3 RESULTS AND DISCUSSION

3.1 OVERVIEW

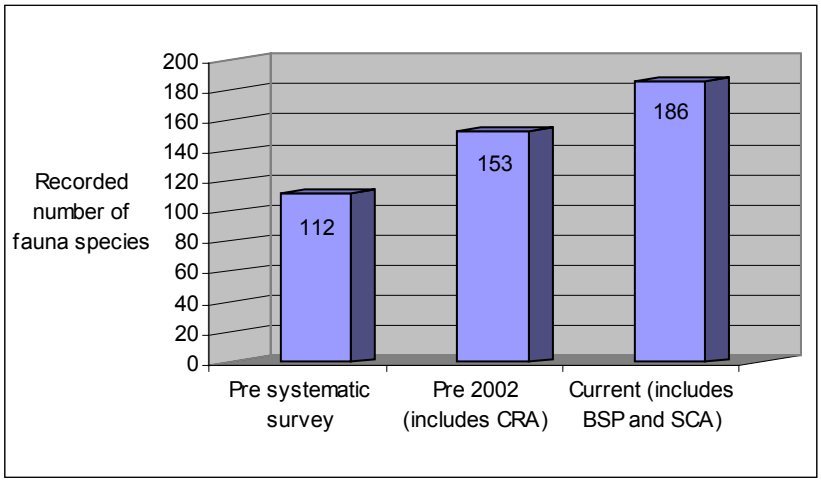
DEC has established and surveyed a total of 100 systematic fauna survey sites within south western Blue Mountains NP, 73 of which were surveyed in 2004 as part of the Biodiversity Survey Priorities fauna survey program. These sites cover the range of dominant habitats and landscapes present within the study area, and have been surveyed during spring, summer and autumn. In addition to these surveys, members of Birds Australia have contributed significantly to the number of fauna records for the study area, as have numerous DEC staff, scientific researchers, and dedicated members of the public.

One hundred and eighty six species of vertebrate fauna have been recorded on the Atlas of NSW Wildlife within the south western Blue Mountains NP. This includes ten species listed as threatened on the NSW Threatened Species Conservation Act (1995) (TSC Act), of which two are also listed on the commonwealth Environmental Protection and Biodiversity Conservation Act (1999) (EPBC Act). Eleven introduced fauna species have been recorded within the study area to date, including eight ground mammals and three birds. A complete species list for all fauna groups is provided in Appendix A.

In addition to the above fauna, 33 species have been recorded within a five kilometre radius of the study area boundary (see Appendix A). This includes six additional threatened species, which will be discussed further below.

The value of systematic fauna survey is apparent in the contribution it has made to the knowledge of fauna within the study area and the building of a species inventory. The CRA surveys, undertaken in 1998, added 41 species to the list of known fauna within south western Blue Mountains NP, and the Biodiversity Survey Priorities (BSP) program, undertaken in 2004, has added a further 33 species to the study area database. Figure 1 indicates the increase in the known number of fauna species within the study area over time, primarily as a result of dedicated systematic fauna survey.

Figure 1: Number of species recorded within south western Blue Mountains National Park following systematic fauna survey.



3.2 NATIVE DIURNAL BIRDS

A total of 108 bird species have been recorded within the study area. Of these 99 are native diurnal species, six are nocturnal species (Section 3.3) and three are introduced (Section 3.9). These records have been accumulated in three stages. Table 3 shows the accumulated species counts and number of records for each of these periods of time. This table includes nocturnal species within the counts of species and records.

The first period was prior to 1998, where a large number of records were gathered as part of the Bird Atlas published by the Royal Australasian Ornithologists Union (RAOU) (Blakers *et al.* 1984). A few incidental records are also included within the Atlas of NSW Wildlife for these period, but the vast majority of records are located at the centre of two ten-minute grid squares that happen to fall within Blue Mountains NP. There

is no guarantee that all or even any of these sightings are actually at that site, and indeed 30 species have not been recorded since this time. The most significant record, in terms of threatened species, was the Regent Honeyeater (*Xanthomyza phrygia*), which listed as endangered on the TSC Act and the EPBC Act. Based on the scarcity of potential habitat for the Regent Honeyeater, it is considered highly unlikely that the bird occurs within the study area. This species is usually found in Grassy Box Ironbark Woodlands or River Oak Forests, such as occur along the Coxs River and to the east of the Study Area. Other species that were recorded on more than five occasions during this period and have not been recorded since include Welcome Swallow (*Hirundo neoxena*), Magpie-lark (*Grallina cyanoleuca*), White-faced Heron (*Egretta novaehollandiae*), Red-browed Finch (*Neochmia temporalis*) and Noisy Miner (*Manorina melanocephala*). Many of the species are waterbirds or woodland species, which are considered unlikely to occur within this part of Blue Mountains NP.

Table 3: Accumulated species and record counts for birds within the study area.

Survey Period	No. of Species	Accumulated No. of Species	No. of Records	Accumulated No. of Records
Pre 1998	99	99	613	613
1998-2002	59	102	384	997
2003-2004	67	108	742	1739

The next period of survey activity started in the late 1990s with the Comprehensive Regional Assessment (CRA) which was part of the Regional Forestry Agreement (RFA) Process. Surveys were conducted over many areas of eastern New South Wales and during 1998 two weeks of systematic surveys were undertaken within the Study Area. Also starting at this time was the second Birds Australia Atlas (Barrett *et al.* 2003) which also obtained incidental records within the Study Area. Only a few species were added to the list at this point, but the number of records obtained between 1998 and 2002 was over one fifth of all bird records for the area.

The final stage of data collection was the current Biodiversity Survey Priorities program in 2004. As most of these records are collected systematically, the number of records obtained in this eighteen month period was more than the either of the two previous stages. The number of species added to the reserve was small (six), but for many other species more than half the records for the Study Area are from this period. These included many common species such as Noisy Friarbird (*Philemon corniculatus*), Superb Lyrebird (*Menura novaehollandiae*), Spotted Quail-thrush (*Cinclosoma punctatum*), Red-browed Treecreeper (*Climacteris erythrops*) and Grey Currawong (*Strepera versicolor*).

Plate 3: Yellow-faced Honeyeater ©P. Green/DEC

Of conservation significance is the presence of a number of bird species that are believed to be in decline in NSW, though they are not yet listed on the TSC Act or Environmental Protection and Biodiversity Conservation Act (1999) (EPBC Act). The Eastern Yellow Robin (*Eopsaltria australis*), Rufous Whistler (*Pachycephala rufiventris*) and Eastern Shrike-tit (*Falcunculus frontatus*) are all part of a group of birds that have been identified as declining in the NSW Wheat-Sheep Belt (Reid 1999) that have been identified within the Study Area. These species, however, are probably the species least reliant on woodland habitats that are included within this list. Barrett *et al.* (2003) identified a number of species that appear to have declined in numbers in recent years. Of these species, the following where recorded within the Study Area in the current survey period: Flame Robin (*Petroica phoenicea*); Gang-gang Cockatoo (*Callocephalon fimbriatum*); Spotted Quail-thrush; White-winged Chough (*Corcorax melanorhamphos*) and Red-browed Treecreeper. The presence of these species within the study area suggests that the area, together with Kanangra-Boyd NP and the Warragamba Special Area, plays an important role in the regional conservation of these species and their habitat.

Honeyeaters are indicative of the diversity of bird species within the study area, with eight species recorded. These include (in descending order of the number of locations they have been recorded) Yellow-faced Honeyeater (*Lichenostomus chrysops*) (Plate 3), Red Wattlebird (*Anthochaera carunculata*), White-eared

Honeyeater (*L. leucotis*), Eastern Spinebill (*Acanthorhynchus tenuirostris*), White-naped Honeyeater (*Melithreptus lunatus*), Brown-headed Honeyeater (*M. brevirostris*), New Holland Honeyeater (*Phylidonyris novaehollandiae*) and Little Friarbird (*Philemon citreogularis*). Four additional species Regent Honeyeater, Noisy Miner, Crescent Honeyeater (*Phylidonyris pyrrhoptera*) and White-cheeked Honeyeater (*P. nigra*) have been recorded, but probably don't occur within the reserve.

