DRAFT

NOMINATION OF YURAMMIE KOALA POPULATION AS AN ENDANGERED POPULATION

EXECUTIVE SUMMARY

Yurangalo Inc. wishes to nominate the koalas (*Phascolarctos cinerus*) in the Yurammie Forest in the Eden Region as an endangered population. The forest is located to the south of, and is part of the escarpment rim that surrounds the Bega Valley (Map 1).

This document follows the structure required for such a nomination. It firstly summarises koala research in the wider region that is relevant to the submission. The history of koalas in the Yurammie area, evidence that koala numbers have declined in recent decades and that few animals now survive, is then provided. The case that the population is now disjunct is discussed, a population estimate provided and threatening processes examined.

Koalas were once abundant in the wider region, particularly in the Bega Valley and Tableland areas. A crash in the numbers of koalas occured in 1903/5 due to co-ocurring factors of disease, clearing for agriculture and hunting. Remnants of this population has persisted in forested areas but with of ongoing localised extinctions. In recent decades there is a concentration of records in the Murrah/Bermagui and Tantawangalo/Yurammie areas. Intensive logging, primarily for export woodchips has been undertaken throughout these areas.

Recovery Plan for koalas in the region. A draft recovery plan for koalas in the South Coast Management Area has been made available comment. This document is attached. Although actions are proposed that should reduce the likelihood of the regional population going extinct the plan also implicitly endorses intensive logging operations in areas managed by State Forests NSW. The various survey and logging protocols have not been quantified and may not be effective in conserving the population in this area.

An large population of koalas existed in the Tantawangalo/Yurammie forests in the late 19th century, sufficient to help sustain a koala skin tannery. After European occupation of the region the forests were subjected to significant ecological degradation. These activities contributed to the widespread koala population crash at the beginning of the 20th Century which probably impacted on koalas in the subject area, A higher number of koalas than presently exist remained in these forests after this crash. The habitat of this population has been subjected to a series of human-induced impacts. Integrated harvesting commenced in Yurammie in 1973. This was undertaken in two areas later highlighted by a SFNSW consultant as being the most significant known to be remaining in the region (West Yurammie and the Mt Darrah area). Koala numbers now appear to be extremely low in the former. No further koala evidence has been found in the latter since this logging. Recent surveys suggest that no koalas remain in an area near to the former where a breeding aggregate of koalas was known to exist earlier in the decade.

The decline and near extinction of this population is precisely that which would be expected given the succession of impacts that it and its habitat have suffered and its known vulnerability to, and slow recovery from, such events.

The major threatening processes facing koalas in the Yurammie forest are: i) the ongoing impacts of intensive logging and associated practices that has already occurred in these koala areas, ii) the threat of further operations in part of the Yurammie controlled by State Forests NSW; iii) wildfire; iv) predation; and, v) forest dieback, primarily caused by the bell minor (*Manorina melanophrys*).

Section xx examines the case that the region's koalas are in immediate danger of extinction.

1 KOALA RESEARCH IN THE WIDER REGION

1.1 Lunney and associates

Lunney and Leary (1988) undertook a study of the history of the once abundant population of koalas in the Bega Valley. They concluded that the decline and near extinction of this population is attributed to its complete dependence on valley species of nutrient-rich eucalypts that were almost entirely eliminated in the conversion of valley forest to farmland.

Lunney and Reed (1989) concluded that the history of koalas within the Woodchip Agreement Area in the Eden region...*demonstrates that large koala populations can decline rapidly, persist for many decades in isolated fragments, and face local extinction because of the sequential loss of each isolated population* (our emphasis).

In 1991-2 Lunney et al (1997) undertook a community survey in the region. They state that the responses suggest that the number of koalas had been constantly low for the previous four decades and that the Murrah/Bermagui and Tantawangalo/Glenbog/ Yurammie areas appeared to contain the core of the surviving koala population in the region.

1.2 Martin (1992)

In his consultancy to the NPWS, Martin (1992) stated the following about the region's koalas:

- *The population may well be a distinct genetic race or contain rare alleles important to the long term conservation of the species. If this is the case then the conservation of this population is of national importance.*
- *Low abundance and high mobility is a feature of natural koala populations. It is unlikely that they clump together in small patches of "prime habitat".*
- *Management of habitat should not therefore be solely centred on identification, delineation and conservation of "prime habitat". A more appropriate regime is to conserve large quantities of contiguous forest comprising habitat of variable quality including "prime habitat".*
- *The current survey methods are essentially micro-survey techniques that have a low probability of detecting koalas living in low abundance. The*

search area is too small to detect individuals which have very large home ranges and which may move long distances even within one day.

