)
- **Coast Banksia Woodland**
- Coastal Sclerophyll Forest Parkes et al.et al. (1983) = (in part) **Limestone Box Forest** (Woodgate et al.et al. 1994); (in part)

Attachment 2

Physical attributes used in East Gippsland to determine the distribution of ecological vegetation classes mapped by the Department of Conservation and Natural Resources in the East Gippsland Regional Forest Area. (= relatively high levels; ¯ = relatively low levels; n = average)

Ecological vegetation class	Discriminating attributes	Discriminating attribute features	Non- discriminating attributes
Coastal Dune Scrub Complex	Geology/ soils/ exposure/ soil water relations/ landform/ climate/ effective rainfall	Aeolian sands/ soils Ca, Fe, ¯humus/ exposure to salt and wind/ droughty soils/ primary dunes/ maritime climate/ low effective rainfall	salinity/ aspect/ slope/ elevation/ rainfall
Coast Banksia Woodland	Geology/ soils/ exposure/ soil water relations/ landform/ climate/ effective rainfall	Aeolian sands/ soils ~Ca, ~Fe, ~humus/ droughty soils/ ~exposure to salt and wind/ secondary dunes/ maritime climate/ low effective rainfall	salinity/ aspect/ slope/ elevation/ rainfall
Coastal Grassy Forest	Geology/ soils/ exposure/ soil water relations/ landform/ climate/ effective rainfall	Aeolian sands/ soils ¯Ca, ~Fe, ~humus/ ¯exposure to salt and wind/ well drained but damp soils / tertiary dunes or sand sheets/ rainfall <800mm/ moderate effective rainfall	salinity/ aspect/ slope/ elevation/ climate
Coastal Vine-rich Forest	Geology/ soils/ exposure/ soil water relations/ landform/ aspect/ slope/ rainfall/ climate/ effective rainfall	Granites, aeolian sands/ colluvial or aeolian sands ¯Ca, ~Fe, ~humus/ moderate to low exposure to fire/ moist soils/ coastal hills and minor gullies/ southern aspects/ gentle slope/ 1000-1200mm rainfall/ maritime climate/ high effective rainfall	salinity/ elevation
Coastal Sand Heathland	Geology/ soils/ exposure/ soil water relations/ landform/ climate/ effective rainfall	Aeolian sands/ ~Ca, ~Fe, ¯humus/ ~ to exposure to salt and wind/ droughty soils/ dunes/ maritime climate/ low effective rainfall	salinity/ aspect/ slope/ elevation
Sand Heathland	Geology/ soils/ soil water relations/ landform/ rainfall/ effective rainfall	Aeolian sands, granitic sands/ ¯Ca, ¯Fe, ¯humus/ droughty soils/ sandy slopes dunes, or sand sheets/ rainfall <750mm/ low effective rainfall	exposure/ salinity/ aspect/ slope/ elevation/ climate
Clay Heathland	Geology/ soils/ exposure/ soil water relations/ landform/ aspect/ slope/ elevation/ rainfall	Outwash clays/ white duplex soils over yellow subsoils/ - exposure to fire/ soils water-logged in winter, dry in summer/ shallow depressions	exposure/ salinity/ climate/ effective rainfall

		or slopes/ northern or western aspects if on slopes/ gentle/ <100m/ <800mm	
Wet Heathland	Geology/ soils/ exposure/ soil water relations/ landform/ slope/ elevation/ rainfall/ climate/ effective rainfall	Aeolian or outwash sands/peaty sands/ exposure to fire/ water-logged soils most of the year, damp in summer/ depressions on plains or slopes near drainage lines/ gentle slopes/ <150m/ 800-1100mm/ maritime/ high	salinity/ aspect

Ecological vegetation class	Discriminating attributes	Discriminating attribute features	Non- discriminating attributes
Coastal Saltmarsh	Geology/ soils/ exposure/ soil water relations/ salinity/ landform/ slope/ elevation	Lacustrine deposits/ sandy peats, organic muds/ - exposure to wind and salt/ ¯exposure to fire/ soils water-logged/ salinity through daily inundation by tides/ estuarine flats/ negligible slope/ sea level	aspect/ rainfall/ climate/ effective rainfall
Estuarine Wetland	Geology/ soils/ exposure/ soil water relations/ salinity/ landform/ slope/ elevation	Lacustrine deposits/ sandy peats, organic muds/ ~ exposure to wind and salt/ soils water-logged/ variable salinity (to ¯) through prolonged and periodic flooding/ estuarine flats/ negligible slope/ sea level	aspect/ rainfall/ climate/ effective rainfall
Coastal Lagoon Wetland	Geology/ soils/ soil water relations/ salinity/ landform/ climate/ effective rainfall	Colluviums/ sandy peats and muds/ soil at field capacity/ usually flooded by freshwater/ depressions on near-coastal plains/ maritime/ effective rainfall	exposure/ aspect/ slope/ elevation/ rainfall
Wet Swale Herbland	Geology/ soils/ exposure/ soil water relations/ salinity/ landform/ climate/ effective rainfall	Alluvium-aeolian mixtures/ peaty sands/ wind exposure ~salt exposure/ soils at field capacity/ freshwater to mildly brackish/ swale/ maritime/ - effective rainfall	aspect/ slope/ elevation/ climate
Brackish Sedgeland	Geology/ soils/ exposure/ soil water relations/ salinity/ landform/ elevation/ climate/ effective rainfall	Alluvium-aeolian mixtures/ peaty sands/ wind exposure ~salt exposure/ soils generally at field capacity only over winter, sometimes flooded for long periods with water backup from lake closure/ freshwater to mildly brackish/ swale/ sea level/ maritime/ effective rainfall	aspect/ slope/ rainfall
Banksia	Geology/ soils/	Outwash and aeolian sands/	aspect/ slope/

Woodland	exposure/ soil water relations/ exposure/ landform/ climate/ effective rainfall	soils ¯Ca, ¯Fe, humus/ well drained soils/ ¯exposure to salt and wind/ tertiary dunes and sand sheets/ maritime climate/ moderate effective rainfall	elevation/ rainfall
Limestone Box Forest	Geology/ soils/ landform/ aspect/ rainfall/ climate/ effective rainfall	Mostly limestone occasionally silty outwash/ terra rossas or silt loams/ gullies and nearby slopes/ all aspects except south/ 760-900mm/ maritime/ moderate	soils/ soil water relations/ salinity/ slope/ elevation
Lowland Forest	soils/ soil water relations/ landform/ slope/ elevation/ rainfall/ climate/ effective rainfall	Clays, sandy clays and clayey gravels/ well drained/ coastal outwash plains and embedded or hinterland hills/ gentle slopes/ <400m/ >750mm/ maritime/ moderate to high effective rainfall	Geology/ exposure/ salinity/ aspect

Ecological vegetation class	Discriminating attributes	Discriminating attribute features	Non- discriminating attributes
Riparian Scrub Complex	Geology/ soils/ soil water relations/ salinity/ landform/ aspect/ slope/ elevation/ rainfall/ climate/ effective rainfall	Alluviums/ peaty sands/ water-logged soils year-round/ freshwater/ lowland streams of low gradient/ <150m/ 800-1000mm rainfall	exposure
Riparian Forest	Geology/ soils/ soil water relations/ landform/ slope/ elevation/ effective rainfall	Alluviums/ silts loams and sands/occasional inundation with freshwater/ alluvial terraces of permanent streams/ gentle slopes/<800m/ effective rainfall	exposure/ soil water relations/ salinity/ rainfall/ climate
Riparian Shrubland	soils/ exposure/ soil water relations/ landform/ slope/ elevation/ effective rainfall	Rock bars, cobbles, sands/ frequent and violent inundation with freshwater exposed to severe flooding/ river courses of major streams/ moderate slopes/<800m/ ~ ¯effective rainfall	Geology/ salinity/ soil water relations/ rainfall/ climate
Heathy Dry Forest	Geology/ soils/ exposure/ soil water relations/ landform/ aspect/ slope/ elevation/ rainfall/ climate/ effective rainfall	Granites/ sandy loams/ fire exposure and insolation/ well drained/ foothills/ north and west/ moderate to steep slope/ 200-900m/ 750-1000mm/ warm dry continental/ ¯effective rainfall	salinity
Shrubby Dry Forest	Soils/ exposure/ soil water relations/ landform/ aspect/	Skeletal sandy clays/ fire exposure and insolation/ well drained/ foothills/ north and	Geology/ salinity

	slope/ elevation/ rainfall/ climate/ effective rainfall	west/ moderate to steep slope/ 200-900m/ 750-1000mm/ warm dry continental/ ¯effective rainfall	
Grassy Dry Forest	Geology/ soils/ exposure/ soil water relations/ landform/ slope/ elevation/ rainfall/ climate/ effective rainfall	Granites/ sandy clay loams/ ~fire exposure and insolation/ well drained/ foothills slopes and broad ridges/ gentle to moderate / 200-900m/ <800mm/ warm dry continental/ ¯effective rainfall	Salinity/ aspect
Valley Grassy Forest (formerly Herb-rich Forest)	Geology/ soils/ exposure/ soil water relations/ landform/ slope/ elevation/ rainfall/ climate/ effective rainfall	Granodiorite, limestone/ clay loams/ ~fire exposure ¯insolation/ well drained/ foothills slopes and valley floors/ gentle/ 250-400m/ <760-900mm/ warm dry continental/ ~effective rainfall	salinity/ aspect
Foothill Box Ironbark Forest	Geology/ soils/ exposure/ soil water relations/ landform/ aspect/ slope/ elevation/ rainfall/ climate/ effective rainfall	Sedimentary/ skeletal sandy clay loam/ ~exposure to fire/ well drained/ foothills/ west and north/ moderate slope/ 800-900m/ 700-800mm/ warm dry continental/ ~effective rainfall	salinity

Ecological vegetation class	Discriminating attributes	Discriminating attribute features	Non- discriminating attributes
Limestone Grassy Woodland	Geology/ soils/ exposure/ soil water relations/ landform/ aspect/ rainfall/ climate/ effective rainfall	Limestone/ terra rossas/ - insolation/ well drained/ karst hills and slopes/ north and west/ <760mm/ warm dry continental/ ¯effective rainfall	salinity/ slope/ elevation
Rainshadow Woodland	Geology/ soils/ exposure/ soil water relations/ landform/ slope/ elevation/ rainfall/ climate/ effective rainfall	Granodiorite/ sandy clay loams/ ~fire exposure - insolation/ well drained/ foothills slopes and valley floors/ gentle to moderate/ 100-600m/ <760mm/ warm very dry continental/ ¯effective rainfall	salinity/ aspect
Rocky Outcrop Scrub	Soils/ exposure/ soil water relations/ landform/ aspect/ slope/ elevation/ rainfall/ climate/ effective rainfall	Brown earths often skeletal/ - insolation, ~ to ¯fire/ well drained/ steep foothills/ north west/ very steep/ 650-900mm/ hot very dry continental/ ¯effective rainfall	Geology/ salinity/ elevation
Rocky Outcrop Shrubland	Soils/ exposure/ soil water relations/ landform/ aspect/	Skeletal soils/ insolation, ~ to fire/ well drained soils/ foothill rocky ridges and slopes/ north	Geology/ soils/ exposure/ soil water relations/ salinity/

	slope/ rainfall/ climate/ effective rainfall	and west aspects/ steep slopes/ 600-700mm/ hot dry continental/ ¯effective rainfall	landform/ aspect/ slope/ elevation/ rainfall/ climate/ effective rainfall
Damp Forest	soils/ exposure/ landform/ aspect/ rainfall/ climate/ effective rainfall	Moderately well developed clay loams/ moist soil profiles year round/ ~insolation, ~ exposure to fire, ~insolation/ foothills/ southern or eastern aspects until fog drip becomes significant and then aspect is not as important/ 1000-1200mm/ warm humid continental/ moderate to high	Geology/ soil water relations/ salinity/ slope
Wet Forest	soils/ exposure/ soil water relations/ landform/ aspect/ elevation/ rainfall/ climate/ effective rainfall	Deep kraznosems/ wet soil profiles year round/ ~ to ¯exposure to fire, ~ to ¯insolation/ foothills and montane plateaus/ southern or eastern aspects until fog drip becomes significant and then aspect is not as important/ 800-1100m/ 1200-2000mm/ cool wet humid maritime/ high	Geology/ salinity/ slope
Cool Temperate Rainforest	Soils/ exposure/ soil water relations/ landform/ aspect/ elevation/ rainfall/ climate/ effective rainfall	Kraznosems with humus/ wet soil profiles year round/ ¯exposure to fire, ¯insolation/ foothills and montane plateaus/ southern or eastern aspects until fog drip becomes significant and then aspect is not as important/ cool to cold wet humid maritime/ very high	Geology/ salinity/ slope
Ecological vegetation class	Discriminating attributes	Discriminating attribute features	Non-discriminating attributes
Warm Temperate Rainforest	Soils/ exposure/ soil water relations/ landform/ aspect/ elevation/ rainfall/ climate/ effective rainfall	Clay loams with humus/ ¯exposure to fire, ~ ¯insolation/ damp soil profiles year round/ gullies of coastal plains, river valleys and low foothills/ southern or eastern aspects/ 600-1200m/ 1200-2000mm/ warm humid maritime/ moderate to high	Geology/ salinity/ slope
Cool/Warm Temperate Rainforest Overlap	Soils/ exposure /soil water relations/ landform/ aspect/ elevation/ climate/ effective rainfall	Clay loams with humus/ damp soil profiles year round/ ¯exposure to fire, ~ ¯insolation/ gullies foothills/ southern or eastern aspects/ 129-870m/ warm to cool humid maritime/ moderate to	Geology/ salinity/ slope/ rainfall

		high	
Dry Rainforest	Soils/ exposure/ soil water relations/ landform/ aspect/ slope/ elevation/ rainfall/ climate/ effective rainfall	Boulders and skeletal loams with humus/ dry soil profiles year round/ ¯exposure to fire, insolation/ soils droughty at some time of the year/ cliffs and screes of low foothills/ northern or western aspects/ generally steep slopes/ 750-900mm/ <0-120m/ warm humid continental/ low	Geology/ salinity
Tableland Damp Forest	Soils/ exposure/ soil water relations/ landform/ slope/ elevation/ rainfall/ climate/ effective rainfall	Moderately well developed clay loams/ ~ exposure to fire, ~insolation/ moist soil profiles year round/ montane tablelands/ gentle/ 1100-1300m/ 850-1200mm/ seasonal (cool to cold humid maritime in autumn, winter and spring continental (with occasional snow), warm continental in summer) fog drip becomes significant in autumn, winter and spring but not in summer/ moderate to high	Geology/ salinity/ aspect
Montane Dry Woodland	Soils/ exposure/ landform/ elevation/ climate/ effective rainfall	Moderately well developed sandy clay loams/ slopes, ridges, and plateaus/ 1000-1200m/ cold dry continental (with snow)/ low to moderate	Geology/ soil water relations/ salinity/ aspect/ slope/ rainfall
Montane Grassy Woodland	Geology/ soils/ landform/ elevation/ climate/ effective rainfall	Basalts, granodiorites/ moderately well developed fertile clay loams/ slopes, ridges, and plateaus/ 900-1200m/ cold dry continental (with snow)/ mod.e	Geology/ exposure/ soil water relations/ salinity/ elevation/ climate/ effective rainfall
Montane Damp Forest	Soils/ exposure/ landform/ elevation/ climate/ effective rainfall	Moderately well developed sandy clay loams/ ~isolation/ slopes and plateaus/ southern and eastern/ 1000-1200m/ cold damp continental (with snow)/ moderate	Geology/ exposure/ soil water relations/ salinity/ aspect
Ecological vegetation class	Discriminating attributes	Discriminating attribute features	Non-discriminating attributes
Montane Wet Forest	Soils/ exposure/ landform/ aspect/ elevation/ rainfall/ climate/ effective rainfall	Well developed clay loams/ ¯exposure to fire, ~exposure to fire/ slopes and plateaus/ southern and eastern/ 1000-1200m/ cold wet continental (with snow)/ high	Geology/ soil water relations/ salinity/ aspect
Montane	Geology/ soils/	Alluviums/ silt/ sheltered	Salinity/ aspect/