Cockatoos (family Cacatuidae) and parrots (family Psittacidae) are both represented in the reserve, with four and three species respectively. This includes the widespread and abundant Crimson Rosella (*Platycercus elegans*), and the charismatic Yellow-tailed Black-cockatoo (*Calyptorhynchus funereus*) and Gang-gang Cockatoo. Glossy Black-cockatoos (*Calyptorhynchus lathami*) have been recorded within a five kilometre radius of the study area, at Back Swamps Creek near Batsch Camp and in the vicinity of Wombeyan Caves (Map 5). However, it is highly unlikely that this species also occurs within the study area, as potential habitat for the species is absent. These Black-cockatoos feed exclusively on *Allocasuarina* trees, which are largely absent from the montane environments of the study area.

Six species of birds of prey have been recorded within the study area to date, though they appear to occur at quite low densities. The Wedge-tailed Eagle (*Aquila audax*) has been seen from atop the Murruin Range, soaring over the valley systems in the east of the study area. Brown Goshawk (*Accipiter fasciatus*) has been recorded once within the study area, at Little Wombeyan Creek in March 2003. Brown Falcon (*Falco berigora*) and Nankeen Kestrel (*F. cenchroides*) have each been recorded within the study area by Birds Australia in the 1970s and 80s, however the low spatial accuracy of these records makes it difficult to assess the species status in the area. The Peregrine Falcon (*Falco peregrinus*) has been recorded at three locations in the study area, most recently at the Mount Werong stone hut in February 2004. At this time, a fauna surveyor had just noticed a Gang-Gang Cockatoo, when a Peregrine Falcon swooped down and attacked it, swiftly killing the Cockatoo by decapitation. Before flying away the Peregrine Falcon coughed up a bundle of prey remains, which was collected for analysis. Unfortunately, however, the cough pellet contained only feathers, which could not be identified. A number of birds of prey, including Brown and Peregrine Falcons are thought to be in decline in various parts of the nation (Barrett *et al* 2003), thus protection of their habitat within the Blue Mountains NP and the surrounding region is important.

South western Blue Mountains NP differs from the adjoining parks within the Warragamba Special Area in that is has only a very small area of grassy woodlands on Devonian soils (NPWS 2003a). This means that many of the woodland birds found in locations like the Burragorang Valley have not been recorded within the park. Similarly, the small areas of rainforest present mean that many species that are common further east, such as Lewin's Honeyeater (*Meliphaga lewinii*) and Brown Gerygone (*Gerygone mouki*) have not been recorded. The species recorded are far more typical of the woodlands and forests of the central tablelands, with many species that appear to favour higher altitudes recorded. These species are discussed further in Section 3.11.

3.3 NOCTURNAL BIRDS

Six nocturnal bird species have been recorded within the study area to date. This includes three owls, the Southern Boobook (*Ninox boobook*) and Powerful and Masked Owls, the latter two of which are listed as Vulnerable on the NSW TSC Act (1995). The Powerful Owl is widespread in the study area, its distinctive low-pitched hoot being heard in response to 11 of 31 nocturnal call playback surveys that were undertaken between April and August, when owls are most likely to respond to the playback (DEC, unpublished data).

Plate 4: Tawny Frogmouth ©Narawan Williams

The abundance of Greater Glider (*Petauroides volans*) in the area, a preferred prey species for this owl, is likely to be a contributing factor to the high numbers of this predator. In contrast, the Masked Owl has only been observed once in the study area, in response to a call playback survey on Limeburners fire trail in May 2003. Both threatened owls will be discussed further in Section 5 below.

Though not known to occur within the study area before systematic surveys were undertaken, Australian Owlet-nightjars (*Aegotheles cristatus*) are relatively common, having been recorded eighteen times during systematic surveys and two times opportunistically. In contrast, the White-throated Nightjar (*Eurostopodus*

mystacalis) is relatively uncommon, having been recorded only once, in the vicinity of Little Wombeyan Creek in January 2004. This Nightjar is generally found at lower elevations (DEC 2004c) and thus would only be expected to occur in lower altitude gorges in the east of the study area. Both the Southern Boobook and Tawny Frogmouth (*Podargus strigoides*, Plate 4) are widespread and abundant within the study area, each having been observed within a variety of vegetation types, but particularly common in the Montane Sheltered Forests and Tablelands Snow Gum Woodlands in the north of the study area.

Other large forest owls are not expected to occur, as their preferred habitats are rare within the study area. The Sooty Owl (*Tyto tenebricosa*) is dependent on tall wet forests with a complex understorey, including wet sclerophyll and rainforest. The Barking Owl (*Ninox connivens*) prefers open woodland habitats at lower elevations, and are rare within the South East Highlands Bioregion (DEC 2004c).

3.4 ARBOREAL MAMMALS

Six species of arboreal mammal have been recorded within the study area during systematic surveys. Of conservation significance is the occurrence of the Yellow-bellied Glider (*Petaurus australis*) in the area, which is listed as Vulnerable on the TSC Act. It has been directly observed at two locations in the east of the study area; one individual was seen and the other was detected by its loud gurgling call, each during nocturnal call playback surveys in May 2004. Yellow-bellied Gliders have a distinct preference for Grey Gum, from which they extract sap to feed (Mackowski 1988). Location of the Gliders at lower altitudes in the east of the study area, in areas where this tree species makes up a significant component of the canopy, is therefore to be expected. Somewhat surprising, however, is the number of locations at which Yellow-bellied Glider scratches and feed marks have been recorded at higher elevations in the study area, particularly around Mt. Werong and along the Boucher Fire Trail. This result will be discussed further in Section 5 of this report.

Also of conservation significance is the presence of the Koala (*Phascolarctos cinereus*) within the study area. Only one individual of this species has been observed within the area, on Mt. Werong Road in October 1995 (de Govrik pers. comm.). Evidence of these large distinctive marsupials has also been collected just 500 metres east of the study area, on the slope between Bindook Mountain and Murruin Creek. This observation was of Koala scats within the Grassy Red Gum-Box-Ironbark Woodlands that dominate the area south east of the study area. It is possible that Koalas also occupy the far east of the study area where this vegetation type occurs, as well as the Montane Slopes Stringybark Forest and other communities where Grey Gum and/or Forest Red Gum comprises part of the canopy. This species is discussed further in Section 5 of this report.

The most abundant and frequently encountered species of arboreal mammal in the study area is the Greater Glider. This large glider was observed during over 80 per cent (36 of 43) of systematic site spotlight surveys, as well as during nocturnal call playback surveys, in predator scats, and numerous times opportunistically. The density of Greater Glider within the study area is indicated by that fact that nine to ten individuals were regularly observed during 200 metre spotlighting transects. The gliders were recorded within all of the vegetation types where systematic spotlighting was undertaken, and are particularly abundant in the taller Montane Sheltered Forests around Mt. Werong, where tree hollows are in good supply. This trend is typical of the species, as tall montane forests support high densities of the species across their range (NPWS 1998). The Sugar Glider (*Petaurus breviceps*) is also abundant in the study area (recorded at twenty locations), frequently detected by their distinctive yapping call, which carries a long distance. These gliders are regularly encountered in the south eastern half of the study area, but have not been recorded in the north east of the study area or in the Snow Gum Woodlands north west of Mt. Werong, despite extensive spotlighting surveys.

Plate 5: Feathertail Glider ©Narawan Williams

Both Common Ringtail Possum (*Pseudocheirus peregrinus*) and Common Brushtail Possum (*Trichosurus vulpecula*) are widespread in the centre and south of the study area, though at low abundance. The Common Ringtail has being recorded at just nine locations, while the Common Brushtail has been recorded at twelve.

Interestingly, Common Brushtail Possums interfered with almost all of the Elliott traps placed along Little Wombeyan Creek in May 2004 by pulling the waterproof bags off, eating the bait, pushing the traps down slopes and depositing scats on top of them. The small Common Ringtail Possum prefers habitats with a dense sub-canopy and shrub layer, in which to shelter and build their nests (dreys); such habitats are uncommon in the study area, largely restricted to patches in the eastern half. Neither of the possums occur within the undulating high-altitude Tableland Snow Gum Woodlands in the north east of the study area.