- *The various protocols directed at conserving koalas in the Eden Management Area are of little use until they are firmly based on a knowledge of this population.*

1.3 Cork

Cork (1994)

Cork et al (1995)

1.4 SFNSW

State Forests staff conducted a radio-tracking study of eight Koalas in the region. These were the only animals they were able to locate for their study. Two of these koalas (both males) were from the nominated area. This commenced in 1991 and had largely ceased by the end of 1994. By then four of these koalas had died and contact with the others was lost (Bali and Delaney 1966).

The animals studied had large home ranges. For example, the two breeding females had home ranges of 600ha and 67ha respectively (Jurskis and Shields 1996).

Primarily from this study, SFNSW estimated the regional population at between 800 to 1600 mature adults (Jerskis pers comm and Shields pers comm). They reached this conclusion by averaging the home ranges of the koalas studied. They assumed that if the animals are evenly spread over all the dry forest types in the region the figure of 1600 mature adults would apply. If 50% of these areas were unoccupied this gave a populaion of 800 mature adults.

These assumptions are contrary to the available evidence that suggests that there are few breeding populations in the region with the scattered nature of the records over the past four decades only suggesting widely dispersing animals (see below).

1.4 The South East Forests Conservation Council

Between 1996/8 the South East Forests Conservation Council undertook fieldwork in the forests of South east NSW to collect data on the distribution, habitat use and the status of remnant Koala populations. This work was funded by the Commonwealth Government through the South East Forests Regional Adjustment Committee.

Although extensive fieldwork was undertaken, and staff proved their ability to locate evidence of Koalas and also of breeding females if they are present, the only unequivocable evidence of a breeding aggregation was located in the Murrah State Forest and even these animals appeared to be widely scattered.

The only other area where widespread evidence was in the Yurammie Forest where 23 active sites were located (Map 2). Approximately 800 hours were spent searching for these sites. Preliminary analysis for tree species preference suggests that *E. cypellocarpa* is a secondary feed tree species and *E. globoidea* and *E. muellerana* are

supplementary browse species when growing both on sedimentary and granitic geologies (South East Forests Conservation Council 1998). These predominate in the nominated area

((Probably exclude following: Areas where koala evidence was not found
Between October 1996 and June 1997 the research team searched the following areas where koala faecal pellets had been found by SFNSW and Tantawangalo Catchment Protection Association (TCPA) survey teams in the past six years and found no evidence of continued use by koalas:

- Wolumla Peak, East Yurammie SF;
- Wyndham Trig, West Yurammie SF;
- Chalkhills Fire Trial -Mataganna catchment, West Yurammie SF);
- North and south of Boben Rd, Tantawangalo SF;
- Tantawangalo NP (TCPA scat moth area -see Cork (1995));
- Compartment 1382, Cathcart SF;
- Compartment 1415, Coolangubra NP;
- Tanja SF (animal sighted in 1991 -no faecal pellets recorded);

The failure to locate koala faecal pellets in these areas does not prove that koalas are now absent. Nevertheless the success the research team has had in other areas, particularly the Murrah State Forest, suggests that the species is now absent from these areas and adds weight to the evidence that the process of local extinctions of remnant populations is continuing.))

1.5 SFNSW Taped callback project

2. HISTORY OP KOALAS IN THE YURAMMIE FOREST

2.1 Evidence of koalas in Yurammie/Tantawangalo Forests before 1900

The Commonwealth (1997) reports that a koala skin tannery existed at the southern edge of the Yurammie Forest. This indicates that an abundant population of koalas existed there during the latter part of the 18th Century when the koala skin trade was the backbone of the region's economy (Lunney and Leary 19888, Platts 1989). This location is well away from the *E. tereticornis* forests and woodlands of the Bega Valley, suggested by Lunney and Leary (1988) to be the area sustaining the most abundant koala population in the region.