Riparian Woodland	exposure/ soil water relations/ landform/ slope/ elevation/ climate/ effective rainfall	creek valleys/ damp soils from streams/ alluvial flats/ gentle slopes/ 900-1200m/ cold dry continental (with snow)/ moderate to high	rainfall
Montane Riparian Thicket	Geology/ soils/ exposure/ soil water relations/ landform/ slope/ elevation/ climate/ effective rainfall	Alluviums/peaty sands and silts/ sheltered creek valleys/ wet soils from streams/ alluvial flats/ gentle slopes/ 1000-1200m/ cold wet continental (with snow)/ high	Salinity/ aspect/ rainfall
Sub-alpine Shrubland	Geology/ soils/ soil water relations/ landform/ elevation/ climate/ effective rainfall	Tilted sedimentary/ skeletal sandy clays/ dry soils/ broad ridge/ 1200-1400m/ cold dry continental (with snow)/ low	Exposure/ salinity/ aspect/ slope/ rainfall
Sub-alpine Woodland	Soils/ landform/ elevation/ climate/ effective rainfall	Moderately well developed clay loams with ~ humus/ slopes, ridges, and plateaus/ 1200-1400m/ cold dry continental (with frequent snow)/ moderate	Geology/ exposure/ soil water relations/ salinity/ aspect/ slope/ rainfall
Treeless Sub-alpine Complex	Soils/ exposure/ soil water relations/ slope/ elevation/ climate/ effective rainfall	Peats and sands/ exposure to wind, frosts and snow/ wet soils/ drainage lines/ gentle slopes/ 900-1400m/ cold dry continental (with frequent snow)/ moderate	Geology/ salinity/ landform/ aspect/ rainfall

Ecological Vegetation Classes peer review

Peer Review Report of Ecological Vegetation Classes

(5 June 1996)

Background

Ecological Vegetation Classes (EVCs) are derived from underlying large scale forest type and floristic community mapping with floristic, structural, and environmental attributes being used to define individual EVCs.

The process of deriving EVCs had not previously been formally documented and critically appraised, although Woodgate et al. (1994) provided an overview of the methodology. The Department of Natural Resources and Environment (NRE), as part of the East Gippsland Comprehensive Regional Assessment, has prepared a full description of the methodology used to derive EVCs.

The Ecological Vegetation Classes Methodology Paper (Appendix G of the Environment and Hertiage Report) was peer reviewed on 5th June 1996, and modified in response to comments received.

The Peer Group

A group of experts was invited to peer review the EVC methodology report, as described in a draft report prepared by NRE. Members of the group were:

- Dr Mark Burgman, University of Melbourne, Victoria
- John Benson, National Herbarium, Sydney, New South Wales
- Sandy Kinnear, Department of Housing and Urban Development, South Australia.
- Prof Jamie Kirkpatrick, University of Tasmania, Tasmania
- Dr Bob Parsons, La Trobe University, Victoria

Adrian Moorrees, David Parkes and Bill Peel of the Department of Natural Resources and Environment (NRE), Victoria were present at the review to explain the EVC methodology and answer questions. Brendan Edgar and John Neldner of the Australian Nature Conservation Agency, and Harry Abrahams of the Australian Heritage Commission were present at the review as observers.

Objectives

To facilitate discussion by the peer group, a number of questions were presented for consideration These were:

- Do you understand the process to derive and define Ecological Vegetation Classes?
- Are these processes ecologically sound and valid?
- Is the relationship of EVCs to environmental attributes, floristic vegetation communities, floristic sub-communities and forest types understood and ecologically sound?
- Is the homogeneity within EVCs sufficient for biodiversity assessments of forest communities?
- Are Ecological Vegetation Classes suitable for a 1:100 000 scale vegetation map for the CRA forest biodiversity assessment of forest communities ?

Summary of Outcomes

- The EVC concept was developed as a regional planning tool that can be applied consistently across the State to raise the awareness of land managers and the public regarding biodiversity conservation and ecological management, and ultimately to produce better land management practice. The identification and mapping of EVCs involves the combination of floristic, life form and reproductive strategy profiles, and relating these to particular environmental site attributes, including aspect, elevation, gradient, geology, soils, landform and rainfall. EVCs are derived from a generally consistent methodology and provide an important Statewide level of vegetation classification and the basis of an on-going mapping program;

- The floristic analysis used to generate EVCs was generally understood. However the step of linking or amalgamating floristic groups into EVCs was less well understood and imprecise, as different environmental attributes were used in defining different EVCs. The attributes (rules) used to group floristic units into EVCs need to be clearly stated for each EVC;

- Mapping of floristic communities (a more detailed level than EVCs) would provide a higher level of discrimination for local conservation planning and land management. This level of mapping will not be completed for many years, although this is not a major impediment to planning at the regional scale since the majority of EVCs comprise a single floristic community. In these cases the EVC is an appropriate basis for assessing floristic biodiversity conservation. However, some EVCs appear to be more heterogeneous, for example some EVCs combine several dominant tree species with different fire sensitivities and regeneration mechanisms. Within East Gippsland, four extensive ecological vegetation classes were considered to contain a significant amount of heterogeneity, particularly if dominant structural form and floristic composition only are used to define EVCs (Damp Forest, Wet Forest, Lowland Forest and Shrubby Dry Forest);

- It was considered that the issue of heterogeneity within the four extensive EVCs in East Gippsland should be further examined. This issue was recognised in the development of the East Gippsland Forest Management Area Plan whereby a geographic sub-unit analysis, as a surrogate, was undertaken in an attempt to ensure that the heterogeneity and range of EVCs was represented in the reserve system;

- The group of experts suggested additional analyses that could be undertaken to address the heterogeneity issue for the four large EVCs. These included the use of forest type mapping, and/or the construction of floristic communities, followed by an assessment of their occurrence in the reserve system. It was noted that if this work were to be conducted it could not be completed in time for inclusion in the Environment and Heritage assessment report for East Gippsland;

- It was proposed that a validation project be designed for EVC mapping. (It was noted that a validation project for EVC old growth mapping was being considered). In future, validation components could be included as standard in vegetation survey and mapping projects; and

- It was proposed that an investigation be conducted as to whether an appropriate heterogeneity analysis could be used to compare the mapping outputs in different Regional Forest Agreement regions across States.

Discussion

The EVC concept

1. The EVC concept was developed as a regional planning tool that can be applied consistently across the State, and should be judged mainly on its effectiveness in conservation planning - raising the awareness of land managers and the public regarding biodiversity conservation and ecological management, ultimately to produce better land management practice. The identification and mapping of EVCs involves the combination of floristic, life form and

reproductive strategy profiles, and relating these to particular environmental site attributes, including aspect, elevation, gradient, geology, soils, landform and rainfall;

2. EVCs are derived from a generally consistent methodology and provide an important Statewide level of vegetation classification and the basis of an on-going mapping program. Mapping of floristic communities is the ideal level of discrimination for detailed local conservation planning and land management. However, because of the time and data required, it will not be completed for many years. At regional scales, most EVCs will exist as a single floristic community, and in these cases EVC mapping provides an adequate level of discrimination. For the EVCs where this is not the case, additional strategies for discrimination for planning purposes will be required.

Validity of the methods used

3. The best test of the validity of the EVC approach was seen as being a deliberate validation exercise, involving random selection and field validation of an independent sample of sites following vegetation survey, analysis and mapping.

4. It was recognised that subjective judgement is important in the EVC methodology, as well as for other vegetation classifications, although scientific analysis generally aims to reduce subjectivity. The step of linking or amalgamating floristic groups into EVCs, which relies on subjective assessments, made it difficult for participants to judge the consistency and validity of the overall approach. The group sought a description of the process used and the specific attributes applied to individual EVCs to clarify these issues.

Appropriateness of EVCs as units for biodiversity conservation

5. It was generally agreed that the participants would benefit from a better understanding of the relationships between EVCs and environmental parameters. However:

- most of the EVCs in East Gippsland seemed appropriate as the basis for assessing biodiversity conservation,
- some were considered to be more heterogeneous than others,
- if the heterogeneity issue could be addressed, EVCs were a good unit, given their floristic basis.

6. The classification which resulted from the EVC approach was seen as being too broad in some cases and needing additional discrimination - e.g. single units combining dominants with different fire sensitivities.

7. The main issue regarding heterogeneity in the East Gippsland Regional Forest Agreement region is with extensive ecological vegetation classes - Damp Forest, Wet Forest, Lowland Forest and Shrubby Dry Forest. This issue was recognised in the proposed East Gippsland Forest Management Plan, in which representative protection of this variation was considered by allocating reserved habitat across a framework of geographic sub-units for all EVCs.

8. Additional analyses that could be undertaken to address the heterogeneity issue for the four large EVCs included the use of forest type mapping, and/or the construction of floristic communities, followed by an assessment of their occurrence in the reserve system.

9. It was agreed that it would be valuable to consider undertaking a comparative assessment of the levels of heterogeneity within vegetation units used in various States for Comprehensive Regional Assessments.

Appropriateness of scale of mapping

10. Participants felt that vegetation mapping should aim to represent areas that act as the most effective surrogates for other elements of biodiversity, to maximise uniformity within vegetation types, and to map boundaries between types that can be identified in the field.

11. The scale of 1:100,000 used for EVCs was seen as an acceptable scale for this mapping given the average size of Regional Forest Agreement regions.

Appropriateness of mapping method

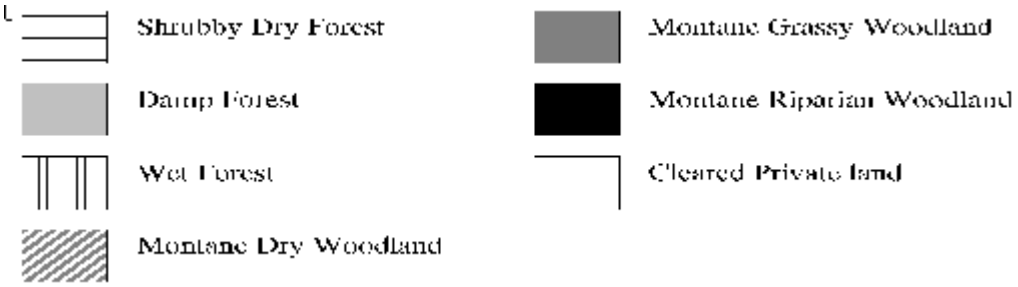
12. It was generally agreed that vegetation mapping should be based on a combination of survey, analysis, aerial photo interpretation (or other remote sensed information) and ground truthing.

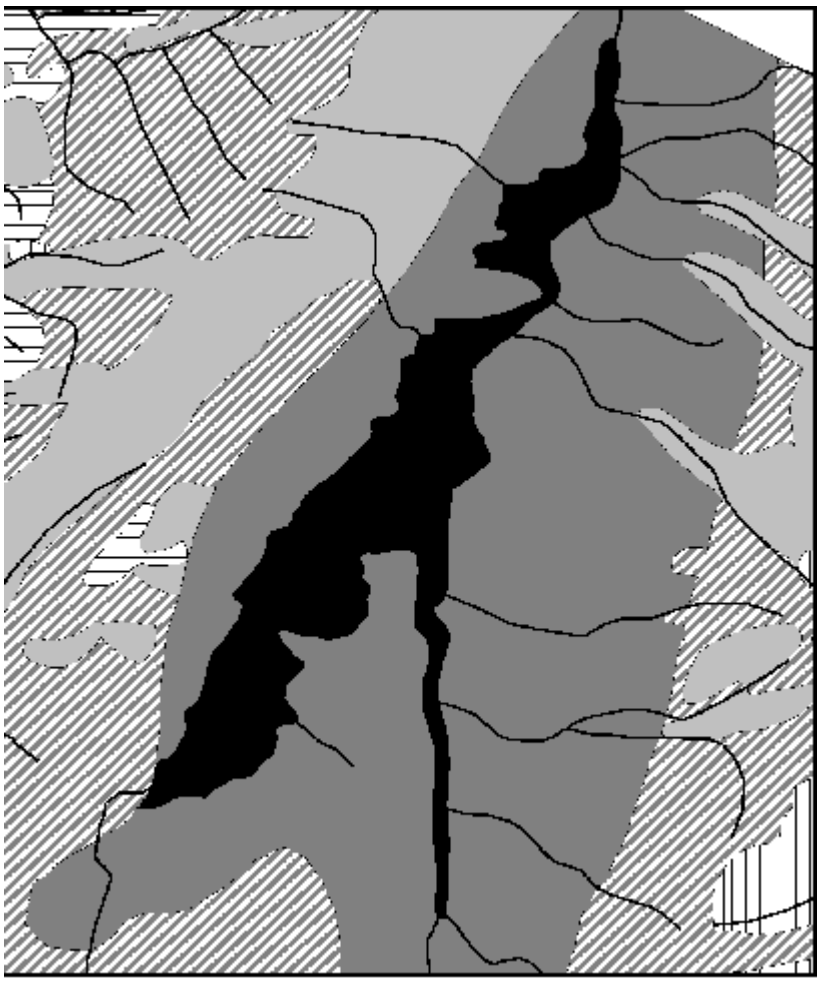
13. It was proposed that formal validation procedures be used to verify the results.