The Feathertail Glider (*Acrobates pygmaeus*, Plate 5) is also present, though this small elusive marsupial is very difficult to detect. The only evidence of the species within the study area is by a capture made by a domestic cat at Lanigans Swamp. Further targeted survey should reveal the presence and distribution of this species in the study area.

One additional species of arboreal mammal, the Eastern Pygmy-possum (*Cercartetus nanus*), that is listed as Vulnerable on the TSC Act has been recorded within five kilometres of the study area, by a specimen held at the Australian Museum. Unfortunately, this record does not have a date of collection and has a low degree of spatial accuracy. Eastern Pygmy-possum has not been recorded in the region in recent times, and it is therefore considered unlikely to occur within the study area. The nearest recent sighting of the species was made approximately seventeen kilometres east of the study area at The Peaks in 1997.

3.5 BATS

Fourteen species of microbat are known to occur within the study area, including both tree and cave-roosting species. This includes three species that are listed as Vulnerable on the NSW TSC Act: the Greater Broad-nosed Bat (*Scoteanax rueppellii*); Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) and Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*). A fourteenth species of bat, the Large-eared Pied Bat (*Chalinolobus dwyeri*) which also listed as Vulnerable on the NSW TSC Act, has been recorded at two locations approximately three kilometres south of the study area, and south of Wombeyan Caves. There is potential for this species to also occur within the study area, as it is known to exist within similar habitats and altitudes in the adjacent Kanangra-Boyd NP (DEC 2004b) and in the eastern blocks of Blue Mountains NP (DEC 2004c). These species will each be discussed further in Section 5.

Generally, the smaller microbats are the most common, including members of the *Vespadelus* genus, the *Nyctophilus* genus, and the Chocolate Wattled Bat (*Chalinolobus morio*). This observation may be an artefact of the sampling technique, however, as these bats tend to fly below the tree canopy and are therefore more readily captured in harp traps. These species primarily roost in trees, in hollows and under bark, meaning that they have less restricted habitat than cave-dwelling species. Bats of the *Vespedelus* genus are abundant in the study area, and can often be seen at dusk flying rapidly along roads or coming in to drink from creeks and other water bodies. The most frequently encountered species during the surveys were the Large Forest Bat (*V. darlingtoni*, captured 87 times and in 70 per cent of harp traps), and the Chocolate Wattled Bat (captured 85 times in 70 per cent of traps). The Southern Forest Bat (*V. regulus*, captured 55 times and in 58 per cent of harps traps) and Little Forest Bat (*V. vulturnus*, captured 54 times in 46 per cent of harp traps) are also abundant. A review of the distribution of microbat records across the Blue Mountains and Kanangra region reveals that the Southern Forest Bat, Large Forest Bat and Chocolate Wattled Bat have been captured most frequently above 600 metres in altitude, while the Little Forest Bat has been captured most frequently below 600 metres (DEC 2004c). This finding is consistent with the pattern of bat captures within the study area, as the Little Forest Bat appears to be absent from the north western corner of the study area, which has the strongest central tablelands influence, while 30 per cent of records for the species in the study area occur above 1000 metres. In contrast, the Southern Forest Bat is most common in the north western half of the study area, and 45 per cent of records for the species were collected above 1000 metres. The Chocolate Wattled Bat, however, appears to be evenly distributed throughout the study area, as does the Large Forest Bat.

Long-eared Bats (*Nyctophilus* spp.) are distributed widely throughout the study area. Gould's Long-eared Bat (*N. gouldii*) has been trapped at sixteen locations, all but two of which are north of Parliament Creek. Often a number of bats of this species are captured in a single trap, with up to eighteen bats captured on one occasion during the 2004 surveys. The Lesser Long-eared Bat (*N. geoffroyi*) is less widespread, captured in eight locations, spread sparsely between Jocks Creek and Cockerills Firetrail. The Long-eared Bats have only been detected by harp trapping, as the species of this genus cannot be distinguished by their ultrasonic call using standard parameters (Pennay *et al.* 2004). These bats can orientate and forage without using echolocation (Churchill 1998), such that very short, quiet calls are often all that is recorded by ultrasound recording devices.

The presence of larger members of the tree-roosting microchiropteran bat group is indicated by a smaller number of captures in harp traps, as well as by ultrasonic call detection. These species tend to fly higher, either within or above the tree canopy (Churchill 1998) and are therefore infrequently captured in harp traps. Gould's Wattled Bat (*Chalinolobus gouldii*) has only been detected by the recording of its ultrasonic call, at four locations in the north and one location in the south of the study area. Similarly the White-striped Freetail-bat (*Nyctinomus australis*) has not been captured in harp traps, yet is regularly detected by its distinctive call which is audible to humans, as well as by using the Anabat device. The Eastern Broad-nosed Bat (*Scotorepens orion*), Greater Broad-nosed Bat and Eastern False Pipistrelle have each been captured a few times, and recorded by anabat at additional locations. This indicates the importance of using a variety of techniques to effectively sample bats within an area. A single record of *Mormopterus* sp. 1 (undescribed Freetail-bat) exists for the study area, collected during the Mt. Werong Biodiversity survey, though it is unsure whether this was from Anabat or harp-trapping. This little known species is likely to be rare within the study area, however further work is required to understand its taxonomic relationships, distribution and habitat preferences.

Plate 6: Eastern Horseshoe-bat © Ray Williams

The karst systems within Blue Mountains and Kanangra-Boyd NP, together with Jenolan and Wombeyan Caves, support a number of cave-dwelling bat species. Though abundant within Kanangra-Boyd NP, the cave-dwelling bats are present only in low numbers within the study area. The Eastern Bent-wing Bat has been detected by its ultrasonic call at three locations, and observed at a fourth. It is not known whether a roost site(s) for this species occurs within the study area, however it is considered likely that the individuals recorded roost within Kanangra-Boyd NP or Wombeyan Caves and use the study area as part of their large foraging range. The Eastern Horseshoe-bat (*Rhinolophus megaphyllus*, Plate 6) was first detected in the study area in January 2004, and has been recorded by anabat at three locations in total. This species is known to roost within the study area; it was observed roosting within a limestone karst along Little Wombeyan Creek during an inspection undertaken in January 2004 and has been detected by anabat at the entrance to another cave in the same system. The cave in which the Eastern Horseshoe-bats were seen roosting is known as 'Twin Caverns' and consists of a narrow three metre long drop which opens out into a double chamber approximately two metres wide and thirteen metres long (Landsdowne 1987). This species has a smaller foraging range than the Eastern Bent-wing Bat and is reported to have a slow and fluttery flight within metres of the ground (Churchill 1998). It is therefore likely that this bat gets recorded closer to its roosting site more frequently than the Eastern Bent-wing Bat does.

The Little Bent-wing Bat (*Miniopterus australis*), listed as vulnerable on the TSC Act, has been recorded at one location within a five kilometre radius of the study area, south of Wombeyan Caves in 1962. This record is of questionable reliability, however, as it does not lie within the species current known range. The Little Bent-wing Bat prefers lower altitude coastal habitats north of the Hawkesbury River (R. Williams pers. comm.). The species will therefore not be discussed further in this report.

3.6 NATIVE GROUND MAMMALS

Ground mammals are difficult to sample adequately as they either require a large, labour intensive trapping effort (e.g. dasyurid and *Rattus* species), are large bodied, wide-ranging habitat-generalists (e.g. Wombats, wallabies, kangaroos), or they prefer inaccessible and precarious habitats (e.g. Brush-tailed Rock-wallabies (*Petrogale penicillata*)). Hence, due to time constraints, fewer sites were able to be sampled for ground mammals than the other fauna groups. The majority of records for large ground mammals, such as wombats and macropods, have come from opportunistic sightings, while a number of small ground mammal records have come from predator scat analyses.