The following significant ecological impacts are known to have occurred in these forests in the early years of European occupation:

1. The forests and woodlands of the Bega Valley to the north and east of the Yurammie/Tantawangalo forests were cleared;

9389576. The woodlands to the west on Cathcart plateau were also cleared;

9389656. Other riparian and higher nutrient areas in and adjoining these forests were also cleared. These included parts of the Myrtle and Matagannah Creeks where significant regenerating stands of *E. viminalis* now occur. This species is considered to be a primary koala browse species when growing on alluvial or volcanic substrates (Phillips 2000).

9389736. The activities related to 1), 2) and 3) removed important koala habitat and caused significant ecological reverberations into the remaining forest. This would have included the death and disruption of many suites of fauna, the infestation of exotic fauna, and the increase in the frequency and severity of fire regimes and probable climate change (eg South Gippsland Development League 1972).

9389816. Extensive timber cutting for sawlogs and sleepers occurred in these forests. The secondary koala feed tree *E. muellerana* (South East Forests Conservation Council 1998) was targeted. Lunney and Leary (1988) state the between 1865 and 1898 there were at least 14 sawmills operating in different localities of the Bega district, all of them located near creeks and rivers to obtain water for boilers.

Extensive mining, primarily for gold, also occurred in many parts of these forests. The impact on surrounding forests as miners cleared the forests, degraded the creeks and felled timber for mining related activities would have been immense. As well as impacting on koala habitat many timber getters and miners would have shot koalas for dog meat, sport and for skins to supplement their income.

2.2 The koala population crash and aftermath

Reed and Lunney (1988) state that historical and anecdotal reports over much of the koala's range mention large numbers of sick and dying koalas. The quote Troughton (1941) in which reference is made to a drastic shrinkage of range in the years 1887-9 and 1900-03 when millions of koalas died and Le Soreuf (1923) who states; *Well known instances of this occurred in 1898-9 and in 1901-03 when millions of koalas were almost exterminated from Central Queensland to Victoria.*

No direct evidence of koalas dying at this time in the Tantawangalo/Yurammie Forests time in the appears to be available. However, the magnitude of the population crash both in the nearby Bega Valley and across eastern Australia suggests that the species in these forests probably suffered the same experience. The ecological impacts in the Yurammie/Tantawangalo forests, described above, occurred in many forests throughout Eastern Australia and were probably important causal factors of this population crash.

The following anecdotal evidence, reported directly to one of the authors of this nomination, suggests that koalas persisted in the Tantawangalo/Yurammie Forests in significant numbers after then:

1. The elderly wife of a sawmill owner in Western Yurammie (Peace Kane) said that her husband, an experienced and knowledgable forester, was well aware of koalas in that area in the 1930's and 40's and did not cut trees in the patches of forests that they used. Interestingly, she stated that her husband believed that the koalas' preferences for specific areas was driven in part by the mineral content of the soils there.

9389896. A Tantawangalo property owner (Joyce Jennings) has told of a large pack of dogs, left to roam the forests by a neighbour for many years, destroyed the koalas on her property in the 1950's. Another (Kerry Pfieffer) has said that dogs from this pack were shot over ten kilometers away near Wolumla Peak, East Yurammie. He has said that the practice of letting large numbers of dogs loose in the forests was common in the area in order to keep kangaroo numbers low.

9389976. Another (Victor Bond), who lived on the edge of the Tantawangalo Forest in the 1940's and 50's has said that there were significant numbers of koalas near where he lived during his childhood. Many other long-term Tantawangalo residents have said the same. Bond spoke of searching this forest after the 1952 and finding some dead koalas; "*With their skins burnt off them they looked like little babies*", he said.

9390056. A landholder (Jim Perry) in Millangandi (on the edge of East Yurammie) stated that his father came home in tears after desperately trying (and failing) to prevent the 1952 wildfire reaching a koala area on his family's property there.

9390136. Another long-term resident (Frank Carey) from Mt Darragh, on the western edge of the Tantawangalo Forest, was aware of koalas near to his family's property that persisted well into the 1980's.

This information is important because it supports the case that, at least until the 1950's, koala numbers in these forests were significantly higher than at present. Although the 1952 wildfire impacted on some populations, extensive areas of forest in this area escaped the fire, particularly in moist forests of West Yurammie and Mt Darragh (Frank Carey pers comm).