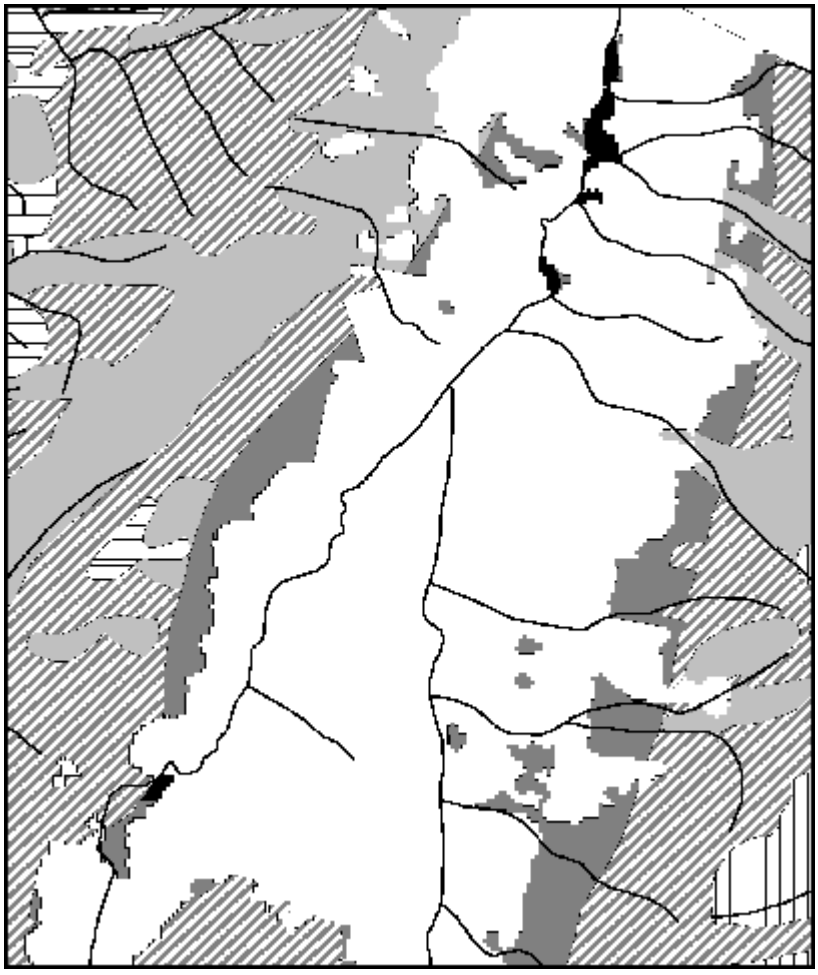
Appendix H: Corrections to Large Format Maps

There is a mapping error on the large format Ecological Vegetation Class maps (Maps 2 and 3). These figures illustrates the correct pattern of EVs.

Legend







Corrections to Map 3 Ecological Vegetation Classes Pre 1750 Extent. / Corrections to Map 2 Ecological Vegetation Classes Current Extent

Appendix I: Report of the Victorian Old Growth Joint Scientific Advisory Group

EXECUTIVE SUMMARY

1. The Joint Scientific Advisory Group (JSAG) recommends adoption of the 10% regrowth crown cover rule on the following basis:

• the definition used by Woodgate *et al.* (1994) was conservative in that it permitted up to 90% mature trees, as distinct from late mature and over-mature trees, to be included in the classification of old growth forest;

• field transects and inspections by Woodgate *et al*. suggested that regrowth crown cover of more than 10% was almost always associated with significant unnatural disturbance;

• expanding the regrowth crown cover limit to the next identified level of 50% would be much more likely to include forests that have experienced significant disturbance than it would be to include additional old growth forests.

JSAG also noted that at least 53% (50% for Jacobsian types, 57% for non-Jacobsian types) of the area of forest that exhibits regrowth crown cover of between 10% to 50% is already protected in reserves.

2. JSAG recommends that before the Woodgate *et al*. protocols are used to classify old growth forest in other Victorian RFA Regions, they should be validated using explicit, repeatable procedures. There is also a need for scientifically and field-based validation of the aerial photo interpretation (API) typing of old growth forests in East Gippsland.

Any system of classification is subject to error. Without validation, it is not possible to gauge precisely the magnitude of error and hence the risk of failing to identify areas of old growth. JSAG is satisfied that, in the present study, the magnitude of error is reasonably low, given the extent of field calibration .

3. In addressing the Term of Reference, JSAG considered that the next major step in clarifying our understanding of old growth forest would involve an examination of the temporal dynamics of individual vegetation types to clarify their successional processes and to establish specific rules for identifying old growth.

In an Australian context, a scientifically and field-based investigation of other ecological attributes of old growth forest listed in Appendix H of Woodgate *et al*. (1994) to further explore the relationship between those attributes and 'old growth' is necessary. JSAG noted that in the absence of this latter investigation, the approach taken to identify old growth was deliberately chosen to be conservative. JSAG considers that this same approach is appropriate in other Regions until the results of such research are available.

JSAG Involvement in the Regional Forest Agreement Process

As signatories to the National Forest Policy Statement (Commonwealth of Australia, 1992), all Governments have agreed to a framework and process for carrying out comprehensive assessments of the economic, social, environmental and heritage values of the forest estate. Comprehensive Regional Assessments (CRAs) provide governments with the information required to make long-term decisions about forest use and management. Regional Forest Agreements (RFAs), setting out obligations of governments in relation to each forest region, will be negotiated following the completion of CRAs. A RFA for East Gippsland (Victoria) is scheduled to be signed by the end of 1996.

A Deferred Forest Assessment (DFA) using processes outlined in Commonwealth of Australia (1995b), was undertaken in Victoria in 1995 to provide interim protection for some forests in question prior to the finalisation of CRAs and RFAs. The outcome of this assessment was the identification and interim protection of forest areas which, in combination with existing nature conservation reserves, might contain the values necessary for the development of a comprehensive, adequate and representative (CAR) forest reserve system.

During the DFA process, conservation groups raised concerns about what they considered to be inadequacies in the Woodgate *et al* (1994) [Woodgate, P.W., Peel, W.D., Ritman, K.T., Coram. J.E., Brady, A., Rule, A.J. and Banks, J.C.G., 1994. A study of old-growth forests in East Gippsland . Department of Conservation and Natural Resources, Melbourne.] interpretation of the old growth definition as applied in East Gippsland.

The concerns were primarily on two grounds:

1. the percentage of regrowth that should be allowed when defining an area of forest as old growth (they considered 10% regrowth to be too low a cut-off point); and

2. the way fire was considered (that is, excluding areas of forest from consideration as old growth as a result of extensive and recent fire damage. [The Steering Committee did not refer this issue to JSAG because it had been resolved through the JANIS process. See the old growth section of the Environment and Heritage report.]

In signing the Interim Forest Agreement, the Commonwealth and Victoria agreed to refer these matters to a Joint Commonwealth/State Scientific Advisory Group (JSAG) during the CRA process. JSAG was appointed in April 1996 to report to the Victorian RFA Steering Committee.

Term of Reference

JSAG was asked to:

"advise on whether the Woodgate et al. premise (that for an area of forest to be classed as old growth there should be no more than 10% regrowth) is appropriate. If it is not, provide advice and reasons on the figure that should be adopted, bearing in mind the range of forest communities."

In reaching its conclusions, JSAG was required to:

• take account of the National Forest Policy Statement and other relevant literature, including the Victorian Deferred Forest Assessment report, and '*A Study Of The Old Growth Forests of East Gippsland'*, Woodgate *et al.* (1994); and

• refer to the principle author of the above study, relevant Commonwealth and Victorian departments, Environment Victoria (originators of the concerns) and others as appropriate.

JSAG Membership

The group was chaired jointly by the former Chief Scientist, **Professor Michael Pitman**, **FAA** and **Professor Ian Ferguson FTSE**, School of Forestry and Resource Conservation, University of Melbourne.

Members were:

Dr Mark Burgman, Senior Lecturer, School of Botany,

University of Melbourne

Mr Jack Bradshaw, Manager, Forest Management Branch

Department of Conservation and Land Management, WA

Dr Ian Noble, Group Leader, Ecosystem Dynamics
Research School of Biological Sciences, Australian National University

Dr John Raison, Senior Principal Research Scientist,

Division of Forestry and Forest Products, CSIRO.

Observers and the Secretariat are listed at Appendix 1.

Observers, Submissions and Presentations

A number of members of the original East Gippsland study team acted as observers (see Appendix 1) at the JSAG meeting and provided comments in response to questions from JSAG during its deliberations.

Submissions were invited from the organisations and individuals listed in Appendix 2 and their submissions are reproduced in Appendix 3.

Peter Woodgate made a presentation on the Woodgate *et al.* (1994) study to JSAG and a brief summary of his presentation is given in Appendix 3. [Some submitters did not provide their approval to publish their submissions.]

Context of the Reference

JSAG recognised that the reference was being considered in the context of the CRAs being undertaken in East Gippsland with the aim of developing a RFA between Victoria and the Commonwealth for the management of forests in the region.

The incorporation of the precautionary principle into decision making has been endorsed by State and Commonwealth Governments (IGAE 1992; Commonwealth of Australia 1992) and is defined as "where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

1. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and

2. an assessment of the risk-weighted consequences of various options."

JSAG was mindful of this principle in considering the reference. It noted, however, that, in contrast to the outcomes of the DFA process which generally were required to be precautionary in nature, the present references were in the context of CRAs requiring an assessment of the risk-weighted consequences of the various options. This environment required JSAG to provide definitive advice in the form of guidelines and principles which could be used in developing a CAR reserve system in the CRAs which would form the basis of a detailed RFA between Victoria and the Commonwealth.

JSAG was mindful of the need for a timely decision on the reference in relation to the deadline for the completion of CRAs in East Gippsland.

JSAG noted that, although the reference was specific to East Gippsland, its decision could have implications for CRAs and RFAs conducted in other regions, both in Victoria or in other States,

where forest types were of a similar nature to those in East Gippsland and the Woodgate *et al*. (1994) interpretation would be applicable.

JSAG based its consideration of the Term of Reference on the near final draft of the proposed interpretation of the definition for old growth developed by JANIS
(see Appendix 4).

Initiation of the Reference

JSAG learnt that the reference had been initiated by conservation groups during the DFA process. Each of the groups was invited to make a submission to JSAG, but some of these groups had chosen not to make submissions to JSAG for the following reasons:

1. concerns about the credibility of the JSAG process and the short timeframe for the East Gippsland CRA;

2. concerns about the implications for reservation of the forest estate of a possible change in the definition of old growth;

3. concerns about the immutability of DFA boundaries; and

4. concerns that JSAG would support the status quo in East Gippsland.

JSAG noted the above, and expressed its disappointment that some conservation groups had chosen not to make submissions.

Concepts Underlying Woodgate *et al*. (1994)

JSAG acknowledged the pragmatic nature of the study by Woodgate *et al.* (1994). It recognised that the study had developed a methodology based on interpretation of air photos so that old growth could be delineated and mapped in a practical manner. It noted that the Woodgate *et al.* approach should be considered in the context of the data and resources available for their study and its scale. All relevant data were made available for use in the study of old growth, but the resources and time available for the study were limited.

JSAG understood that some calibration of the photo-interpretation had been carried out using measurements of crown cover along field transects and vehicular and other inspections.

Definition of Old Growth Forest

JSAG recognised that many definitions of 'old growth' exist as a result of contemporary debate about this type of forest. It identified three main concepts of old growth forest which it considered were embodied in these definitions. These were:

1. Age - old growth forest defined on the basis of the age of the upper stratum or overstorey and comprising the oldest aged stands.

2. Naturalness - old growth forest defined on that basis of having suffered negligible unnatural disturbance (but which may have suffered severe and/or recent natural disturbance).

3. Ecological maturity - old growth forest defined by the structural attributes of the older growth stages of the forest from maturity through to senescence.

Commentary on the Woodgate et al. (1994) Study

JSAG considered that the study by Woodgate *et al.* was ground-breaking work, resulting in the development of a practical definition for old growth forest based on an effective synthesis and integration of many varied sources of information.

JSAG noted that the Woodgate *et al.* methodology was based on the two primary characteristics of old growth forest (growth stages and disturbance level, as incorporated in the National Forest Policy Statement) and that a number of important technical requirements underlay the definition and assessment methodology.

The Woodgate *et al*. 'growth stages' were based on distinctive tree crown attributes, described by Jacobs (1955) [Jacobs, M. R., 1955. Growth habits of the eucalypts . Forestry and Timber Bureau, Canberra.] , which characterise the developmental stages of eucalypts and approximate to broad age classes. Woodgate *et al.* used aerial photograph interpretation (API) to identify the relative proportion of these 'growth stages' in the upper stratum in each distinct stand (polygon) of forest.

The old growth definition developed by the study was based on the API mapping of relative crown cover of these growth stages. These classes spanned the ranges of <10%, 10 - 50%, and >50% crown cover. The implications of increasing the regrowth threshold permissible in stands identified as old growth from the current <10% crown cover to $\leq$50% crown cover (as detectable from API) were noted by Woodgate *et al*.

JSAG also recognised that the Woodgate *et al*. definition of old growth forest subsumes a number of other ecological characteristics of old growth forest besides age, particularly those listed in Appendix H of Woodgate *et al*. (1994). This assumption was not formally tested in the study, although some transects and field inspections were used to calibrate the API.