The Spotted-tailed Quoll, listed as Vulnerable on the TSC Act, has been recorded once within the study area, by a scat collected near Mt. Werong in 2001. This species has never been directly observed within the study area, but is known to occur to the east in Kanangra-Boyd NP (DEC 2004b). It is likely that the species occurs only in very low abundance within the study area, as will be discussed further in Section 5 of this report. A second species listed on the TSC Act has been recorded within a five kilometre radius of the study

area, but not within the park itself, is the Brush-tailed Rock-wallaby. This endangered species was formerly known from around Wombeyan Caves, though the last known individual from this population was captured and taken to Jenolan Caves in 1995 (R. Humphries pers. comm.). Anecdotal records from the area around Wombeyan Caves persist, with possible sightings in the Guineacor Creek and Top of the World Area (D. Ashton pers. comm.), though these have not been confirmed. The only recent sighting of the species within a five kilometre radius of the study area is of two individuals in the Murruin Creek catchment, 400 metres south of the National Park boundary, in November 2001. This species is considered to have the potential to occur within the study area, and will be discussed further in Section 5 of this report.

Four species of macropod are definitely known to occur within the study area. The most frequently encountered of these within the study area is the Red-necked Wallaby (*Macropus rufogriseus*, 34 locations), which is commonly observed along roads throughout the study area. The Swamp Wallaby (*Wallabia bicolor*, 29 locations) is also widespread and abundant in the area, with the majority of records coming from opportunistic sightings along roads, as well as observations made during spotlighting surveys. This species has also been identified in Fox scats, as presented in Section 3.10 below. The Eastern Grey Kangaroo (*Macropus giganteus*, 17 locations) is less common in the study area, with records concentrated around Mt. Werong and along the edges of cleared land between Back Creek and Range Fire Trail. These kangaroos prefer open grassy habitats for foraging and are therefore a common sight in more open vegetation types that feature a dense ground layer of grasses. The Common Wallaroo (*Macropus robustus*) has been recorded at seven locations in the south of the study area, including on steep slopes on the east side of Mount Jim Dingo, as well as at Limeburners Flat and south of the Little Wombeyan Firetrail.

A record of Tasmanian Bettong (*Bettongia gaimardi*) exists for Wombeyan Caves, two and a half kilometres south of the study area, probably of subfossil remains, collected in 1987. This species is listed on the TSC Act as being presumed to be extinct in NSW, and is highly unlikely to occur within the study area. It will therefore not be discussed further in this report.

Common Wombats (*Vombatus ursinus*) have been recorded over fifty times within the study area, evidenced by direct observation, burrow entrances, and their characteristic prominently placed scats. These large marsupials have been observed in all areas where systematic surveys have been undertaken, and in a variety of vegetation types, however they are most commonly recorded in the Montane Sheltered Forests in the north of the study area.

One species of monotreme occurs within the study area, the Short-beaked Echidna (*Tachyglossus aculeatus*). This distinctive animal has been observed opportunistically during the systematic fauna survey field trips five times, three individuals around Mount Werong, one on the Maneveland fire trail and one along Little Wombeyan Creek. In addition, diggings and tracks have been recorded in the far north of the study area, just south of Gurnang State Forest. It is likely that the second species of monotreme, the Platypus (*Ornithorhynchus anatinus*), occurs within the study area, for example along the Abercrombie River or Mount Werong Creek. Landholders have observed the latter species in neighbouring lands, such as at Abercrombie Station (C. Mateer pers. comm.).

The Elliott trapping which has been undertaken has increased our limited understanding of the distribution and abundance of small terrestrial mammals within the study area. Two small dasyurid marsupials occur in the study area, the Brown Antechinus (*Antechinus stuartii*) and the Common Dunnart (*Sminthopsis murina*). The former is widespread in the area, captured at five of seven Elliott trapping sites, and observed at an additional two locations. They have been captured in a variety of vegetation types, from Montane Sheltered Forests to Mallee Heath. A number of the *Antechinus* captured in the study area in May 2004 had an unusual appearance. They were quite small, had prominent eye rings, had a greyish head and brownish body, and some lacked orange colouring on their underside. A sample of hair from one of these unusual individuals was collected, and later analysis identified the animal as a Brown Antechinus, ruling out the possibility that it was Yellow-footed Antechinus (*A. flavipes*). Further refinement of the taxonomy and zoogeography of the *Antechinus* genus, however, may reveal a second species to occur within the study area.

The Common Dunnart is generally rarely captured in Elliott traps, and has only been captured once within the area in a pitfall trap installed at Mt. Werong. It is likely that this species is more widespread in the area than records indicate, however elucidation of its distribution and abundance in the study area would require a very labour intensive pitfall trapping effort. One species of native rodent, the Bush Rat (*Rattus fuscipes*) occurs in the study area. This species has only been observed once, again at Mt. Werong in 2001. As this native rat readily uses Elliott traps, and has not been recorded in any predator scats, it is considered to occur only at very low abundance in the study area. This species prefers habitats with dense shrubs and ground cover (Lunney 1995), which may be a reason for its scarcity within the study area.

The Dingo (*Canis lupus dingo*) has been recorded in the study area in 2004. One animal was found dead just north of Banshea Road in February, while at least eight animals were detected by their distinctive howling between Mt. Armstrong and Mt. Jim Dingo in May. These animals appeared to have a relatively high degree of Dingo breeding, however the degree of the animals' purity is unknown and would only be confirmed by genetic testing. Knowledge of the distribution of these animals within the study area is minimal. It is reported that in the early days of European settlement, Dingoes were so numerous in the area that they prevented the grazing of sheep, such that graziers turned to Cattle as an alternative (DEC 2004a). A research project on the Dingo across the Warragamba Catchment will commence shortly, which aims to tease out the distribution of Dingos in comparison to Dogs across the region (B. Purcell pers. comm.). Currently, most records on the Atlas of NSW Wildlife are entered as Dingo/Dog, and the distribution of these records is discussed below.

3.7 REPTILES

The diversity of landscapes within the study area provides a variety of habitats for reptiles which is shown by the diverse mix of species, including high altitude specialists, litter dwelling species, low altitude species and water-loving species. A total of 28 species of reptile have been recorded to date, including one species of turtle, four dragons, one monitor, eighteen skinks and four snakes. None of these reptiles are listed as threatened under state or federal legislation, however some of the records provide important information on species ranges and habitats.

The Eastern Snake-necked Turtle (*Chelodina longicollis*) was recorded within the study area for the first time in May 2004, when it was seen at two locations on the Abercrombie River, between Round Flat and Johnny Barnes Flat. This species is likely to occur elsewhere along the river, and possibly also within other large drainage systems, such as Werong Creek.

Of the four species of dragon within the study area the Mountain Heath Dragon (*Tympanocryptis diemensis*) is the most common, occurring at low density throughout the area. The species has been observed at seven locations, in a variety of vegetation types from montane sheltered forests to dry woodlands. The Eastern Water Dragon (*Physignathus lesueurii*) has been recorded at five locations, including along the Abercrombie River, Ruby Creek and Mount Werong Creek. As its name suggests, this large dragon occurs along drainage lines and is usually spotted during the day, basking on rocks or vegetation by the water's edge. The Jacky Lashtail (*Amphibolurus muricatus*) has also been recorded at five locations, in the vicinity of Mt. Werong and along the Abercrombie River. This species has only been observed opportunistically, including basking on rocks and sheltering under piles of abandoned corrugated iron. The Eastern Bearded Dragon (*Pogona barbata*) has only been recorded once, in the vicinity of Mt. Werong in December 2000. It is possible that this species also occurs elsewhere within the study area, though the fact that they have not been observed during any of the systematic fauna survey periods indicates that they are at very low abundance.

Lace Monitors (*Varanus varius*) have been observed at four locations in the study area including at Lanigans Swamp, on Little Wombeyan Creek Firetail south of the creek, on Cockerills Firetrail and on the Murruin Range. This large goanna is a habitat generalist with a large home range, and is likely to occur at low density throughout the study area.

The northern half of the study area accommodates a suite of skinks typical of the south eastern NSW high country. This area of the study area lies entirely above 800 metres in altitude, with significant portions above 1000 metres. The reptile fauna is therefore dominated by skinks that prefer the grassy open forests and woodlands of montane sub-alpine environments. This includes the species (in order of recorded abundance) Trunk-climbing Cool-skink (*Pseudemoia spenceri*), Tussock Cool-skink (*P. entrecasteauxii*), Southern Forest Cool-skink *(Niveoscincus coventryi*), Cool-temperate Water-skink (*Eulamprus tympanum*) and Blotched Bluetongue (*Tiliqua nigrolutea*). Bold-striped Cool-skink (*Bassiana duperreyi*) is also considered to be a high-altitude species, yet within the study area it has been recorded only three times, including once below 800 metres above sea level.