2.3 After 1970

West Yurammie

In a region-wide survey in 1979/1980 Braithwaite (1983) stated that koalas were repeatedly reported from this area, the only one where evidence of the species was reported by logging crews. These surveys did not extend as far as the Bermagui/Murrah Forests. Recher et al (1980), Harris Diashowa (1986), Lunney and Reed (1990) and Fanning (1990) also report koala records from West Yurammie. This evidence suggests that it was the most significant population surviving at least in the central parts of the region at this time.

Integrated harvesting commenced in western Yurammie State Forest in 1973. Over the following twenty years alternate coupe intensive logging was undertaken in most of this forest (Tanton 1995). Figure 1 is an aerial photo of the areas logged in part of this forest in 1979/1980. This is the same area that Braithwaite said that koalas were repeatedly reported. The relatively large patch of forest remaining towards the centre of this figure is predominantly *E. fastigata* old growth forest on a steep south facing slope in a cold and wet area. Because this is the dominant eucalypt species, and because of the topography and aspect, this is unlikely to be important koala habitat except, perhaps, in severe drought.

The presence of a significant population of koalas in logging areas in West Yurammie during these operations was further confirmed by a tree faller (Mervin Hanson) working in this forest in 1979. He has stated that the FCNSW marking foreman would check trees in logging coupes in this area to ensure no koala was present before it was felled. He stated that they were aware of several koalas in one coupe where, he added, *I dropped a tree with a big buck in it and it went for me. It gave me quite a fright.*

Jurskis and Potter (1997) presented information about a male koala (Simon) radio-tracked in this area in 1992/4. In Figure 6 and associated text of this publication they argued that the concentrations of the koala's activity are associated with, and

concluded that the koala preferred the logged areas. They based this in part on the claim that that logged and unlogged coupes were distributed "relatively evenly" across the range of aspect and slopes. This is not true, as is shown in Figure 2; most of the unlogged areas are on steeper slopes with less hospitable aspects.

Intensive surveys in 1996/8 located 23 active sites that were spread over the area (South East Forests Conservation Copuncil 1998).

No responses were recorded in this area in the Diashowa/SFNSW/NPWS taped calls survey in 1998.

The above information suggests that the koala population in Western Yurammie is very close to extinction.

2.4 Conclusions

1. Koala numbers in the Yurammie/Tantawangalo forests have declined significantly over this century. The habitat of the most significant known breeding aggregate recorded in the 1970's and 80's in this area (West Yurammie) was intensively logged in 1979 and now very few koalas remain there.

9390216. That those logging operations contributed to that decline and that these have made a significant contribution to the extinction process in this area, is the only reasonable conclusion to be drawn from the available, albeit fragmentary, evidence.

9390296. The radio-tracking study by SFNSW was studying the last stages of a koala population in crisis. This has never been understood or acknowledged by them.

The experience of the koala population in the Yurammie/Tantawangalo Forests has been repeated in Nagee (Jurskis and Shields 1995) and Cathcart (Allen in press), where no recent evidence of koalas remain. The habitat of the koala population in Murrah/Bermagui has also been intensively logged (South East Forests Conservation Council 1998). Larger numbers of koalas appear to remain there probably because this appears to have been a larger population than elsewhere in the region. Although not as well documented this process also appears to have occurred in Nullica and Murrambrine.

The decline and near extinction of the regional population is precisely that which would be expected given the succession of impacts it has suffered and its known vulnerability to (Lunney and Reed 1989, Hume 1989) and slow recovery from (Phillips submitted), such events.

SFNSW has refused to accept that the intensive logging that was undertaken in koala areas in the region has significantly impacted on the species and their chances of survival. Instead it has attempted to deal with the koala problem by firstly denying their existence (Forestry Commission 1988, Appendix 1 this document), then producing theories of koalas preferring regrowth (Fanning 1990, Tanton 1995) and then saying that there are large numbers of koalas in the region (Jurskis and Potter 1997).

3. IS THE YURAMMIE KOALA POPULATION DISJUNCT?

The Yurammie Forest is linked by forests to the west (the Yurangalo VCA area and the Tantawangalo Forest), the south (Gnupa and Nullica Forests) and the east (Bournda NR) and forests on private land to the south east. This section examines these areas in turn and assesses whether the Yurammie koalas may be linked to other remnant populations in these forests. Map 3 shows the location of these forests in relation to the Yurammie Forest.