JSAG noted that the percentage crown cover of regrowth was only one criterion relating to disturbance on which forest was classified as 'old growth' in the Woodgate *et al*. study. Others used to identify areas having undergone significant disturbance included:

1. The interpretation by API and other records of eight specific forms of disturbance including natural wildfire, fuel reduction burning, grazing, clearfelling, selection logging, pathogen attack (eg *Phytophthora cinnamomi*), agricultural clearing and mining.

2. Classification of the severity of impacts of disturbance based on ecological vegetation class (EVC), forest type, species composition, growth stage, and forms of disturbance, based on evidence in the literature or on EVCs occurring in East Gippsland.

JSAG recognised that the members of the Woodgate team had carried out calibration of API results in the field. JSAG considered that the field transects and other results available from the calibration should be published. Explicit, repeatable validation should be put in train before the approach was more widely applied in other Regions (see Future Research below.)

Implications of Scale

JSAG recognised the implications of scale on the outcomes of the study by Woodgate *et al.* and considered that the definition should be seen in the context of the scale and the methodology on which it was based. Complete air photo coverage of the study area was available from a combination of air photo projects from 1987, 1990 and 1992. All photos were at a scale of 1:40 000. The average size of polygons was about 80 hectares (ha) and the minimum mappable area was about 10 ha. The growth stage categories used in the project were based on Jacobs (1955) description but were modified according to the detail evident from 1:40 000 scale air photos (Woodgate
et al. 1994) old growth. The use of a different mapping scale (see submission by McNally) and/or crown cover classes might enable more ready identification of different levels of regrowth crown cover or growth stages. Forests of low site productivity do not always exhibit Jacobs' (1955) growth stages (termed non-Jacobsian forests by Woodgate *et al.*) and thus

sometimes present difficulties in applying the Woodgate *et al.* criteria, especially in distinguishing mature from senescent growth stages.

Conservative Nature of the Definition

JSAG identified that the study by Woodgate *et al.* (1994) had been conservative in its identification of old growth by permitting a large percentage of some early mature forest types to be considered as 'old growth' in addition to late mature and over-mature forest. The definition permitted the inclusion of up to 90% mature forest, and as little as 10% senescent forest in its delineation of old growth forest. The ‘mature’ class included a broad spectrum of forest structures including young mature stands. JSAG agreed that this classification was inherently conservative. In the study, the latter two stages were combined and re-named the 'senescing' growth stage [Using API, mature Jacobsian forest was characterised by full, rounded crowns, compared with late mature and over-mature trees which displayed a more open crown with large numbers of dead and dying branches and which appeared lighter in colour than younger trees of the same species. Non-Jacobsian forest had less detectable morphological characteristics (Woodgate et al. 1994.)] . JSAG also noted that the NFPS definition targetted the late mature and over-mature growth stages. Woodgate *et al.* confined the concept of 'old growth forest' to older forest where the effects of disturbances were currently negligible, with ‘older forest’ defined by the characteristics of the late successional stages of a particular forest community. The Woodgate *et al.* approach could therefore be seen to be more precautionary than the NFPS definition (see also submission by Grose).

Figure 1

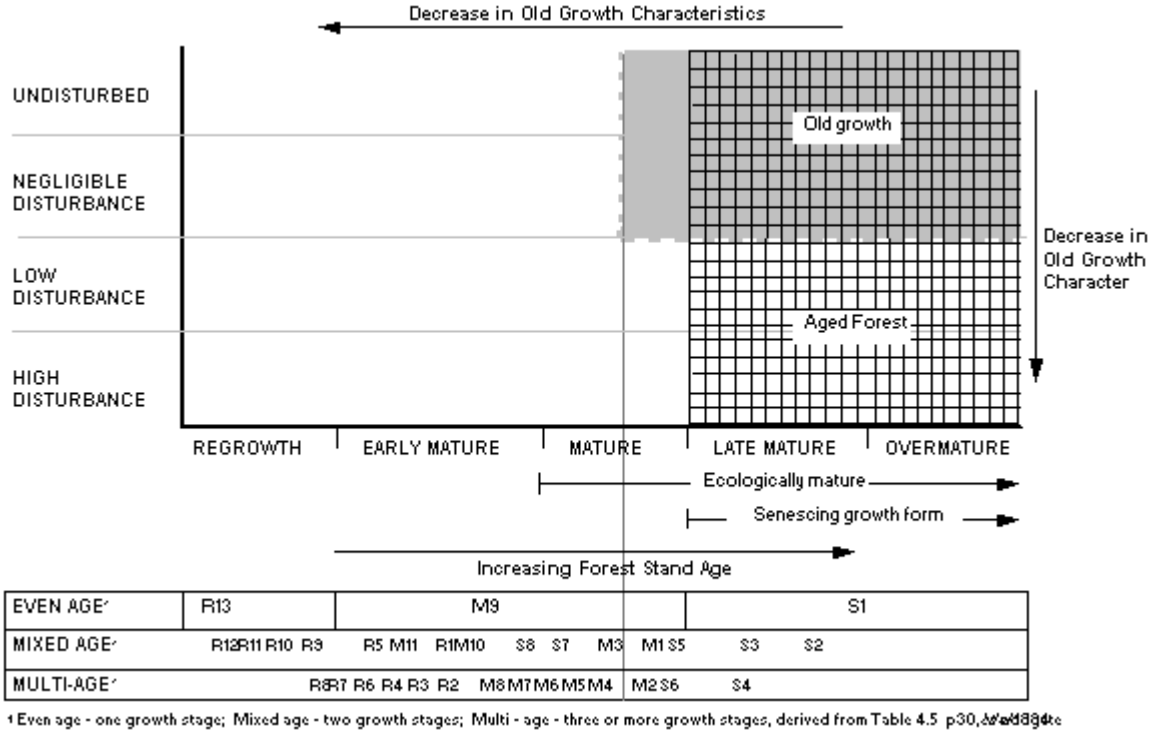


Figure 1 illustrates the derivation of old growth as identified by Woodgate *et al.* (1994). They propounded that the two most prominent indicators of old growth were growth stage characteristics and level of disturbance, which is consistent with the NFPS definition. Old growth is defined, therefore, on the basis of these two elements. Two concepts are depicted in this figure:

• old growth (grey shading) which was defined by the Woodgate *et al*. (1994) stand codes to the right of the vertical line; and

• aged forest represented by grid shading.

The point at which a stand is no longer defined as old growth, though subjective, can be delineated through arbitrary and dual assignment of separate thresholds for each element (Woodgate *et al*. 1994.) Note that the ordering of the Woodgate *et al*. stand codes is sometimes confounded in non-Jacobsian forest because of the difficulty of identifying growth stages.

10% Regrowth as a Surrogate for Disturbance

JSAG recognised that the percentage level of regrowth allowable in forest defined as 'old growth' was used as a surrogate for the level of disturbance encountered by the forest. JSAG acknowledged the strength of the arguments for this assumption advanced by the study and by Woodgate in his oral presentation, that is, that no scientific evidence existed to vary the percentage regrowth allowable in forest classified as old growth for each individual EVC.

Some JSAG members and submissions (e.g. Barnett) considered that the Woodgate *et al.* premise may not always equate with non-negligible disturbance of the overstorey. For example, in multi-aged forests, regrowth may become established either without disturbance or after mild fires. This regrowth may subsequently develop into mature forests. Such forest could undergo continual recruitment as distinct from recruitment after major disturbance (catastrophic recruitment.) The difficulty of distinguishing between continual versus catastrophic recruitment in mixed and multi-aged eucalypt stands could lead to errors in the identification of old growth, depending which regrowth crown cover limit was adopted. Using the Woodgate *et al.* methodology, forests characterised by continual recruitment might be excluded as old growth by the 10% rule. Vegetation types affected in this way may include Rocky Outcrop Scrub in East Gippsland (Peel, pers comm) and Alpine Ash in Montane Damp and Montane Wet Forests in the ACT (Raison, pers comm.) An understanding of temporal dynamics of forest systems may therefore become very important in understanding 'old growth' for these and other EVCs.

Impact of 10% Regrowth Rule

JSAG agreed that stands comprising less than 10% regrowth may be considered old growth and that stands with more than 50% regrowth should not be considered old growth forest. JSAG also recognised that, even in these two categories, there would doubtless be some small chance of classification error, because of errors inherent in aerial photo interpretation, and errors in the reliability of the shape of tree crowns to act as surrogates for the ecological status and disturbance history of the forest.

JSAG considered whether it may have been appropriate to afford an intermediate level of protection to stands with between 10% and 50% regrowth, depending on additional evidence as to their status, and on other conservation values and constraints. For these reasons, JSAG explored the potential impact of changing the 10% rule. If much of the additional area of forest that would be classified as old growth by expanding the regrowth crown cover limit to 50% was already in conservation reserves, then little would be gained by modifying existing thresholds.

JSAG considered what the broad impact of alteration might be using the following figures derived from Woodgate *et al*. (1994):

Crown cover of regrowth (%)	**Area classified as old growth in East Gippsland (ha)**
0%	207,992 [Source: Total area of stands containing senescing growth stages (dominant, co-dominant and subdominant)

	derived from Appendix 5 LESS total of S4, S6 and M2 which are senescing and mature growth stages containing sparse regrowth, Table 4.5 p 30, Woodgate et al. 1994.]
Less than 10%	224,657 [Source: Total area of stands containing senescing growth stages (dominant, co-dominant and subdominant), derived from Appendix 5 of this report.]
Less than or equal to 50%	262,381 [Source: 262 381 = 224 657 + 37 724, explained in Appendix 5.]

From this information, JSAG noted that extension of the definition of old growth to include regrowth up to 50% crown cover would increase the area by 37,724 ha. JSAG noted the relatively conservative nature of the definition and the resultant level of old growth identified in the East Gippsland Forest Management Area (21.2% of public land occurring in 26 of the 33 forested EVCs.) JSAG arranged for further analyses of the data to be undertaken to identify those areas with 10% to 50% regrowth crown cover for all EVCs. These analyses showed that 53% of forests with these characteristics was already protected in reserves (Appendix 5.) No distinction has been made between the various levels of disturbance in these forests and new rules would need to be developed to distinguish those that are negligibly disturbed. However, it is worth noting that there is a greater likelihood of significant disturbance having occurred outside existing reserves and the proportion of negligibly disturbed forest is thus likely to be greater in those forests already protected in the reserve system.

Appropriateness of the 10% Rule

JSAG recommended adoption of the 10% regrowth crown cover rule on the following basis:

• the definition used by Woodgate *et al.* was conservative in that it permitted up to 90% mature trees, as distinct from late mature and overmature trees, to be included in the classification of old growth forest;

• field transects and inspections by Woodgate *et al*. suggested that regrowth crown cover of more than 10% was almost always associated with significant unnatural disturbance; and

• expanding the regrowth crown cover limit to the next identified level of 50% would be much more likely to include forests that have experienced significant disturbance, than it would be to include additional old growth forests.

JSAG also noted that at least 53% (50% for Jacobsian types, 57% for non-Jacobsian types) of the area of forest that exhibits regrowth crown cover limit of between 10% to 50% is already protected in reserves.

For these reasons, JSAG recommended adoption of the 10% rule for East Gippsland.

JSAG recommends that before the Woodgate *et al.* (1994) protocols are used to classify old growth forest in other Victorian RFA Regions, they should be validated using explicit, repeatable procedures.

JSAG noted that field checking was presently occurring in other Victorian RFA Regions in which CRAs were being undertaken, and recommended that this be validation rather than calibration, in order to provide estimates of the errors of misclassification.

Future Research

In providing its advice on the Term of Reference, JSAG acknowledges (as do Woodgate *et al*) that following completion of the present round of old growth identification in Victoria, the next

major step in our understanding of old growth forest would be to undertake an examination of the temporal dynamics of each individual vegetation type to clarify their successional stages. This could then be used to establish specific rules for the identification of old growth forest in each vegetation type.

In an Australian context, JSAG also noted that a field-based investigation of old growth attributes listed in Appendix H of Woodgate *et al*. (1994) to further explore the relationship between these attributes and old growth is necessary. JSAG noted that, in the absence of this latter investigation, the approach taken by Woodgate *et al*. (1994) to identify old growth was conservative. A similar approach would also be appropriate in other Regions until the results of such research are available.

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Commonwealth of Australia 1995a, *National Forest Reserves. Commonwealth Proposed Criteria. A Position Paper*, Australian Government Printing Service, Canberra.

Commonwealth of Australia 1995b, *Deferred Forest Areas - Victoria*, Australian Government Printing Service, Canberra.

