

1 INTRODUCTION

1.1 PROJECT AIMS

The Central Directorate Parks and Wildlife Division (PWD) of the NSW Department of Environment and Conservation (DEC, formerly NSW National Parks and Wildlife Service (NPWS)) has for the first time established a biodiversity survey priorities program for all NPWS managed estate within the Directorate. This program recognises that Wollondilly River Nature Reserve (NR) is characterised by very low levels of information on both flora and fauna values (NPWS 2003a). The decision to sample Wollondilly River NR at this point further benefited from the opportunity to integrate new survey work into a broader study examining the biodiversity values of the Warragamba and Metropolitan Special Areas (DEC in prep.).

The fauna survey program seeks to address the shortfall of information on vertebrate fauna within and immediately surrounding Wollondilly River NR. Improved information will enable park managers to better integrate local information into planning decisions and to become more active in promoting the values of the reserve. It will provide the opportunity to develop more focused strategies on threatened species management, monitoring programs and community education. Importantly it will expand the ability of management to understand the role the reserve plays in conserving fauna within the greater Sydney Region.

Specific objectives of this report are to:

1. Document, review and collate existing fauna data.
2. Identify and profile threatened fauna species and other regionally significant fauna that are known or likely to occur.
3. Identify broad-scale patterns in fauna occurrence and habitat use across the reserve and identify habitats of particular conservation significance.
4. Highlight areas where further survey work may need to be carried out.



Plate 1: View across Horse Flat to Mt. Hickson from Bowman's Hill, Wollondilly River NR ©DEC

1.2 BACKGROUND

Wollondilly River NR currently consists of two portions of land in the Wollondilly Valley approximately 40 kilometres west of Mittagong on the Southern Highlands. The reserve is primarily surrounded by freehold tenures, although additional Crown Land portions are found on the south side of the Wollondilly River and a number of DEC reserves to the north and east including Nattai, Blue Mountains and Bangadilly National Parks (NP) and Joadja NR (Map 1).