3.1 Forests to the west

3.11 Yurangalo VCA

Residents commitment to forest conservation and restoration.
Surveys
No evidence of koalas

3.12 Wyndham Trig

FC surveys in 1991. Koala faecal pellets located.
SEFKRP surveys in 1997. No evidence

3.13 Boben Rd area

Young koala radio-tracked 1991
Logging operations 1992/3
SEFKRP surveys. No evidence

3.14 Central Tantawangalo

This area has been extensively studied in the past decade by SFNSW (Jerskis et al 1994) and the local conservation group, the Tantawangalo Catchment Protection Association (TCPA) (Allen 1992, Allen 1995).

The TCPA first located a female with young in this area in 1990. Transect surveys were undertaken in 1991 that yielded data on koala presence over approximately 100 ha (Allen 1991). Further surveys in 1992 located a site to the west of this area where there was evidence of intense koala activity. An unnamed species of moth that is dependant on koala faecal pellets was discovered (Martin 1994, Allen 1995) at this site.

SFNSW staff also undertook surveys for koala faecal pellets in 1991 in approximately 50 ha within the same area. They suggested that three different koalas were present in this area (Jurskis et al 1994).

In November 1991 SFNSW commenced radio-tracking a female koala in the same area. A young female koala was captured and tagged at the same time. Contact with the radio-tracked animal was lost in 1994, shortly after she was found dead, eaten by a large carnivore (Shields pers.comm.1996).

Staff and volunteers from the Research Project undertook surveys for koala faecal pellets in the same area in October and November 1996 and found four active sites,. However none of the pellets found were fresh. Searches were again undertaken in May 1997 within the same area. No koala faecal pellets were found.

No responses were recorded in this area in the Diashowa/SFNSW/NPWS taped calls survey in 1998.

3.4 Mt Darragh

Fanning (1990) was employed as a consultant by the FCNSW to report on koala distribution and habitat requirements in the region. He reported concentrations of records in West Yurammie and the Mt Darragh area. Most of the records from the latter area came from a diligent local landholder and scientist, Mr Frank Peters (Fanning 1990). In 1989 he was at the centre of the row over logging operations near to his property that he believes (Peters, per comm) destroyed the population there (Appendix 1).

No koala evidence has been found in this area since 1989. No responses were recorded in this area in the Diashowa/SFNSW/NPWS taped calls survey in 1998.

3.2 Gnupa and Nullica Forests

The forests to the south of Yurammie are the Gnupa and Nullica State Forests.

In its rejection of the nomination by the SEFCC to have the region's koala population declared endangered the Committee stated there was a "high number of records to the south" ((Check letter)).

This view needs to be reconsidered. This is because there have been xxx coupes in the Gnupa/Nullica Forests where prelogging surveys have been undertaken since 1991 when the koala survey protocols were developed. No koala evidence has been found in any of these surveys and intensive logging has proceeded in almost all these areas.

Recent research suggests there was a remnant population in South Nullica SF, which is xxx kilometers to the south of Yurammie. Three of the eight animals being radio-tracked by SFNSW came from this area. Of these a young female was found dead and contact with an adult male and female was lost. This female was "elderly", yet occupied a home range of 600ha in an area that had been subject to the first cycle of integrated harvesting (Jurskis & Shields 1996).

Koala faecal pellets were found in three locations in 1997 (South East Forest Conservation Council (1998). Almost all of the regeneration from earlier integrated harvesting operations consists of dense stands of *E.sieberi* and *A. littoralis*. Further intensive logging operations are planned. The future of this remnant population, if it survives, looks bleak.

3.3 Bournda Nature Reserve

Also private land at Old Mill Rd
SFNSW callback site

3.4 Koalas to the north

The other population known to be surviving is in the Bermagui/Murrah Forests.

The forested link along the coast between the Bermagui/Murrah and Yurammie population is approximately 50 kilometres. There are no records of koalas crossing the Princes Highway east of Yurammie SF or crossing the Snowy Mountains Highway between Tathra and Bega.

There are scattered records between these areas from before 1990, but only two since then. One koala sighting in Mimosa Rocks National Park was followed up with surveys in the area by NPWS and SFNSW staff but no further evidence was found (M.Saxon pers.comm.)