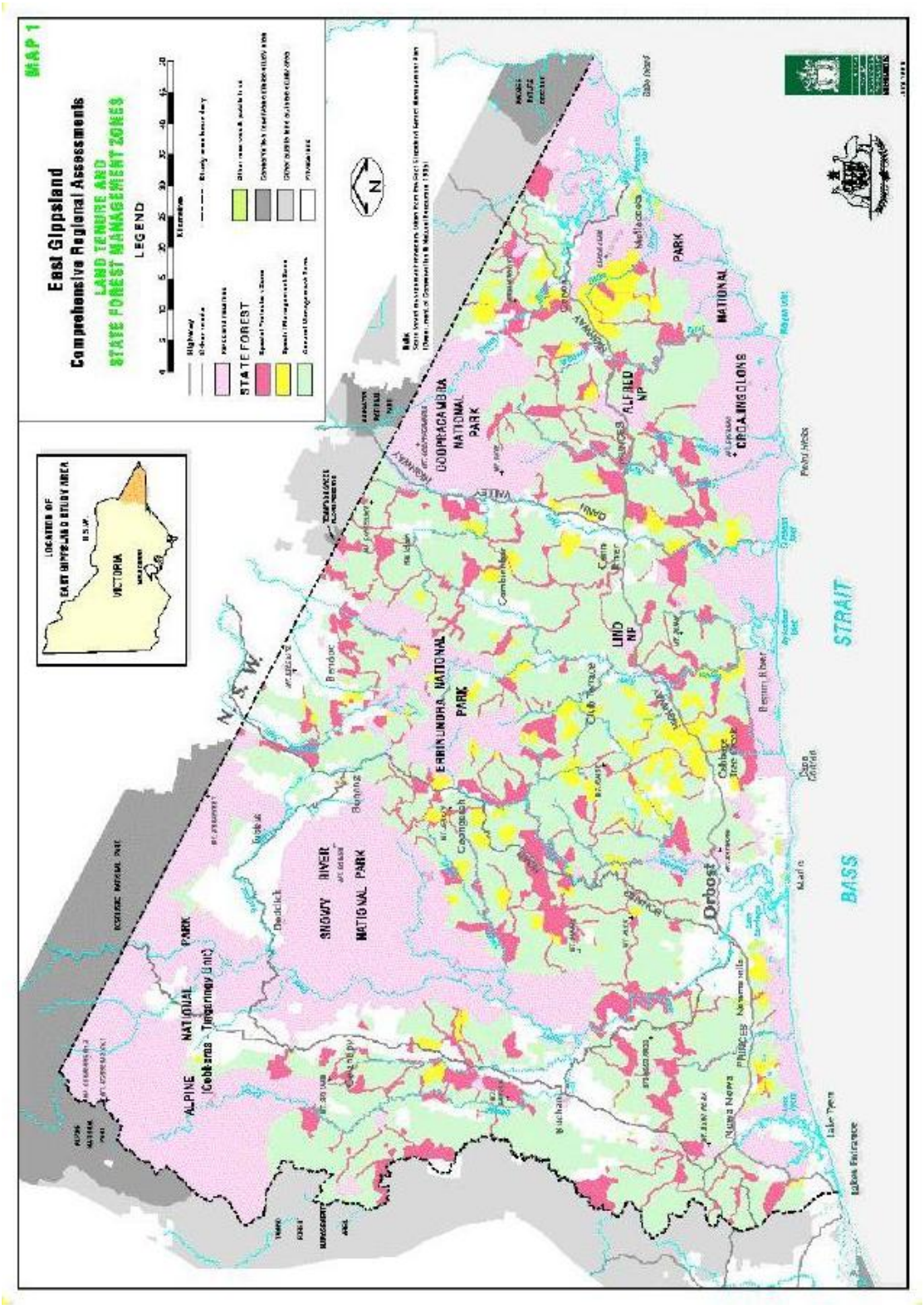
Jacobs, M. R., 1955. *Growth habits of the eucalypts*. Forestry and Timber Bureau, Canberra.

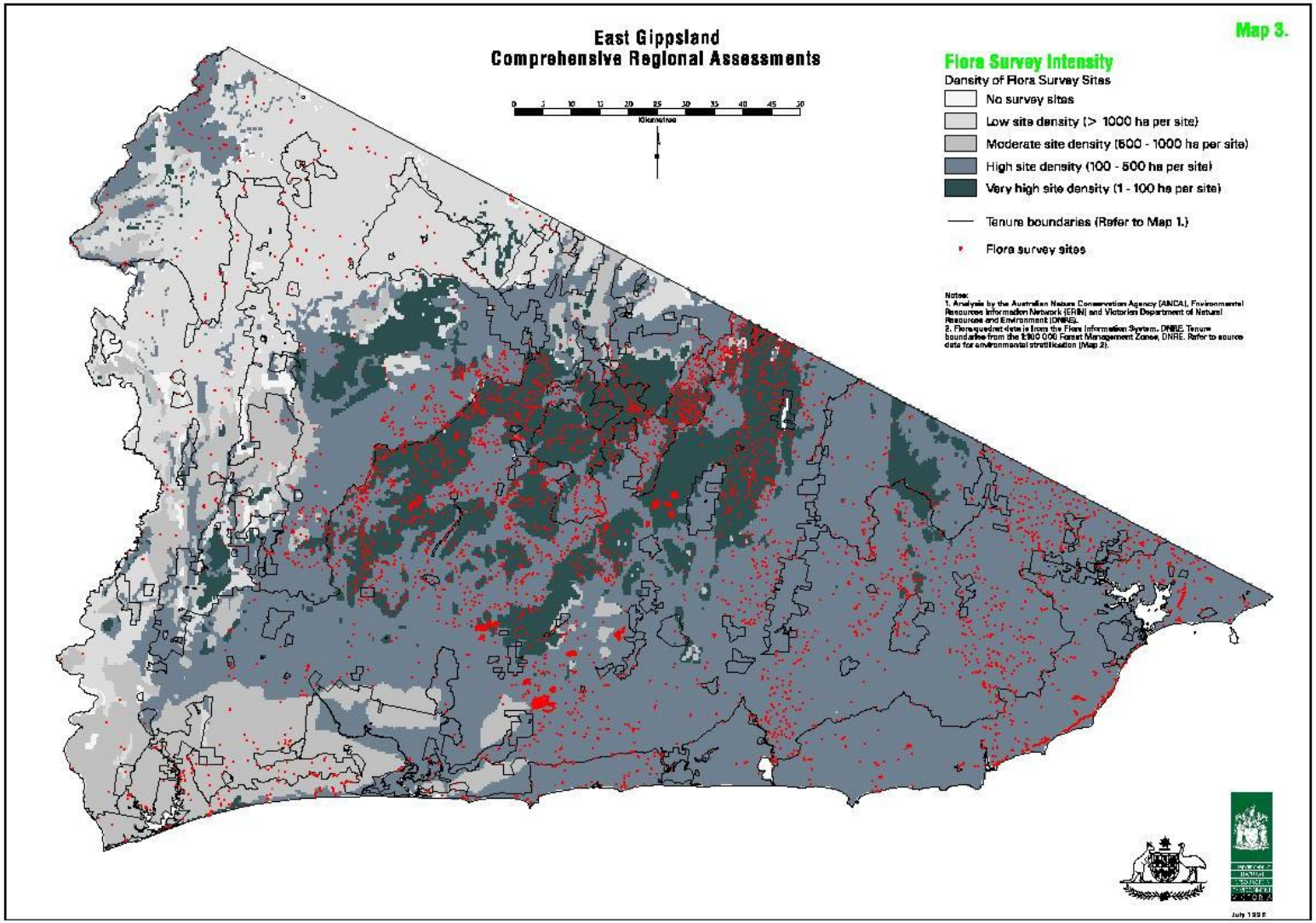
Woodgate, P.W., Peel, W.D., Ritman, K.T., Coram. J.E., Brady, A., Rule, A.J. and Banks, J.C.G., 1994. *A study of old-growth forests in East Gippsland*. Department of Conservation and Natural Resources, Melbourne.