The most abundant and widespread reptile species in the study area is the Warm-temperate Water-skink (*Eulamprus heatwolei*), which has been recorded at 46 locations and at over 50 per cent (20 of 37) of systematic diurnal herpetofauna surveys. This species is typical of mid to high altitude landscapes within the greater Blue Mountains area, occurring in a diversity of habitats ranging from Montane Sheltered Forests to Tablelands Exposed Silvertop Ash-Brittle Gum Woodland and Tablelands Snow Gum Woodland. The Pale-flecked Sunskink (*Lampropholis guichenoti*) is also abundant in the area, having been observed at 35 locations and during 65 per cent (24 of 37) of systematic diurnal herpetofauna surveys. This species occurs at a wide range of altitudes, but in contrast to the related Dark-flecked Garden Sunskink (*Lampropholis delicata*), is generally more common above 800 metres above sea level (DEC 2004c).

A number of species more typical of low altitude habitats also occur within the study area, but at very low abundance. These include the Cream-striped Shinning-skink (*Cryptoblepharus virgatus*), which has been observed once between Parliament Creek Firetrail and the Abercrombie River; Copper-tailed Ctenotus (*Ctenotus taeniolatus*), which has been recorded once around the limestone outcrops at Little Wombeyan Creek; and the Dark-flecked Garden Sunskink, which has been recorded at four locations, including on Murruin Range, near Little Wombeyan Creek and on the southern boundary of the study area, just north of Wombeyan Caves. None of these species have been recorded above 1000 metres within the study area. The Eastern Water-skink (*Eulamprus quoyii*) is also generally considered to be a low elevation species and within the Kanangra region is usually identified below 600 metres in altitude (DEC 2004c). The species has been recorded ten times within the study area, however, including seven times between 800 and 1000 metres, and twice above 1000 metres in altitude. The species is typically an inhabitant of streamlines and other wet areas at lower altitudes, but has previously been recorded, as it has been in this study, extending up streamlines to higher elevations, where it can become sympatric with the Warm-temperate Water-skink (R. Wellington pers. comm.). Interestingly, however, the Eastern Water-skink has not been recorded in the south east of the study area, which is lower in altitude. Further work is required on the Water-skinks in this area, and throughout the state, to elucidate the taxonomic relationships and relative distribution of species in this genus.

The Weasel Shadeskink (*Saproscincus mustelinus*) shows no obvious altitudinal preference across the greater Blue Mountains region (DEC 2004c), reflected in its occurrence at a range of altitudes within the study area (from 690 to 1100 metres). This litter-dwelling species has been recorded at eleven locations, most of which are located within Montane Sheltered Forest along the Murruin Range; the species has not been found in the north east of the study area. The Red-throated Cool-skink (*Bassiana platynota*) similarly exists at a range of altitudes within the region (DEC 2004c), yet is relatively uncommon within the study area, with just four locations on record, including three in the east around Limeburners Flat and Little Wombeyan Creek, and one north of Mt Werong.

Two species of lizard from the *Egernia* genus occur within the study area, though White's Rock-skink (*E. whitii*) has only been observed on one occasion, just south of the junction between Swamp Creek and the Abercrombie River. The Black Crevice-skink (*Egernia saxatalis intermedia*, Plate 7) is more widespread, having been recorded at five locations, each south of Mount Werong. Within the greater Blue Mountains region this species has not been observed below 600 metres in altitude, and is much more common above 800 metres.

Plate 7: Black Crevice-skink near Goker Firetrail © David O'Connor/DEC

The habitat in which the lizards have been located within the study area, however, is somewhat unusual for the species. This medium-sized lizard is typically rock-dwelling, usually found on boulder slopes and in crevices under exfoliating slabs on exposed rock faces (Cogger 1996). Typical habitat for the species does occur within the study area, for example within the system of limestone outcrops around Little Wombeyan Creek, where numerous Black Rock-skinks were located during a systematic survey in January 2004. Of interest, however is the location of the species within Tableland and Escarpment Moist Fern/Herb Grass Forest along the Goker Firetrail and within Tablelands Exposed Brittle Gum-Silvertop Ash Woodland along the Range Firetrail. Neither of these habitats had any outcropping or exposed surface rock, but featured a ground cover of Bracken Fern (*Pteridium esculentum*). The lizards were located on logs exposed above the layer of ground cover.

Two species of short-limbed fossorial skinks occur within the study area: the Yellow-bellied Three-toed Skink (*Saiphos equalis*) and the Three-toed Earless Skink (*Hemiergis decresiensis*). These species have only been recorded above 800 metres in altitude within the study area, and have each been found once above 1000 metres. Both species occur at low abundance, having been recorded at three locations (Mt. Werong, Range fire trail and Little River fire trail) and five locations (around Mt. Werong and at Parliament Hill) respectively.

The importance of comprehensive stratified fauna survey is indicated by the fact that no snake species had been recorded within the study area prior to 2003. Four species of snake are now known to occur, each

detected at low abundance during DEC systematic surveys. The Highlands Copperhead (*Austrelaps ramsayi*) is a specialist of montane/sub-alpine environments, and hence has been recorded at three locations in the north east of the study area (each above 800 metres in altitude). The Mainland Tiger Snake (*Notechis scutatus*) has been recorded at one location on the Loombah Plateau, on the boundary of Blue Mountains and Kanangra-Boyd NPs. The occurrence of these two species within the study area has conservation significance, as they are both thought to be in decline in NSW (R. Wellington pers. comm.). The Red-bellied Black Snake (*Pseudechis porphyriacus*) and Eastern Brown Snake (*Pseudonaja textilis*) are more uncommon inhabitants of the study area, having been observed at only two and one locations respectively. These species occupy a broad range of habitats within the region, and have the potential to occur at further sites in the study area, particularly at lower altitudes.

3.8 FROGS

The success of frog surveys is largely dependent on the immediate weather, season and recent climatic conditions. Unfortunately, in the lead up to and during the 2002-2004 systematic survey period, survey conditions were dry and warm, providing poor conditions for conducting frog surveys. Hence minimal systematic frog surveys were carried out, and frogs were primarily recorded during other systematic survey techniques such as site spotlighting, diurnal herpetofauna searches, nocturnal call playback and opportunistically.

A total of ten frog species have been recorded within south western Blue Mountains NP, including seven ground frogs and three tree frogs. Of high conservation significance is the occurrence of the Stuttering Frog, which is listed as Endangered on the NSW TSC Act and Vulnerable on the Commonwealth EPBC Act. This species has declined rapidly through much of its former range in recent years. The species was first discovered in the study area in December 2000 when a fauna surveyor spotted two adults in amplexus in Ruby Creek during the day (C. Barker pers. comm.). Since then, the species has been recorded at numerous locations along Ruby Creek, both above and below the falls. Targeted surveys for the species were undertaken as part of the DEC survey program in February 2004, during which tadpoles of the species were discovered in two new locations on Mount Werong Creek (Plate 8). The occurrence of the Stuttering Frog within the study area is particularly important, as it is the only known extant population of the species within the greater Sydney Basin (bounded by Bathurst, the Hunter River and Macquarie Pass) occurring above 280 metres above sea level (White in prep.); the locations for the species within the study area are all over 1000 metres. Unfortunately four dead adults and metamorphs of the species were found during the surveys of Ruby Creek. A post mortem was carried out by Dick Montali of Taronga Zoo, revealing the presence of chytridiomycosis (chytrid fungus). This is the first report of chytrid fungus for the species (refer to NSW Scientific Committee 2002a). This fatal disease, listed as a Key Threatening Process on the NSW TSC Act (1995), presents a severe threat to the survival of the Stuttering Frog population as it is known to have had a particularly dramatic impact on populations of stream-dwelling species at high altitudes in recent years (NSW Scientific Committee 2003a). This species is considered to be a very high priority for conservation research and management within the study area, as will be discussed further in Sections 4 and 5 of this report.