More recently staff from the SEF Koala Research Project examined the area where Kavanah (1992) recorded a koala, but no further evidence was found. KavanahÆs sighting was was on the south eastern side of Dr George Mountain (Cpt. 2102, Tanja SF). Cpt 2102 and surrounding compartments were subsequently subjected to integrated harvesting. No reference is made in the Harvesting Plans for these compartment (State Forests, 1993) of the koala sighting and no ameliorative precriptions were applied.

Other factors contributing towards the loss of suitable potential habitat corridors between the two areas (Murrah and Yurammie) include urban and rural development and associated infrastructure (eg. clearing for power lines, removal of critical remnant vegetation, including threats to remnant *E. tereticornis* forest), along with the large scale clearing required for development of major projects, such as the new horse racing facility being constructed to the north of Bournda National Park.

4. POPULATION ESTIMATES

The estimate for the remaining koalas in theYurammie area is between five and ten animals. There may be one, or possibly two breeding females.

5. THREATENING PROCESSES

5.1 Integrated Harvesting

5.11 Impacts of integrated harvesting

In the short-term following logging koalas face greater risk from predation and disruption to their foraging patterns and social systems (Saxon and Shepherd 1992). The nutrient economies of koalas are precarious and that factors affecting foraging patterns for more than a few days may have severe consequences for a population (Hume 1990). Over a longer period soil moisture (and therefore available soil nutrients) is significantly reduced and the risk of severe fire may be increased in the predominantly even aged regrowth (Saxon and Shepherd 1992).

The disturbance created during logging favors the germination of *E. sieberi* (Silvertop Ash) over other eucalypt species (Bridges 1983, Williams 1999). The proliferation of this species reflects the stated intent to develop production forests for pulp (Recher et al. 1987).

5.12 Survey and logging protocols

Key issue is whether these are effective

Martin (1992) stated that the current survey methods are essentially micro-survey techniques that have a low probability of detecting koalas living in low abundance. The search area is too small to detect individuals which have very large home ranges and which may move long distances even within one day. He also stated that the various protocols directed at conserving koalas in the Eden Management Area are of little use until they are firmly based on a knowledge of this population.

Cork (1994) has stated that similar protocols are too subjective and unquantified to be applied in areas of high importance for Koala conservation and that objective quantification should be given a very high priority. Martin (Saxon and Shepherd 1992) has expressed similar concerns. Because of ongoing concern about the effectiveness of these protocols in protecting Koalas and Koala habitat a moratorium on logging in areas identified as priority areas in the habitat map will be implemented for the life of the plan or until revised measures are agreed to be all stakeholders.

5.13 SFNSW complacency

Ever since the issue of koala management in production forests became one of significant public concern, SFNSW have displayed an unwarranted level of complacency about the status of the remnant koala population in the region and appear to be unable to face the possibility that these populations are endangered (See, for example, all EIS documents since 1990, Jurskis et al (1994) and Jerskis and Shields (1996)).

This complacency is well demonstrated by the following:

> *Whilst it is obvious that a Koala could be injured if a tree is cut down there is no proof or substantiation that logging otherwise is deleterious to Koalas, and considerable evidence to the contrary.....Koalas live in regrowth forests throughout NSW indicates that harvesting does not cause a long-term adverse impact on koala populations and distribution. (SFNSW 1995)*

The argument that the presence of the koala in regrowth forests demonstrates that harvesting does not cause long-term adverse impact is fatuous. This is because the breeding aggregates of the species have a long-term fidelity to their home range and a complex and vulnerable social system (Phillips pers. comm.). Koalas therefore may be present in a regrowth area even though the habitat is degraded and its carrying capacity reduced. They may also persist in these areas for many years even though their social system has been disrupted and their numbers declining.

It is this complacency by the organisation currently responsible for the known remnant koala populations in the region that itself is a threatening process.