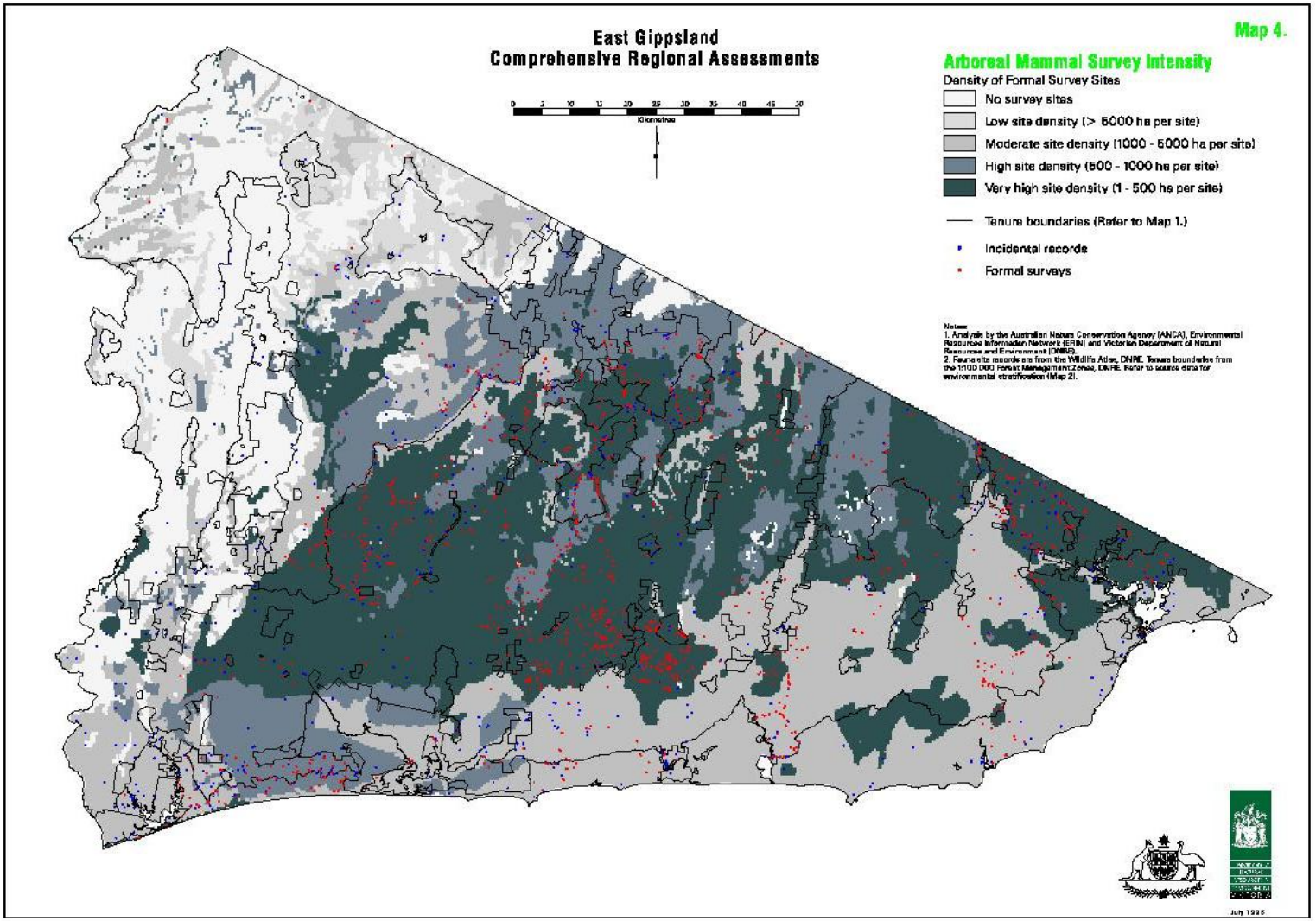
List of Tables

List of Figures

East Gippsland: Environment and Heritage: List of Maps

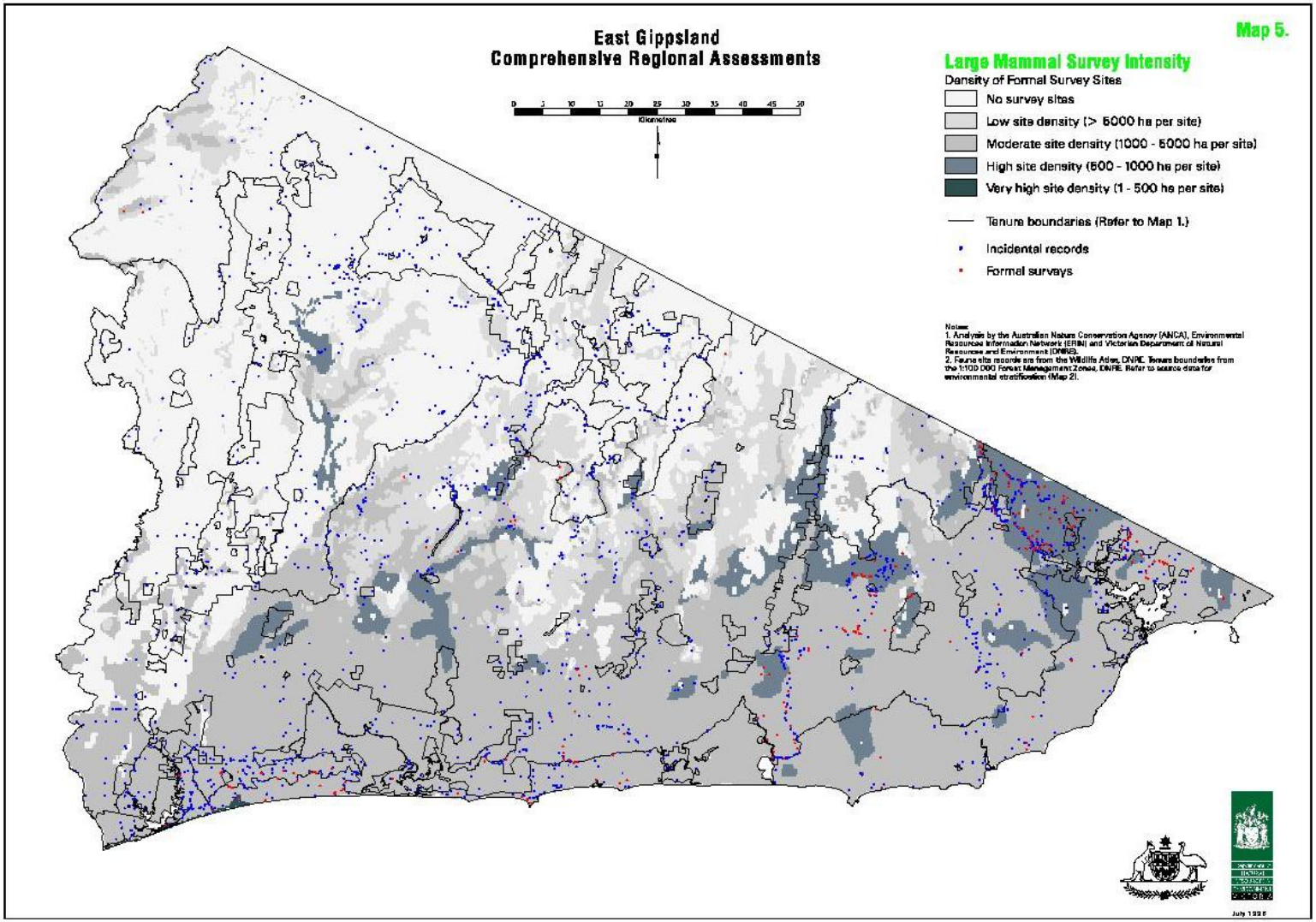


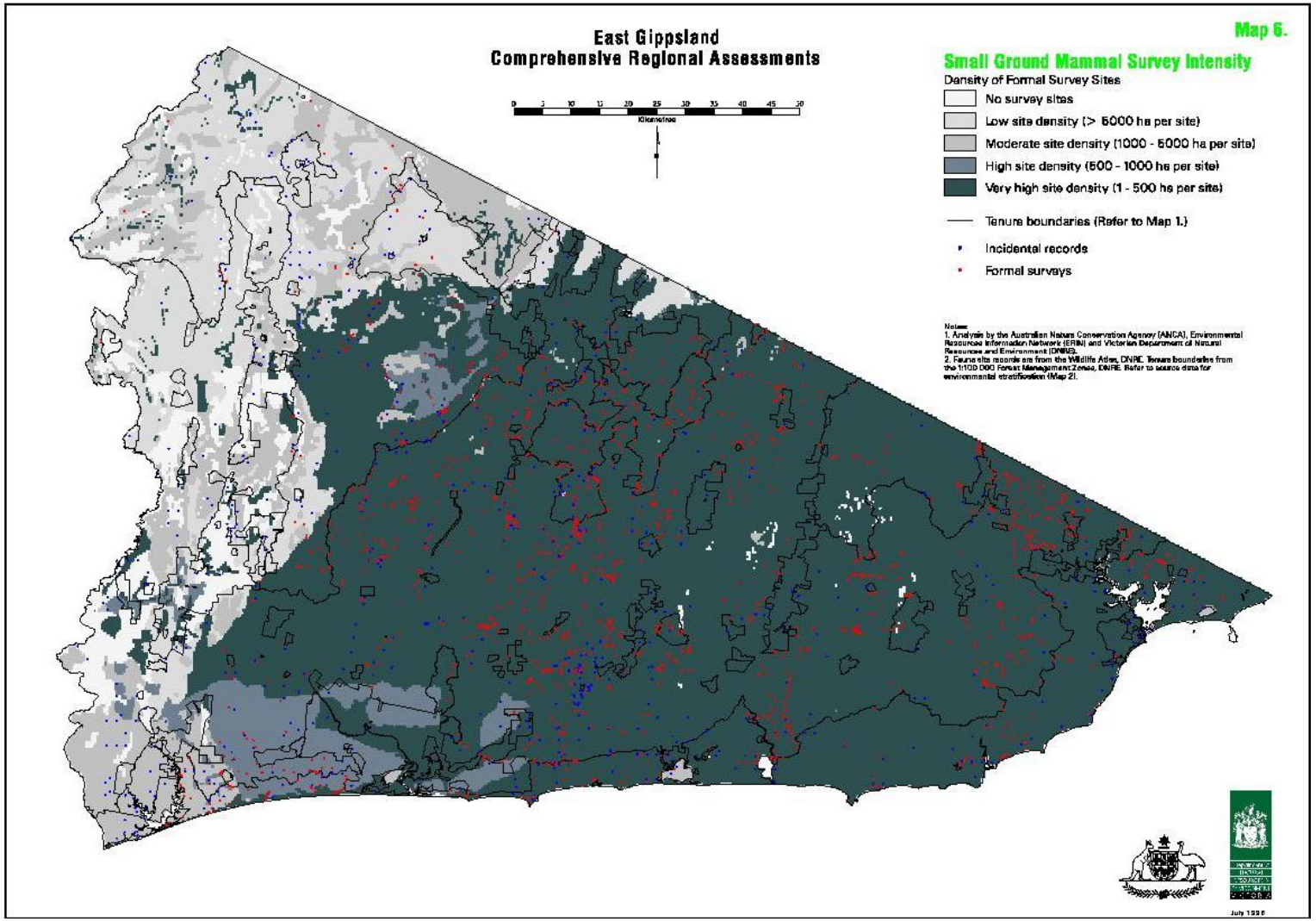

Map 3.
East Gippsland
Comprehensive Regional Assessments
0 5 10 15 20 25 30 35 40 45 50
Kilometres
Flora Survey Intensity
Density of Flora Survey Sites
No survey sites
Low site density (> 1000 ha per site)
Moderate site density (500 - 1000 ha per site)
High site density (100 - 500 ha per site)
Very high site density (1 - 100 ha per site)
Tenure boundaries (Refer to Map 1.)
Flora survey sites
Notes:
1. Analysis by the Australian Nature Conservation Agency (ANCA), Environmental Resources Information Network (ERIN) and Victorian Department of Natural Resources and Environment (DNRE).
2. Floraquadret data is from the Flora Information System, DNRE. Tenure boundaries from the 1:100 000 Forest Management Zones, DNRE. Refer to source data for environmental stratification (Map 2).
July 1995

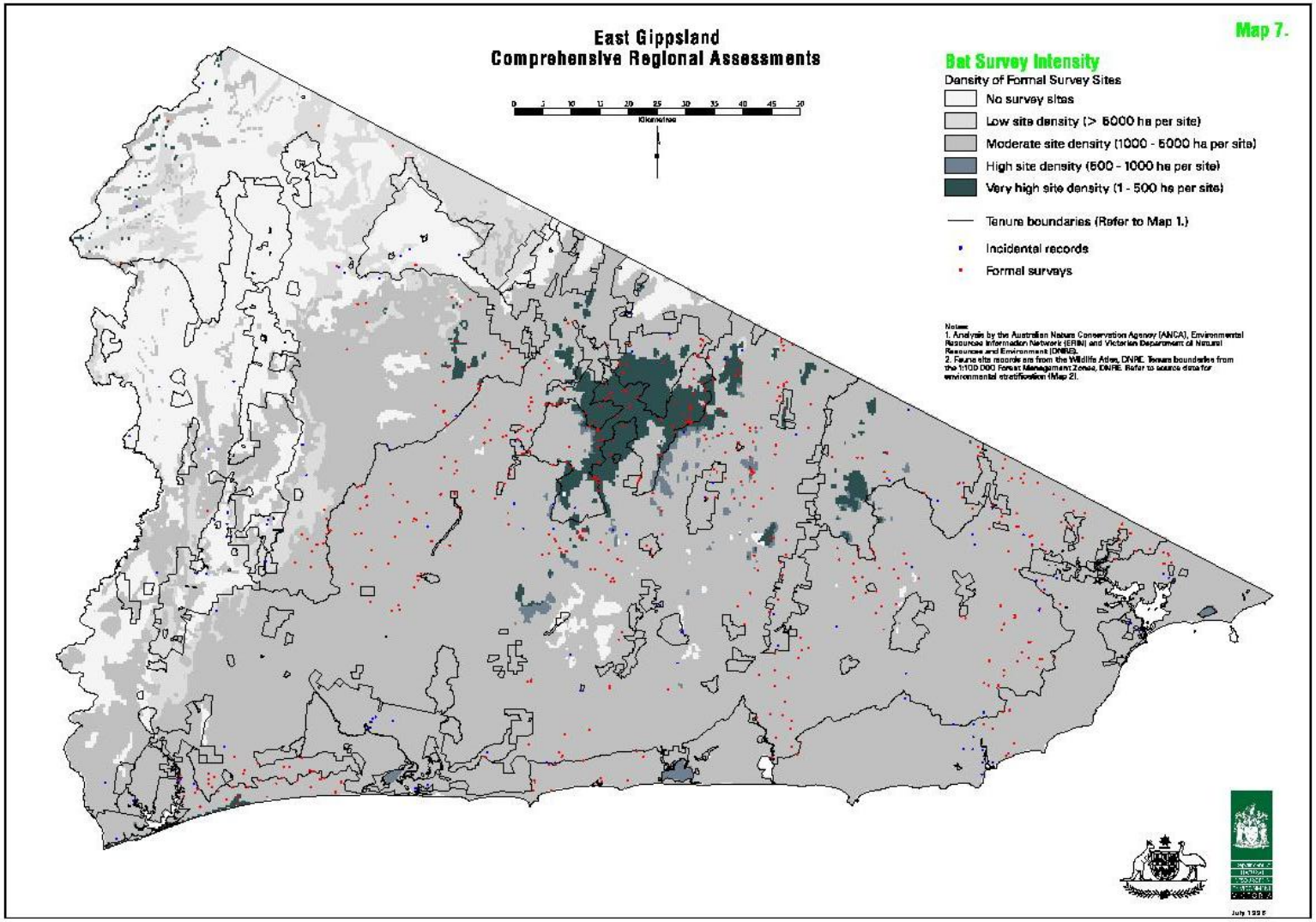

East Gippsland
Comprehensive Regional Assessments
Map 4.
Arboreal Mammal Survey Intensity
Density of Formal Survey Sites
No survey sites
Low site density (> 5000 ha per site)
Moderate site density (1000 - 5000 ha per site)
High site density (500 - 1000 ha per site)
Very high site density (1 - 500 ha per site)
Tenure boundaries (Refer to Map 1.)
Incidental records
Formal surveys
Notes:
1. Analysis by the Australian Nature Conservation Agency (ANCA), Environmental Resources Information Network (ERIN) and Victorian Department of Natural Resources and Environment (DNRE).
2. Fauna site records are from the Wildlife Atlas, DNRE. Tenure boundaries from the 1:100 000 Forest Management Zones, DNRE. Refer to source data for environmental stratification (Map 2).
July 1996

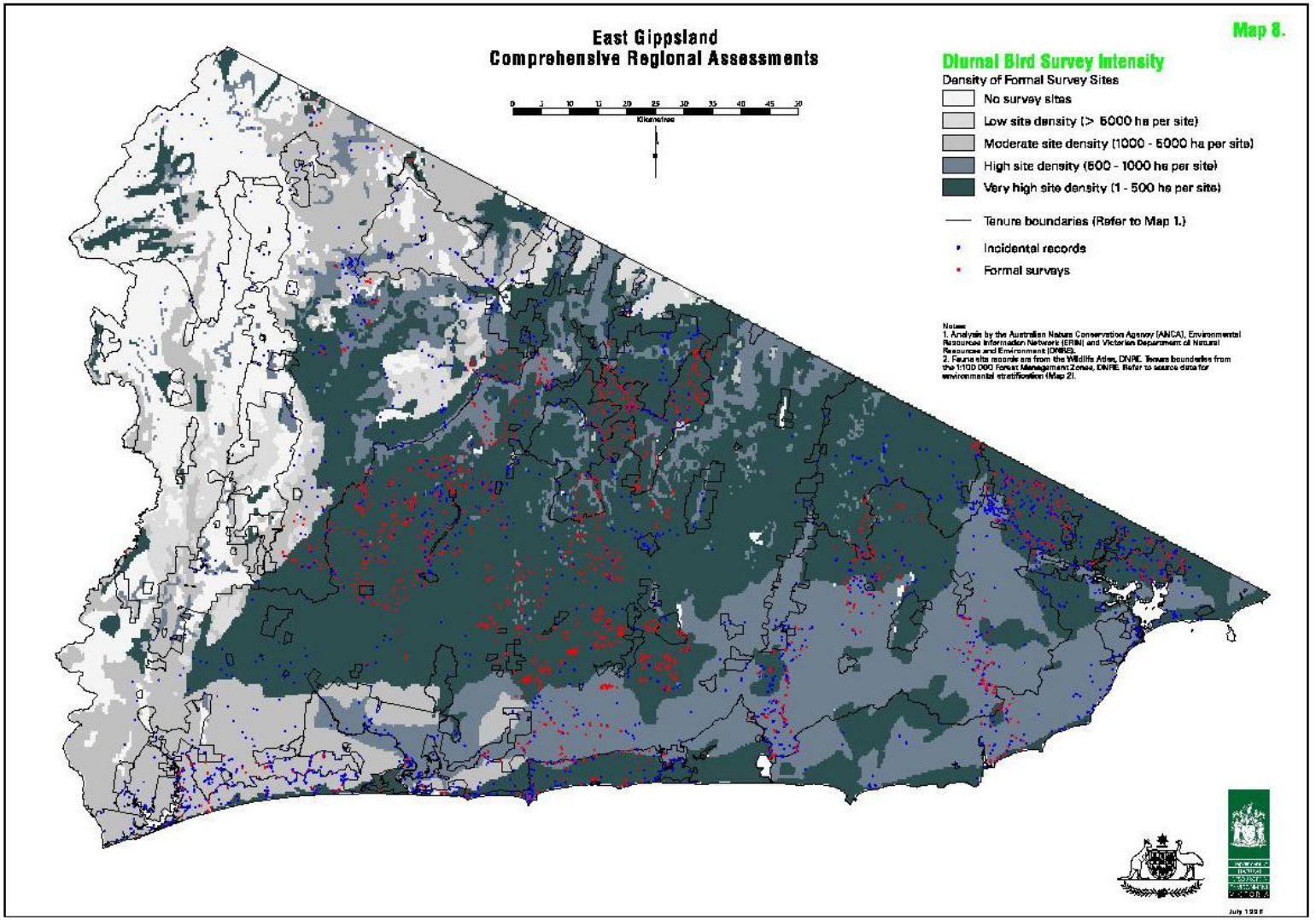
Map 5.