Plate 8: Mount Werong Creek where Stuttering Frog tadpoles were located © DEC

By far the most commonly recorded frog within the study area is the Common Eastern Froglet (*Crinia signifera*), which has been observed or heard calling at thirty locations in a variety of water bodies, from

swamps to creeks, and within a range of vegetation types, from Montane Sheltered Forest to Tablelands Snow Gum Woodlands and High Elevation Swamp. It has not been recorded in the south of the study area, although this is likely to be due to the dry conditions experienced during surveys in this area rather than an absence of the species. The remaining ground frogs have been recorded at much lower frequency, and include (followed by the number of locations at which they have been observed) Banjo Frog (*Limnodynastes dumerilii*, 7), Bibron's Toadlet (*Pseudophryne bibronii*, 6), Spotted Marsh Frog (*Limnodynastes tasmaniensis*, 3), Striped Marsh Frog (*Limnodynastes peronii*, 2) and Smooth Toadlet (*Uperoleia laevigata*, 1).

It is widely hypothesised that the Bibron's Toadlet that occurs in highland areas, including south western Blue Mountains NP, is a different form from the frog that occurs at lower elevations in the Sydney Basin (A. White pers. comm.). The highland form of Bibron's Toadlet has yellow on the urostyle, red fringes around the dorsum papillae and a distinct call (A. White pers. comm.). There is widespread concern that the low elevation form of Bibron's Toadlet is in decline, particularly within the Sydney Basin (R. Wellington pers. comm.), possibly due to loss of breeding habitat (A. White pers. comm.). The highland form of the species appears to be stable, however, occurring in large numbers in the Kanangra region, including Kanangra-Boyd NP (DEC 2004b). Within the study area, however, the species has only been recorded along the Murruin Range, just west of the Loombah Plateau. It is likely that the species does occur elsewhere in the study area, but has not been detected due to the dry conditions at the time of survey.

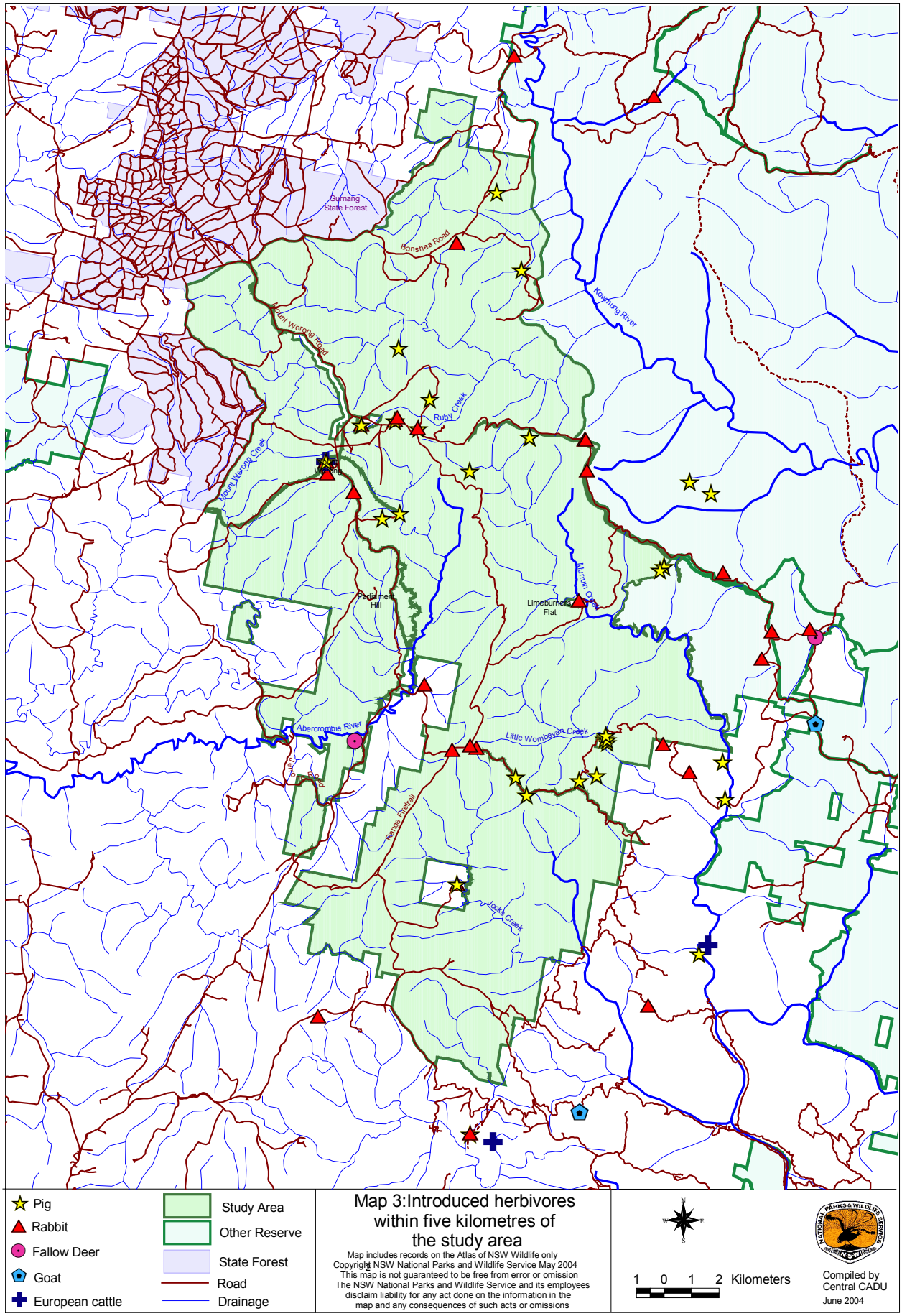
Tree frogs have only been recorded at low abundance in the study area, which again is likely to be an artefact of the dry conditions at the time of systematic survey. Verreaux's Tree Frog (*Litoria verreauxii*) is the most commonly recorded of the tree frogs, with five records in the vicinity of Lanigans Swamp and Mt. Werong, one on Banshea Road, one on Mt. Werong Road, one on Mount Werong Creek and one on the Abercrombie River. Adult Peron's Tree Frog (*Litoria peronii*) have been heard calling, and metamorphs seen, on the Abercrombie River in January 2004, and tadpoles of the species were located along Burnt Hole Creek in February 2004. The identification of *Litoria nudidigita* in south western Blue Mountains NP in January 2004 is an exciting find, as it constitutes a range extension for the species and contributes important information to the known distribution of the frog. This is a newly described species (Donellan et al 1999), which had previously been identified as the southern call race of the Green Stream Frog (*L. phyllochroa*) (Anstis 2002). The frog has also recently been identified in Kanangra-Boyd NP (DEC 2004b). It would be valuable to undertake further frog surveys in appropriate weather conditions to ascertain the distribution of this species within the study area, as well as the distribution and abundance of other frog species that have only been recorded on a small number of occasions.