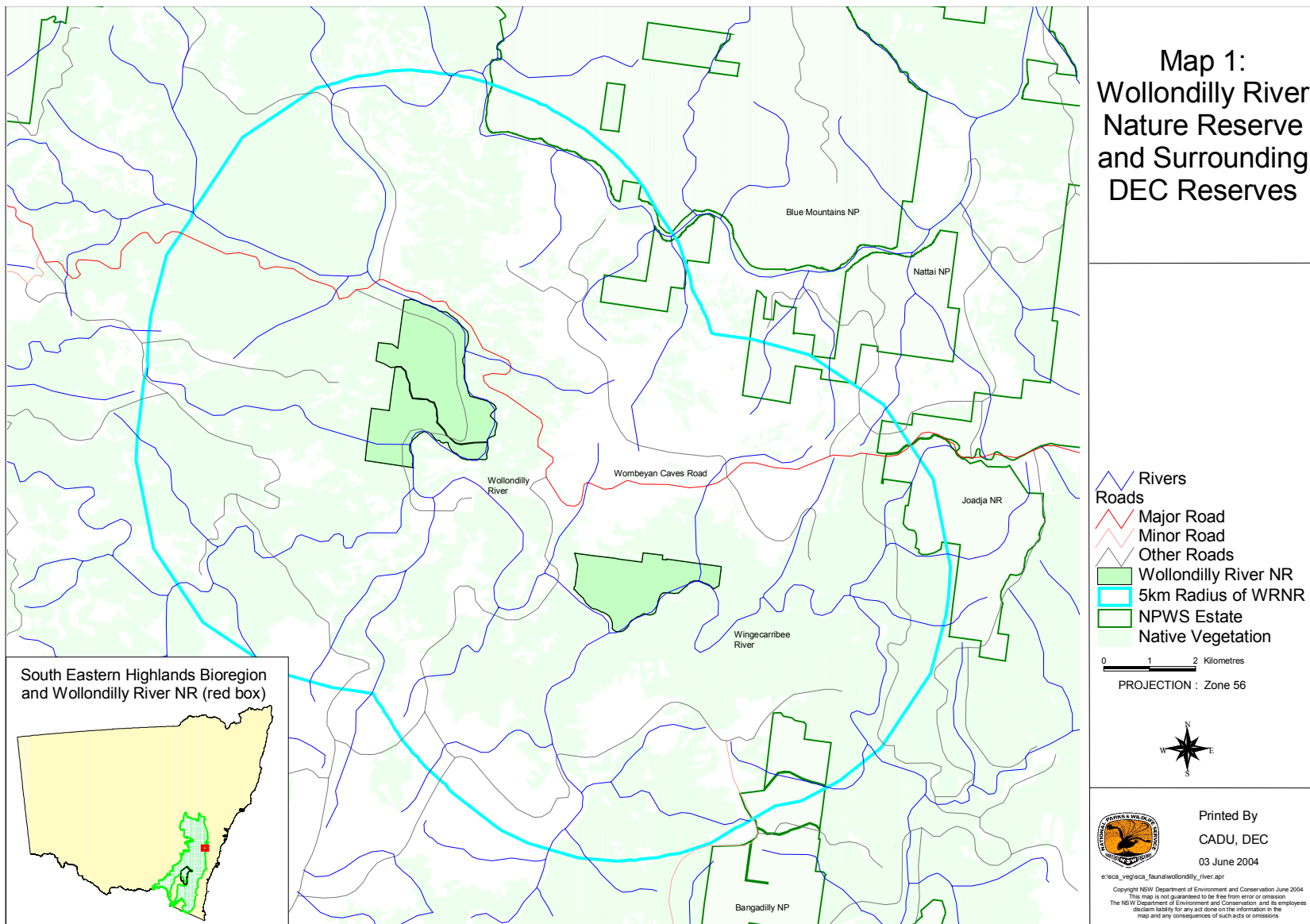
The south eastern portion is just under 300 hectares in area and consists of steep country to the north of the Wollondilly and Wingecarribee River junction (Plate 2). It is accessed through private land south of Wombeyan Caves Road near the locality of Bullio. The rugged terrain of this area means that clearing has been restricted to the very northern boundary. The second, larger portion is 613 hectares of land extending from the western bank of the Wollondilly River towards Tallygang Mountain (Plate 1). The main access is along the Wollondilly River from Goodmans Ford along a fire trail that extends to the southern boundary. A homestead and various sheds have been retained from previous occupation on Horse Flat and these have been used as a base for both DEC and Sydney Catchment Authority (SCA) staff.



Plate 2: Rocky country near the confluence of the Wollondilly and Wingecarribee Rivers. ©DEC

Wollondilly River NR falls into the Warragamba Special Area that is managed by the SCA to retain the quality of Sydney's drinking water. In 2002, some land with the Special Area that had been identified as of suitable conservation value were transferred to NPWS management. Wollondilly River NR was gazetted as part of this process. Some investigations have been made towards acquiring further crown land on the southern side of the Wollondilly River and, if acquired, it is likely to be added to this reserve. No attempt has been made to survey this land at this stage.

In 2001 DEC was commissioned by the SCA to investigate the biodiversity values of the Warragamba and Metropolitan Special Areas. Systematic flora surveys were undertaken within the park in November 2001 as part of this program and are reported in NPWS (2003c). In addition, a review of biodiversity data across the DEC Central Directorate Reserves identified Wollondilly River NR as a high priority area for the collection of fauna data (NPWS 2003a) and the Central Directorate Parks and Wildlife Division (PWD) provided funding under the Biodiversity Survey Priorities Survey Program. Systematic fauna surveys were undertaken within and around the park between September 2002 and March 2004.



1.3 ENVIRONMENT

Wollondilly River Nature Reserve is comprised almost entirely from Bindook porphyry, an igneous rock formed during the Upper Devonian age. This is granite-like in appearance and erodes to form a clay-loam soil. These soils are highly erodible and form significant instability on the steepest slopes where landslips and scree slopes are common. The rugged nature of the landscape is illustrated by the fact that many slopes reach over 50 degrees. The highest point in the reserve is 790 metres at Mt. Hickson, in the western portion. The lowest point is Horse Flat on the narrow levee plain that hugs a bend of the Wollondilly River. Deeper alluvial soil is found here, and as a result, most of the original vegetation has been cleared for agriculture.