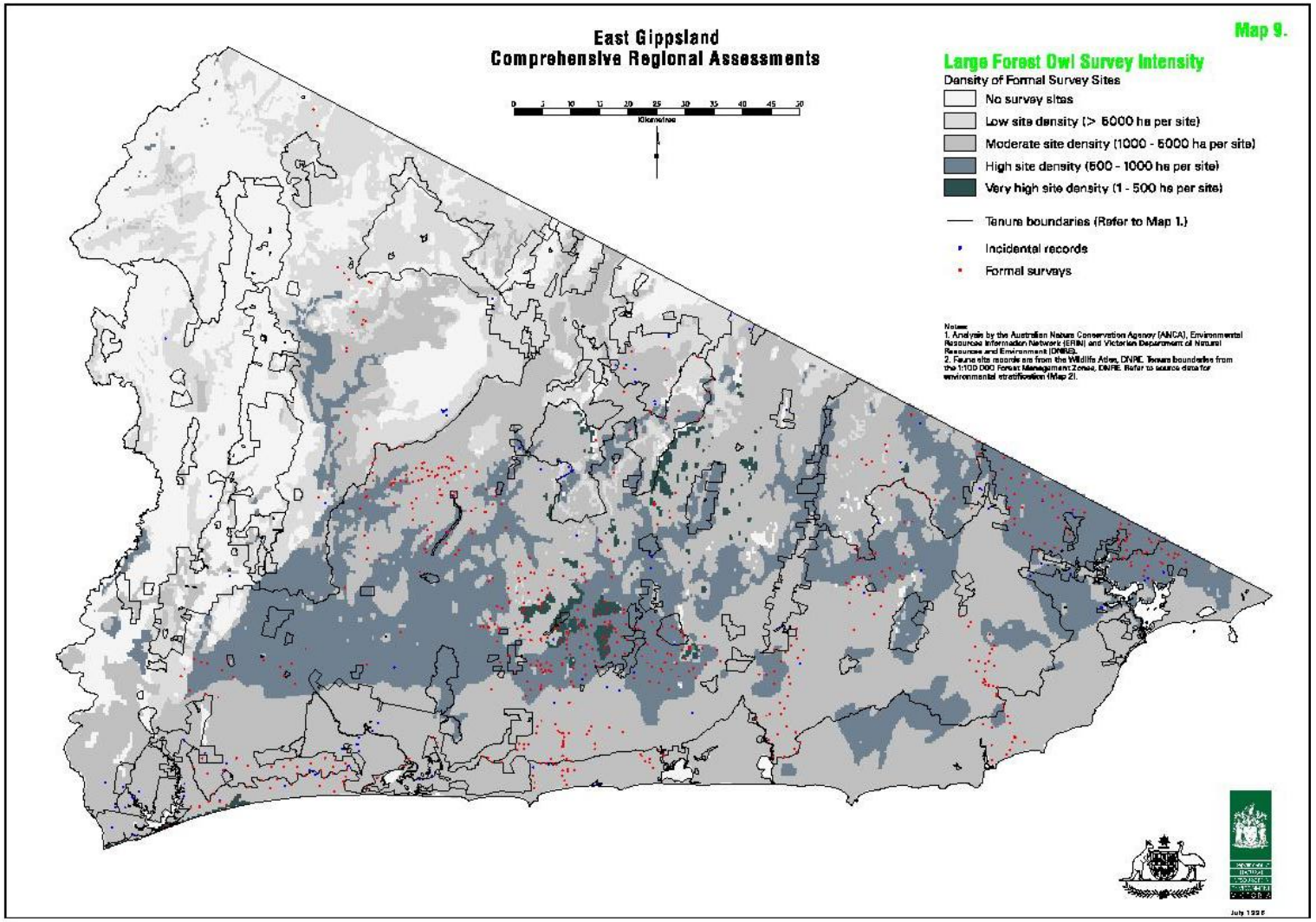
East Gippsland
Comprehensive Regional Assessments

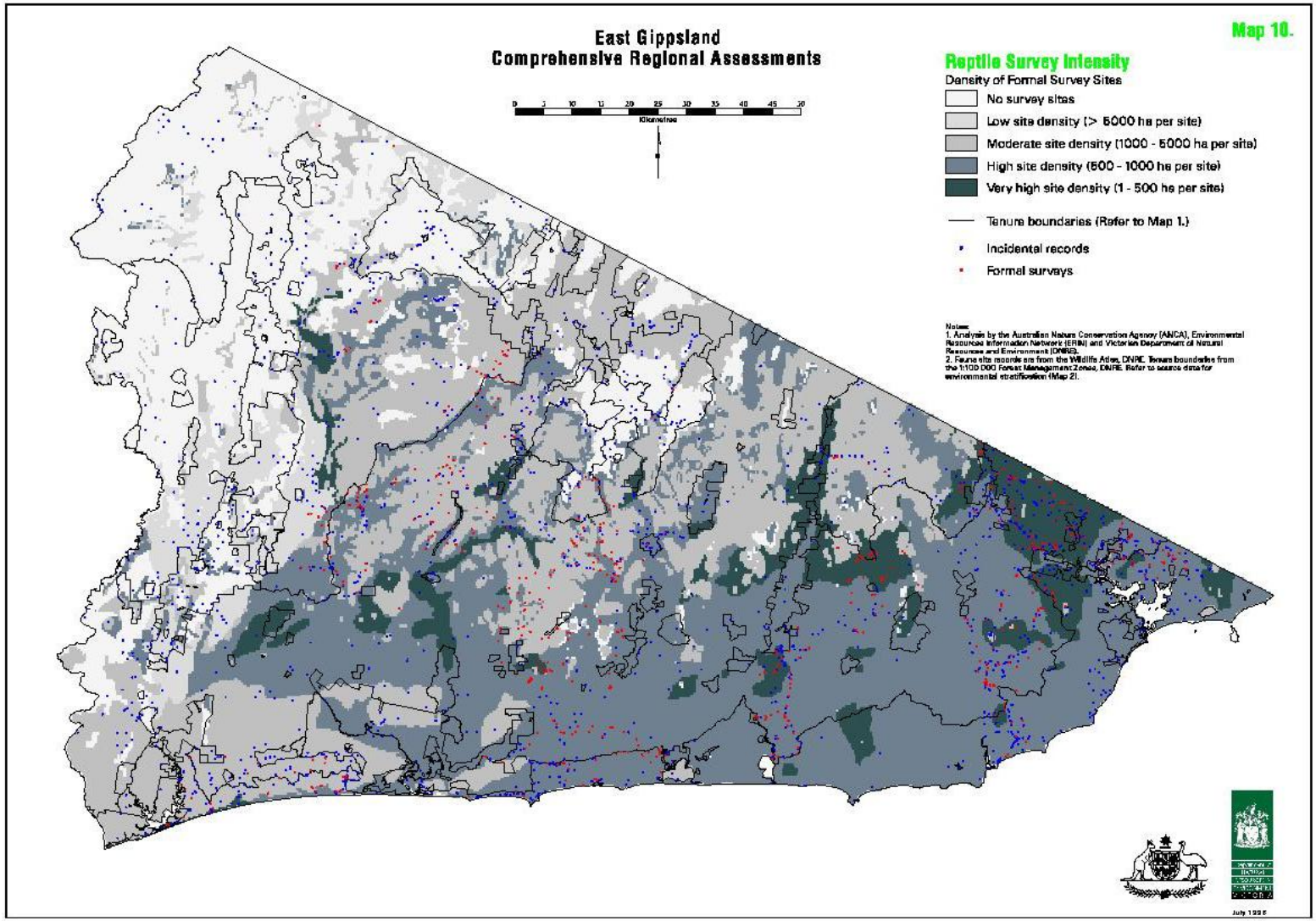


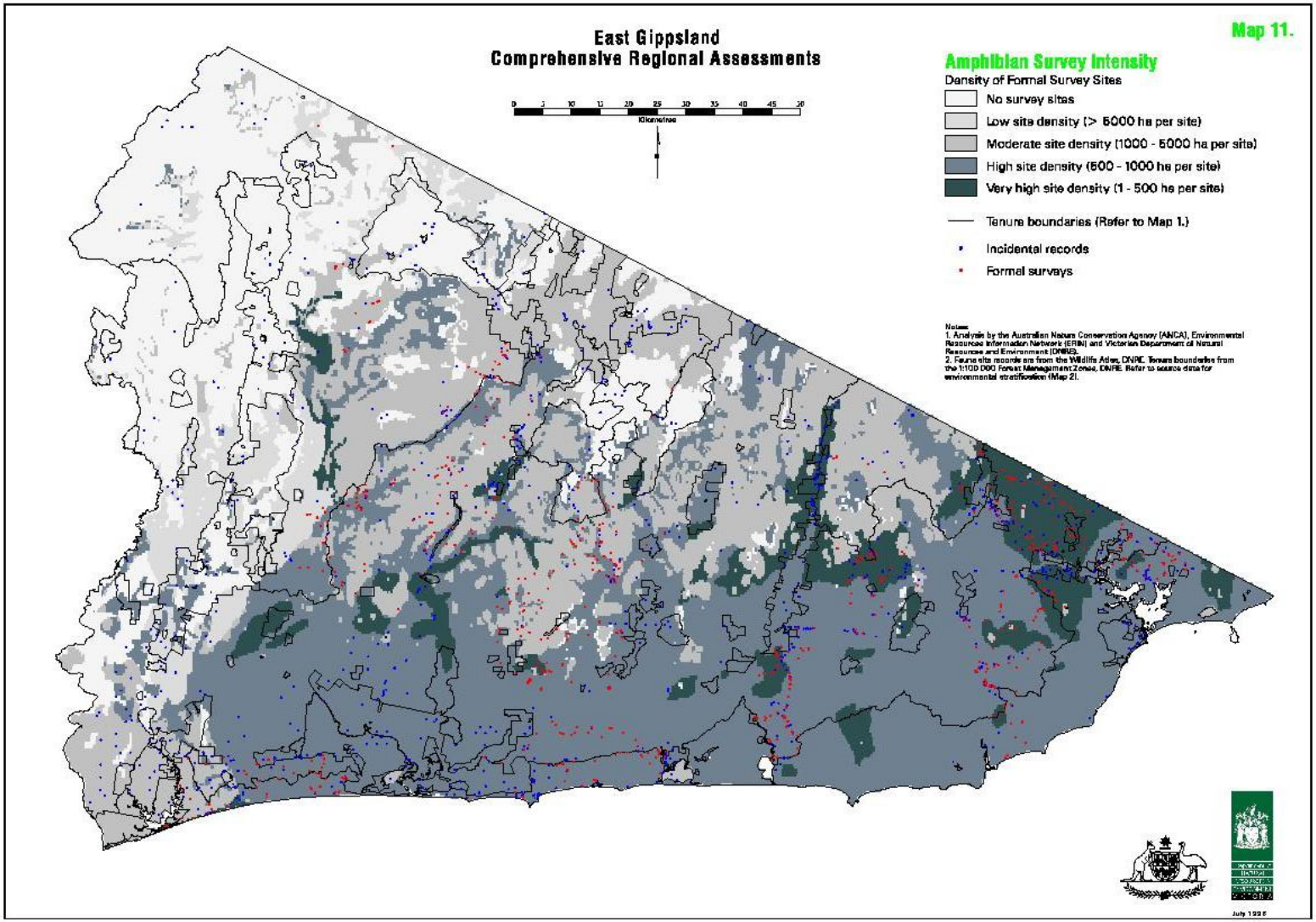

East Gippsland
Comprehensive Regional Assessments
Map 6.
Small Ground Mammal Survey Intensity
Density of Formal Survey Sites
No survey sites
Low site density (> 5000 ha per site)
Moderate site density (1000 - 5000 ha per site)
High site density (500 - 1000 ha per site)
Very high site density (1 - 500 ha per site)
Tenure boundaries (Refer to Map 1.)
Incidental records
Formal surveys
Notes:
1. Analysis by the Australian Nature Conservation Agency (ANCA), Environmental Resources Information Network (ERIN) and Victorian Department of Natural Resources and Environment (DNRE).
2. Fauna site records are from the Wildlife Atlas, DNRE. Tenure boundaries from the 1:100 000 Forest Management Zones, DNRE. Refer to source data for environmental stratification (Map 2).
July 1996

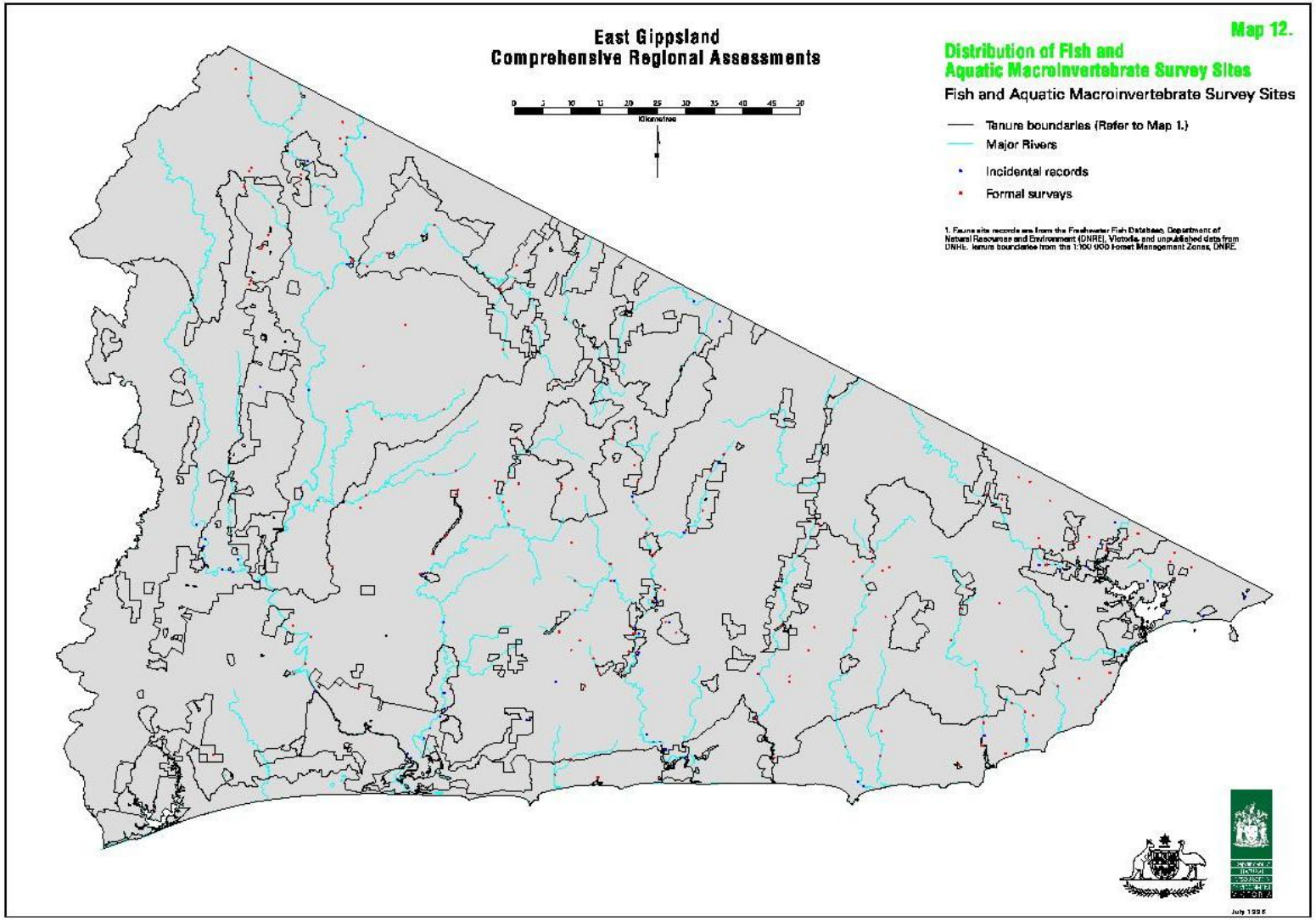

East Gippsland
Comprehensive Regional Assessments
Map 7.
Bat Survey Intensity
Density of Formal Survey Sites
No survey sites
Low site density (> 5000 ha per site)
Moderate site density (1000 - 5000 ha per site)
High site density (500 - 1000 ha per site)
Very high site density (1 - 500 ha per site)
Tenure boundaries (Refer to Map 1.)
Incidental records
Formal surveys
Notes:
1. Analysis by the Australian Nature Conservation Agency (ANCA), Environmental Resources Information Network (ERIN) and Victorian Department of Natural Resources and Environment (DNRE).
2. Fauna site records are from the Wildlife Atlas, DNRE. Tenure boundaries from the 1:100 000 Forest Management Zones, DNRE. Refer to source data for environmental stratification (Map 2).
July 1996