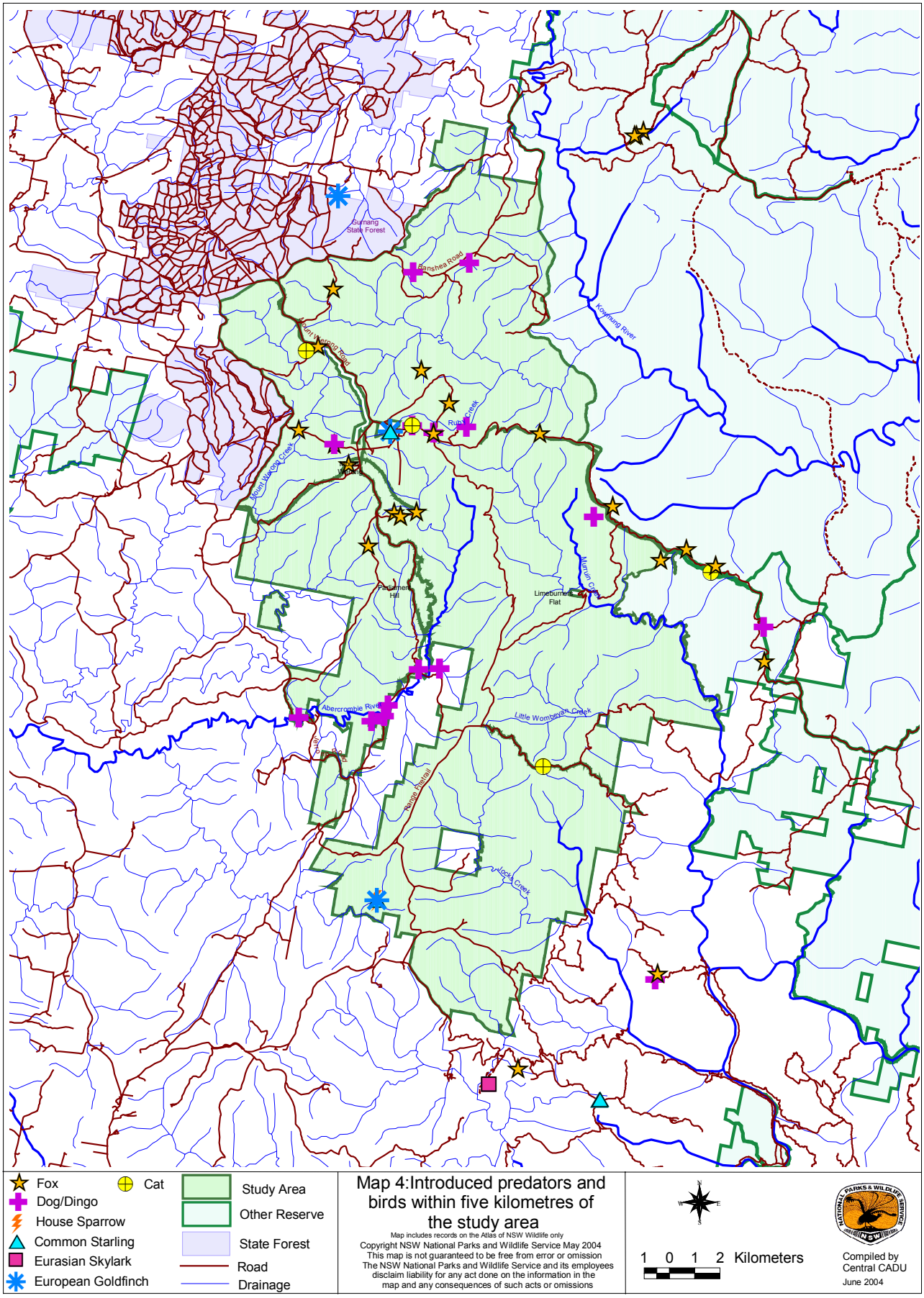
The Booroolong Frog (*Litoria booroolongensis*), classified as Endangered under the NSW TSC Act, has not been recorded within the study area. However, specimens held by Australian Museum have been collected within a five kilometre radius of the area, at Morong Falls on the Kowmung River (1976) and at Wombeyan Caves (unknown collection date) (Map 5). The species is known to occur in good numbers within Abercrombie River Nature Reserve, six kilometres to the west of the study area (DEC 2004c). Broad-scale habitat modelling for the species identified high quality habitat in the south east of the study area (NPWS 2000b) although this prediction was based on very limited information. More recent on-site assessment suggests that potential habitat for the species is virtually absent in the study area (A. White pers. comm.). The Booroolong Frog is generally considered to be more secure in drainage systems west of the Divide, possibly due to reduced abundance of introduced Brown Trout (*Salmo trutta*) and the Rainbow Trout (*Oncorhynchus mykiss*) (A. White pers. comm.). There is therefore a potential for the frogs to persist within the study area, but it is considered unlikely.

3.9 INTRODUCED SPECIES

Eight species of introduced ground mammals have been recorded within the study area. This includes species that are well established and widespread (such as the Fox, Rabbit (*Oryctolagus cuniculus*) and Pig) and species that have only been recorded at one or two locations (such as Fallow Deer (*Dama dama*)). The distribution of introduced species records within the study area is presented in Map 3 and Map 4. As noted above, Dingoes and Dogs have been presented together in the distribution map, as until recently they could not be entered separately into the Atlas of NSW Wildlife, and it is difficult to ascertain the level of Dingo purity in the field.

The most commonly recorded introduced species within the study area is the Feral Pig, the occurrence of which is often evidenced by their characteristic tracks, scats and diggings. Pigs primarily feed and wallow in moist environments or along drainage lines, particularly in Montane Sheltered Forest and to a lesser extent Highlands Gorge River Peppermint Forest. Evidence of the species is concentrated in these environments, yet Pigs also roam widely through a variety of habitats. The species or evidence of the species has been


Gurnang State Forest
Banshea Road
Mount Werong Road
Kowmung River
Ruby Creek
Mount Werong Creek
Parliament Hill
Limeburners Flat
Murrin Creek
Abercrombie River
Little Wombeyan Creek
Range Firetrail
Jocks Creek
Pig
Rabbit
Fallow Deer
Goat
European cattle
Study Area
Other Reserve
State Forest
Road
Drainage
Map 3:Introduced herbivores within five kilometres of the study area
Map includes records on the Atlas of NSW Wildlife only
Copyright NSW National Parks and Wildlife Service May 2004
This map is not guaranteed to be free from error or omission
The NSW National Parks and Wildlife Service and its employees disclaim liability for any act done on the information in the map and any consequences of such acts or omissions
1 0 1 2 Kilometers
Compiled by Central CADU
June 2004


Gurnang State Forest
Banshea Road
Mount Victoria Tops
Mount Victoria Forest
Parliament Hill
Limeburners Flat
Abercrombie River
Little Womboyne Creek
Jacks Creek
Kowmung River
Fox
Dog/Dingo
House Sparrow
Common Starling
Eurasian Skylark
European Goldfinch
Cat
Study Area
Other Reserve
State Forest
Road
Drainage
Map 4:Introduced predators and birds within five kilometres of the study area
Map includes records on the Atlas of NSW Wildlife only
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Compiled by Central CADU
June 2004

recorded 26 times in the study area, with records concentrated on the highlands around Mt. Werong and the Murruin Range, as well as in the vicinity of Little Wombeyan Creek (Map 3). Pig damage has also been noticed along creek lines near the southern part of the Lower Werong Creek fire trail and near where woodland borders the cleared land south of the Abercrombie River (J. Bros pers. comm.).

Both Fox and Rabbit are well established in the study area, recorded at nineteen and eighteen locations respectively (Map 4 and Map 3). Sightings and evidence of Fox have only been recorded north of Parliament Hill, despite searches for scats being undertaken in the south of the study area. It is likely that the species does occur in the south of the study area, however results imply that they must be at markedly lower abundance in that area, in contrast to their widespread distribution in the north. Rabbit records are spread throughout the central third of the study area, particularly around Mount Werong, the Loombah Plateau and the Range Firetrail. Dog/Dingo has been recorded at ten locations, either by direct observation or by the collection and analysis of scats. Records for this species area concentrated around Mt. Werong, as well as along the Abercrombie River (Map 4).

Feral Cats (*Felis catus*) and Fallow Deer have also been observed within the study area, though in relatively low numbers. The Cat has been recorded at three locations (Map 5), while Fallow Deer was recorded for the first time in the study area on cleared land by the Abercrombie River, south of Johnny Barnes Flat. Recently, Deer have been observed at increasing frequency in the adjacent Kanangra-Boyd NP (M. Jones pers. comm.) and it is possible that this trend will extend to the study area unless appropriate management actions are taken. Fallow Deer have recently been seen moving north into the study area from the Abercrombie River area, and in the vicinity if Abercrombie River Station (J. Bros pers. comm.). Though not yet recorded on the Atlas of NSW Wildlife, low numbers of Goats (*Capra hircus*) are known to occasionally occupy parts of the study area along the Abercrombie River (J. Bros pers. comm).

These introduced species are likely to be having a significant negative impact on the native terrestrial flora and fauna of the study area. Six of the species are listed, or are pending finalisation, as a Key Threatening Process on the TSC Act, as they are known to adversely affect threatened species and have the potential to cause other species to become threatened. The threats posed to native fauna by each animal are summarised below. The first five of these species are also listed as a Key Threatening Process on the EPBC Act.