Wollondilly River NR lies on the extreme eastern boundary of the South Eastern Highlands Bioregion (Thackway and Creswell 1995) (inset Map 1). This Bioregion covers an extensive area of the Central Tablelands and slopes of New South Wales and Victoria. The Bioregion is dominated by a temperate climate characterised by mild to warm summers and no dry season (NPWS 2003b). Approximately fifteen percent of the Bioregion is reserved for conservation (in National Parks, Nature Reserves, Karst Conservation Reserves and State Conservation Areas) (NPWS 2003b). Just to the east of the reserve is the Sydney Basin Bioregion that is typified by the sandstone landscapes that surround the Sydney metropolitan area.

1.4 CLIMATE

The average annual rainfall for the Wollondilly River NR ranges between 680 and 830 millimetres. This is typical of areas within the rainshadows in the Wollondilly and Burratorang Valleys. Temperatures are more extreme than in coastal environments, with warm summers and cool winters. The mean daily minimum temperature ranges from 4°C in higher elevations to 18°C on the river flats, whilst the mean maximum temperature ranges from 25°C at higher elevations to 30°C on the flats. The climate appears to be much more typical of areas on the south west slopes of NSW rather than the typical coastal and tableland climates found in the areas surrounding the reserve.



Plate 3: Devonian Red Gum-Yellow Box Woodland on the southern boundary of Wollondilly River NR. ©DEC

1.5 VEGETATION

Wollondilly River NR was mapped at the northern extent of the forest ecosystem mapping undertaken as part of the Southern Comprehensive Regional Assessment (CRA) (NPWS 2000). This was a broad-scale mapping exercise that mapped five communities occurring within the reserve. As part of the vegetation mapping of the Warragamba Special Area (NPWS 2003c), Wollondilly River NR was once again mapped, with far greater precision. This report described seven native vegetation communities within the reserve, plus areas of cleared, modified or regenerating vegetation. Many of the communities show no correlation with those mapped in 2000 so site selection was based on NPWS (2003c) as this was the more accurate and recent layer, and was also based on survey sites done within the reserve. Map 2 shows the vegetation communities listed within NPWS (2003c) and all references to vegetation communities from this point follow terminology used therein.

The most extensive vegetation community within the reserve is Devonian Red Gum-Yellow Box Woodland (Plate 3). This is found on the steep slopes and is characterised by a few Eucalypt species and an open canopy with clearly visible shrub layer. Forest Red Gum (*Eucalyptus tereticornis*) and Yellow Box (*E. melliodora*) are commonly the dominant canopy species, whilst the shrub layer is dominated by species such as Wallaby Weed (*Olearia viscidula*) and Native Blackthorn (*Bursaria spinosa*). It is widespread in both portions of the reserve. On the lower slopes Grey Box (*Eucalyptus moluccana*) is dominant with Forest Red Gum although a very similar understorey persists. At the higher elevations in both portions Highlands Slopes Grey Gum-Stringybark Forest is found. The forest is dominated by a variety of eucalypt species including Grey Gum (*Eucalyptus punctata*), and Blue-leaved (*E. agglomerata*) and Thin-leaved Stringybarks (*E. eugenioides*), though the former species is uncommon in the eastern portion. The shrub layer is usually not as dense as the previous community but similar species are often present.

The most common community bordering the Wollondilly and Wingecarribee Rivers is Tablelands River Oak Forest characterised by tall River Oak (*Casuarina cunninghamiana* subsp. *cunninghamiana*). The canopy cover is quite variable in this community, as is the understorey, which is dependent on factors such as time since flooding, soil depth and disturbance. Grey Myrtle Dry Rainforest and Sheltered Porphyry Forest develops in some of the steeper gully lines, particularly in the eastern portion, and the former community is also common on scree slopes.