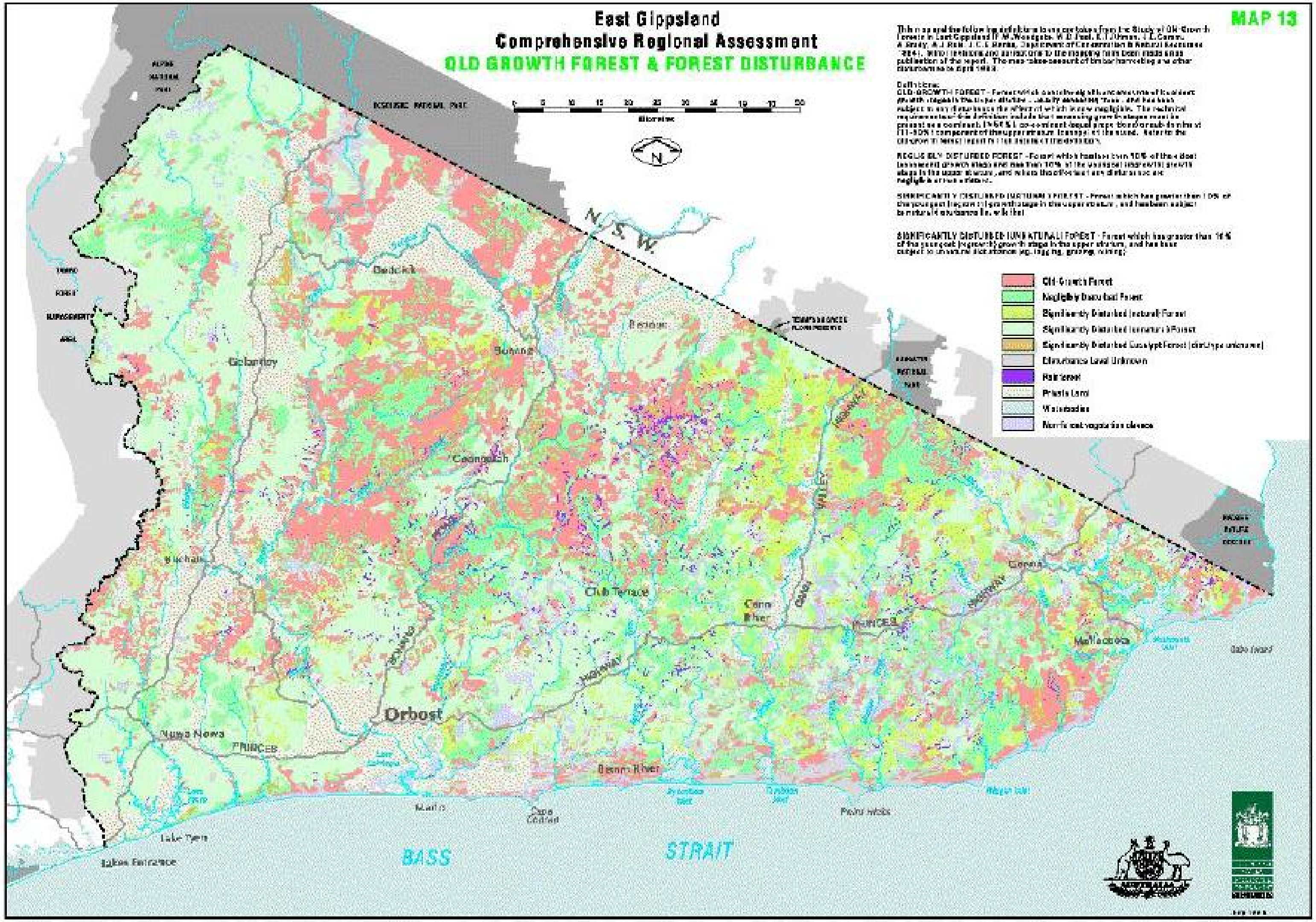

East Gippsland
Comprehensive Regional Assessments
Map 8.
Diurnal Bird Survey Intensity
Density of Formal Survey Sites
No survey sites
Low site density (> 5000 ha per site)
Moderate site density (1000 - 5000 ha per site)
High site density (500 - 1000 ha per site)
Very high site density (1 - 500 ha per site)
Tenure boundaries (Refer to Map 1.)
Incidental records
Formal surveys
Notes:
1. Analysis by the Australian Nature Conservation Agency (ANCA), Environmental Resources Information Network (ERIN) and Victorian Department of Natural Resources and Environment (DNRE).
2. Fauna site records are from the Wildlife Atlas, DNRE. Tenure boundaries from the 1:100 000 Forest Management Zones, DNRE. Refer to source data for environmental stratification (Map 2).
July 1995


East Gippsland
Comprehensive Regional Assessments
Map 9.
Large Forest Owl Survey Intensity
Density of Formal Survey Sites
No survey sites
Low site density (> 5000 ha per site)
Moderate site density (1000 - 5000 ha per site)
High site density (500 - 1000 ha per site)
Very high site density (1 - 500 ha per site)
Tenure boundaries (Refer to Map 1.)
Incidental records
Formal surveys
Notes:
1. Analysis by the Australian Nature Conservation Agency (ANCA), Environmental Resources Information Network (ERIN) and Victorian Department of Natural Resources and Environment (DNRE).
2. Fauna site records are from the Wildlife Atlas, DNRE. Tenure boundaries from the 1:100 000 Forest Management Zones, DNRE. Refer to source data for environmental stratification (Map 2).
July 1996

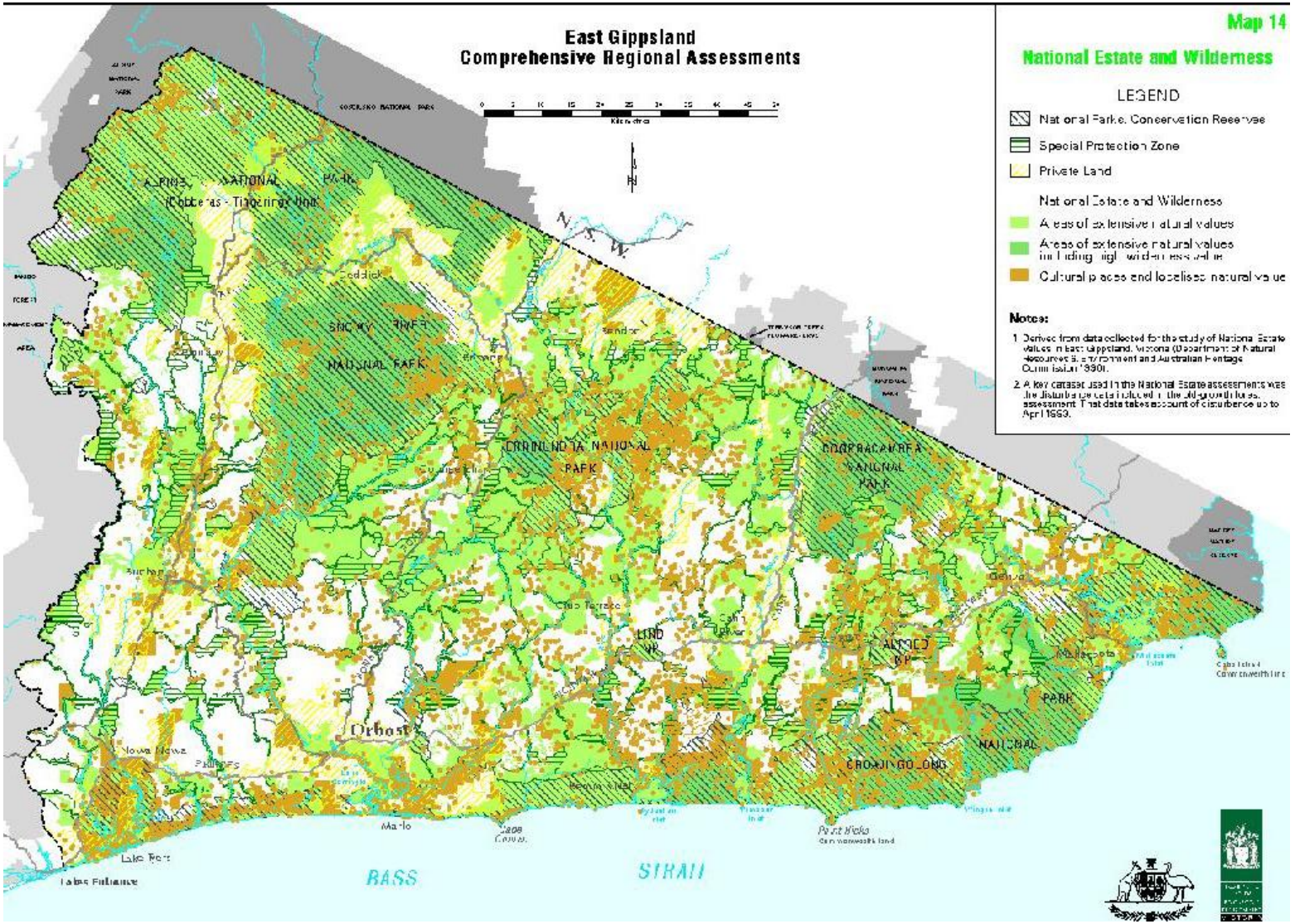

East Gippsland
Comprehensive Regional Assessments
Map 10.
Reptile Survey Intensity
Density of Formal Survey Sites
No survey sites
Low site density (> 5000 ha per site)
Moderate site density (1000 - 5000 ha per site)
High site density (500 - 1000 ha per site)
Very high site density (1 - 500 ha per site)
Tenure boundaries (Refer to Map 1.)
Incidental records
Formal surveys
Notes:
1. Analysis by the Australian Nature Conservation Agency (ANCA), Environmental Resources Information Network (ERIN) and Victorian Department of Natural Resources and Environment (DNRE).
2. Fauna site records are from the Wildlife Atlas, DNRE. Tenure boundaries from the 1:100 000 Forest Management Zones, DNRE. Refer to source data for environmental stratification (Map 2).


East Gippsland
Comprehensive Regional Assessments
Map 11.
Amphibian Survey Intensity
Density of Formal Survey Sites
No survey sites
Low site density (> 5000 ha per site)
Moderate site density (1000 - 5000 ha per site)
High site density (500 - 1000 ha per site)
Very high site density (1 - 500 ha per site)
Tenure boundaries (Refer to Map 1.)
Incidental records
Formal surveys
Notes:
1. Analysis by the Australian Nature Conservation Agency (ANCA), Environmental Resources Information Network (ERIN) and Victorian Department of Natural Resources and Environment (DNRE).
2. Fauna site records are from the Wildlife Atlas, DNRE. Tenure boundaries from the 1:100 000 Forest Management Zones, DNRE. Refer to source data for environmental stratification (Map 2).
July 1996


East Gippsland
Comprehensive Regional Assessments
Map 12.
Distribution of Fish and
Aquatic Macroinvertebrate Survey Sites
Fish and Aquatic Macroinvertebrate Survey Sites
Tenure boundaries (Refer to Map 1.)
Major Rivers
Incidental records
Formal surveys
1. Fauna site records are from the Freshwater Fish Database, Department of Natural Resources and Environment (DNRE), Victoria, and unpublished data from DNRE. tenure boundaries from the 1:100 000 forest Management Zones, DNRE.
July 1998



MAP 13
East Gippsland
Comprehensive Regional Assessment
OLD GROWTH FOREST & FOREST DISTURBANCE
Kilometres
N
N.S.W.
Old-Growth Forest
Negligibly Disturbed Forest
Significantly Disturbed (natural) Forest
Significantly Disturbed (unnatural) Forest
Significantly Disturbed Eucalypt Forest (dist. type unknown)
Disturbance Level Unknown
Rainforest
Private Land
Waterbodies
Non-forest vegetation classes
Orbost
Bendoc
Bonang
Goongerah
Club Terrace
Cann River
Genoa
Mallacoota
Buchan
Gelantipy
Nowa Nowa
Lake Tyers
Lakes Entrance
Marlo
Cape Conran
Bemm River
Point Hicks
Gabo Island
PRINCES
HIGHWAY
CANN
VALLEY
BASS
STRAIT


East Gippsland
Comprehensive Regional Assessments
Map 14
National Estate and Wilderness
LEGEND
National Parks, Conservation Reserves
Special Protection Zone
Private Land
National Estate and Wilderness
Areas of extensive natural values
Areas of extensive natural values including high wilderness value
Cultural places and localised natural value
Notes:
1. Derived from data collected for the study of National Estate values in East Gippsland, Victoria (Department of Natural Resources & Environment and Australian Heritage Commission 1990).
2. A key dataset used in the National Estate assessments was the disturbance data collected for old-growth forest assessment. That data takes account of disturbance up to April 1989.
ALPINE NATIONAL PARK
(Cobberas - Tingaringy Unit)
SNOWY RIVER NATIONAL PARK
CROAJINGOLONG NATIONAL PARK
Orbost
Lake Tyers
Lakes Entrance
BASS STRAIT