- Feral Pigs compete for food resources with native fauna, actively predate upon native birds, reptiles, bird and reptile eggs, and frogs, and are capable of significant habitat degradation as a result of their behaviour and feeding habits (NSW Scientific Committee 2004a).
- Feral Rabbits impact negatively on indigenous species via competition for resources, alteration of the structure and composition of vegetation, and land degradation (NSW Scientific Committee 2002b).
- Predation by Foxes is a major threat to the survival of native Australian fauna, with non-flying mammals weighing between 35 and 5500 grams and ground-nesting birds at greatest risk. Fox predation has been implicated in limiting habitat choice and population size of a number of medium-sized marsupials (NSW Scientific Committee 1998). The fact that Foxes prey upon native animals within the study area is evident from scat analysis, as summarised in section 3.10 below.
- Feral Cats threaten native fauna by direct predation. Cats are carnivorous and capable of killing vertebrates up to three kilograms. Preference is shown for mammals weighing less that 220 grams and birds less than 200 grams, but reptiles, and amphibians are also eaten (NSW Scientific Committee 2000).
- Feral Goats were given a preliminary determination as a Key Threatening Process in June 2004. They cause habitat degradation and have the ability to significantly alter the habitat of native fauna. Goats may compete with native fauna for food, water and shelter (NSW Scientific Committee 2004b).
- Deer cause environmental degradation through overgrazing, browsing, trampling, ring-barking, antler rubbing, dispersal of weeds, creation of trails, concentration of nutrients, exposing soils to and accelerating erosion (NSW Scientific Committee 2003b).

Clearly the potential for introduced predators and herbivores to significantly impact on native fauna in the study area is of high conservation concern. Comprehensive targeted survey of the species, assessment of their impacts, followed by appropriate management actions, should remain a high priority for study area management.

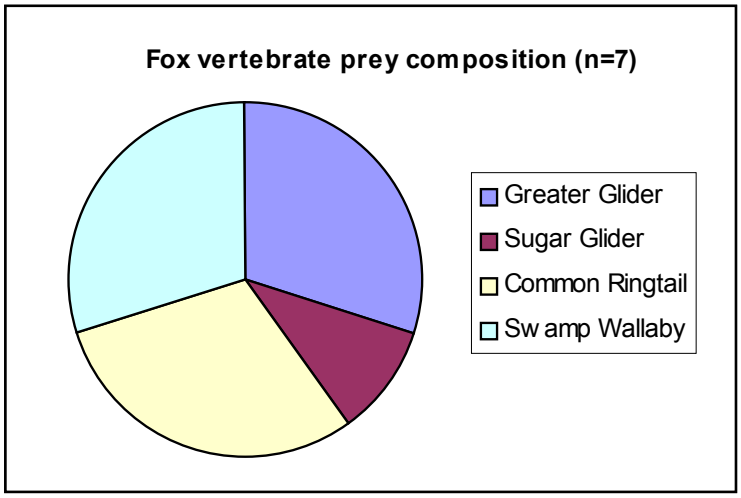
Three species of introduced birds have been recorded within the study area, these being House Sparrow (*Passer domesticus*), European Goldfinch (*Carduelis carduelis*) and Common Starling (*Sturnus vulgaris*). All were recorded as part of the first Bird Atlas (see Section 3.2) and hence have inaccurate spatial referencing. These species are considered unlikely to occur within south western Blue Mountains NP, but may occur

within and at the margins of adjacent private lands that have been cleared or contain weed species on which the birds forage. As these species are restricted in their occurrence and abundance in the study area, it is considered unlikely that they impact significantly on native fauna at this stage.

3.10 Predator Scat Analysis

The analysis of Fox and Dingo/Dog scats has yielded interesting information about the vertebrate prey composition of the predator's diet. Only three Dog/Dingo scats collected within the study area have been analysed, within which the remains of Greater Glider and Rabbit were found. Seven Fox scats have been analysed, revealing that within the study area arboreal mammals make up the largest vertebrate component of the Foxes' diet, with Swamp Wallabies also consumed (Figure 2). Only limited conclusions can be drawn from these analyses due to the low number of scats analysed. An analysis of predator scats across the region is being undertaken as part of the SCA fauna survey program, with the aim of obtaining more comprehensive information about prey composition (DEC in prep).

Figure 2: Vertebrate prey items (hair and skeletal remains) identified from Fox scats



3.11 Landscape Scale Patterns in Fauna Distribution

The vegetation of south western Blue Mountains NP is broadly effected by two parameters - elevation and geology. This has resulted in a number of distinct structural vegetation types, as described in Section 1.2 above. In summary, the study area features: tall montane forests on granite knolls in the north of the study area around Mt. Werong and Banshea; woodlands typical of undulating slopes of the central tablelands in the north west; cool temperate gullies and ridges on the eastern fall of the Divide; deeply incised gorges along Murruin, Little Wombeyan and Jocks Creeks, including limestone outcrops and karsts; alluvial flats along the Abercrombie River and larger creeks; heath on the Loombah plateau; and small isolated bogs and swamps. The distribution of fauna species across the study area reflects this diversity of habitat types, with suites of species responding, either directly or indirectly, to the habitat changes.

The reptiles exhibit the most obvious example of the response of fauna to these changes. The northern half of the study area accommodates a suite of reptiles typical of the south eastern NSW coastal high country, including Trunk-climbing Cool-skink, Tussock Cool-skink, Southern Forest Cool-skink, Cool-temperate Water-skink, Blotched Bluetongue, and Highlands Copperhead. These species are likely to be responding variously to habitat changes (such as the occurrence of tussock grasses (for *Pseudemoia* spp.)) and temperature differences (for example, Highlands Copperhead is one of the few snakes in Australia that can survive above the snowline). At lower altitudes in the study area, a number of species typical of more coastal hinterland habitats occur, including Copper-tailed Ctenotus at Little Wombeyan Creek and the Eastern Snake-necked Turtle on the Abercrombie River. The restricted extent of lower altitude habitats within the study area is reflected in the low abundance of these species. In addition, there are a number of reptiles species for which the majority of the study area comprises suitable habitat, such as the Cool-temperate Water-skink, which is a species typical of mid to high altitude landscapes within the greater Blue Mountains region, and the Pale-flecked Sunskink which is known to occur at a wide range of altitudes (DEC 2004c).

Some bird species appear to effectively replace each other in the various broad habitat areas. For example, the Satin Flycatcher (*Myiagra cyanoleuca*) appears to replace the more widespread Leaden Flycatcher (*M. rubecula*) on the Boyd Plateau within Kanangra-Boyd NP, and though there are less records in the study area, the same appears to happening there. This reflects the situation in the ACT where the former species replaces the latter in closed habitats and is rare below 800 metres, while the Leaden is uncommon above 900 metres (Taylor and COG 1992). Other birds that seem to be more prevalent at higher altitudes are Flame Robin, Red-browed Treecreeper, Grey Currawong and Red Wattlebird. Some species that appear to be recorded more regularly at lower altitudes have not been recorded within the study area including Brown Gerygone, Lewin's Honeyeater and Bell Miner (*Manorina melanophrys*). It must be remembered, however, that because most of records were collected during systematic surveys undertaken in spring, these patterns reflect habitat preferences only at this time of year. Some species, such as the Flame Robin, may move to lower altitudes in winter, for example.

The pattern of distribution of mammals is less distinct, but trends are still apparent. The Greater Glider has been recorded throughout the study area, but at greatest density in the tall moist sheltered forests in the montane and tableland influenced landscapes to the north of the study area. In contrast, Yellow-bellied Gliders have only been directly observed only in the south east of the study area, within the steep gorges and slopes of the Murruin Creek Catchment. This area lies at lower altitude and is influenced by the landscapes of the neighbouring Wollondilly valley, with species such as Grey Gum occurring, which is a preferred feed tree for the Yellow-bellied Glider. This pattern is also seen in the Koala, which also relies on trees that grow at lower altitudes, such as Grey Gum and Forest Red Gum.