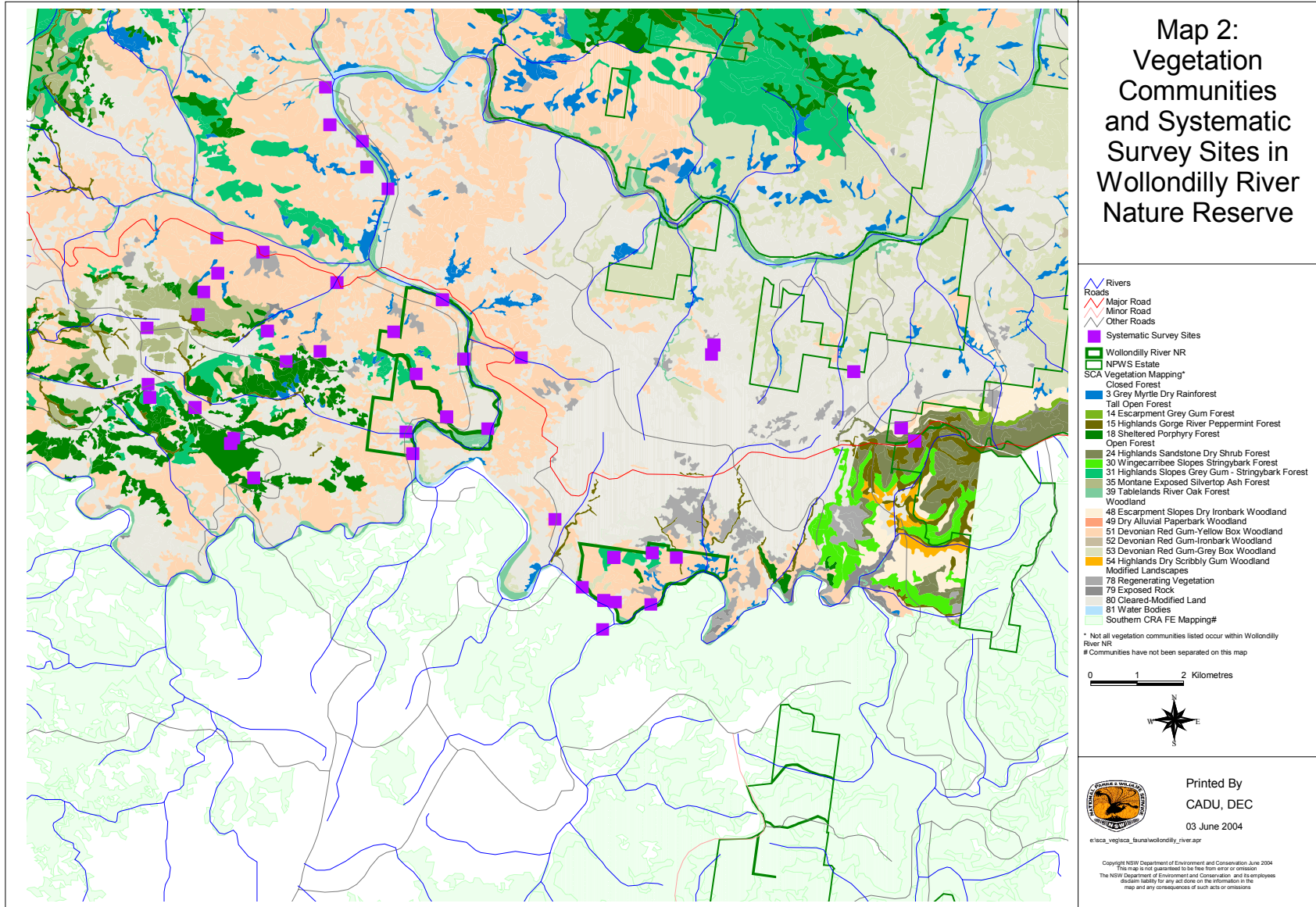
1.6 DISTURBANCE

The primary landuse in the Wollondilly Valley over the last 100 years has been agriculture, particularly grazing. River flat environments have been extensively cleared and on lower slopes the native vegetation has been extensively modified. Similar trends are found on the flat ridgetops of Tallygang Mountain where modification is evidenced by cleared areas and regenerating vegetation. While much of the reserve is steep, bridle trails that connect the river with the mountains provided tracks that stock once traversed. Feral animals may continue to use these trails to disperse through the reserve.

Land clearing and grazing pressure has caused degraded areas and infestations of weeds, most notably of Serrated Tussock (*Nassella trichotoma*), Blackberry (*Rubus* spp.) and Fireweed (*Senecio madagascariensis*). The lower elevations are often characterised by large areas of cleared and modified land or regenerating vegetation. This is most notable in the vicinity of Bowman's Hill Hut.

1.7 FIRE

There have been no recent wildfires in the area of the Wollondilly River NR. The last known wildfire was in 1979 on Tallygang Mountain (R. Pedroza pers. comm.) before the area became a nature reserve. Fire has been used to attempt to reduce the weed problems on Horse Flat, but the areas burnt have been minimal. Vegetation throughout much of the reserve is sparse and open, with very little fuel build up, despite the long fire interval (see Plate 3).



2 METHODOLOGY

2.1 EXISTING FAUNA DATA

The DEC Atlas of NSW Wildlife was the primary source of existing data. This data has been collated from casual observations made by park workers, residents and recreational observers. There had been no systematic fauna surveys conducted in the Wollondilly River Nature Reserve prior to these surveys. Included within this database are records collected as part of the Birds Australia Atlas, which collated data from around the country between 1998 and 2002 (Barrett *et al.* 2003).

2.2 SURVEY STRATIFICATION AND SITE SELECTION

The map of vegetation communities described by NPWS (2003c) covering the Warragamba Special Area and surrounds formed the primary stratum for the majority of survey planning (Map 2). Sites were planned using Geographic Information Systems (ArcView 3.2) and were selected in order to sample all of the major vegetation communities in the reserve. Site selection in the field was based on the following parameters:

- Consistent vegetation community throughout the site
- Vegetation community representative of the mapped community
- Accessible by either car or foot

The preferable sampling strategy would have aimed to sample the mapped vegetation communities proportionately according to the mapped area of each community within the reserve *and* have included enough repeated sampling within each vegetation community to provide reasonable reliability that potential variations within widespread stratum were captured. However, due to the relatively small size of the reserve, there were difficulties in replicating sites within vegetation communities whilst maintaining sufficient distance between sites to ensure they were independent from one another (one kilometre apart). Consequently, data from sites that were placed outside the reserve but within a five kilometre radius have also been included in this report. Records of species that were collected outside the reserve area are specified as such throughout the report.

The majority of sites were placed on or near access trails to maximise the number that could be accessed during the limited survey time. Nevertheless, considerable effort was put into the establishment of sites away from trails. Off road sites were placed where walking access was possible, which sometimes included access through adjoining private land. Some vegetation types were inaccessible during the time allocated for the survey period and therefore were not sampled.

Table 1 shows the number of sites conducted for each vegetation community. Generally, all survey methods were conducted at each site, though this was not always the case. Often sites were chosen specifically for a harp trap or Anabat placement based on suitability. Map 2 shows the locations of all survey sites in relation to mapped vegetation. A full list of site locations and associated surveys is provided in Appendix A.

2.3 SURVEY METHODS

Systematic fauna survey methods undertaken were based on those described by NPWS Biodiversity Survey Coordination Unit (NPWS 1997). This details the specifications of timed searches within fixed areas for all survey techniques. Six of these techniques were used to sample each of the following vertebrate fauna groups: reptiles, diurnal birds, bats (two techniques), arboreal mammals and nocturnal birds. Consistency in the use of these techniques will allow future comparisons with consistent surveys of environments elsewhere. Amphibians were not surveyed systematically due to the dry conditions during, and in the several months preceding, the survey period. Creeklines and soaks were dry, with the Wollondilly River the only permanent source of water on the fringe of the reserve. The river is fast flowing in many locations and has many fish, making it poor breeding habitat for many species of frog, so this group was examined opportunistically. Due to time and budget constraints, small ground mammals were surveyed only by analysis of predator scats.