5.2 Dieback

After the first cycle of integrated harvesting, the retained remnant vegetation patches are concentrated primarily along the edges of creeks and in gullies containing moist eucalypt forests (Recher et al. 1987). Intensive logging is acknowledged to initiate conditions favourable to Bellminers (*Manorina melanophrys*), a highly territorial bird species associated with eucalyptus dieback Margules and Partners, 1986; Stone, 1996). These conditions develop after the opening of the canopy and the creation of an artificial edge (filter strip) of unlogged forest (Margules and Partners 1986; Lyons

et al. 1983; Stone, 1996). Dieback is also evident in the retained trees which lack insectivorous bird species to reduce the incidence of preditory insects. In the same manner bellbird colonies prevent other insectivorous birds from controlling insects responsible for dieback.

The recommendations of State Forests consultants (Margules and Partners,1986) in relation to bellbird - associated dieback were: *the problem ... requires further investigation and monitoring, particularly in view of the importance of retained trees for wildlife management.* The recommendations were repeated in 1988 and 1989 (in supplementary EIS for Eden Management Area). Whether any monitoring or investigation occurred as a result of these recommendations is unknown.

Much of the area now contained in coastal national parks was formerly either State Forest or Crown land over which State Forests had timber concessions. As such, these areas were subject to integrated harvesting, prior to the change in tenure.

Due to the extent of dieback and the likelihood of regeneration of non-eucalypt species (in moist gullies and creek edges) large areas of remnant higher quality eucalypt habitat will continue to be lost in production forests over the next few decades.

5.3 Predation

5.4 Fire

The concentration of fuel in regrowth areas represents a serious potential fire hazard and is given a high wildfire suppression priority by SFNSW (Eden EIS, 1994). Given the extent of regrowth, the implications for the remaining koalas in the event of a wildfire could be catastrophic.

5. IMMEDIATE DANGER OF EXTINCTION

6. REFERENCES

Allen C D (1992) *Koala Habitat Survey of the Devils Ck Catchment* Unpublished submission to the Australian Heritage Commission

Allen C D (1995) *Koala research in Tantawangalo Forest from Koala Conservation in the South East Forests*: Proceedings of an expert workshop Edited by Cork S, Feary S & Mackowski C. NPWSNSW PO Box 1967 Hurstville NSW 2220

Allen, C. D. (in press). *Biodiversity conservation, koala research and local communities.* RMIT Centre for Remote Sensing and GIS report No. 38, RMIT University, Melbourne.

Bali and Delaney (1966) *A Review of Radio-collaring Research.* NPWS,NSW PO Box 1967 Hurstville NSW 2220

Braithwaite et al (1983) Studies on the arboreal marsupial fauna of eucalypt forests being harvested for woodpulp at Eden NSW. 1. Species and distribution of animals. Australian Wildlife Research 1983 10 219-229.

Bridges, R.G. (1983) *Integrated logging and regeneration in the Silvertop ash-Stringybark forests of the Eden region.* Forestry Commission of NSW, Research paper No.2.

Commonwealth (1996) *Advice for the Minister for the Environment from the Endangered Species Scientific subcommittee (ESSS) on public nominations to Schedule 1 of the Endangered Species Protection Act (1992).* Department of Environment, Sport and Territories, Commonwealth Government, ACT Australia.

Commonwealth of Australia (1997) Proceedings from Heritage Workshops

Cork, S J (1994) *Koala Conservation in the South East Forests.* NPWSNSW PO Box 1967 Hurstville NSW 2220

Cork S, Feary S & Mackowski C. (1995) *Koala Conservation in the South East Forests: Proceedings of an expert workshop.* NPWSNSW PO Box 1967 Hurstville NSW 2220

DUAP (1996) *Environmental Impact Assessment for Eden.* Department of Urban Affairs and Planning, Sydney 2000

Fanning, D. (1990).*Koalas in the South East Forests*. Gunninah Consultants, Sydney, NSW.

Forestry Commission NSW (1988). *Forestry Operations in the Eden Management Area Environmental Impact Statement Oct 1988.* State Forests NSW, Pennant Hills, Sydney.

Harris Diashowa (Australia) Pty Ltd (1986). *Final Environmental Impact Statement for the Eden (NSW) export woodchipping operation for the period 1989-2009.* Margules & Partners Pty Ltd. Harris Diashowa (Australia) Pty Ltd Eden NSW 2551.

Harvesting Plans SFNSW, Narooma District, Cpts 2102, 2180, 2181, 2046, 2047, 2048, 2049, 2061, 2062, 2063, 2064, 93.

Hume (1990) in Koala Summit: *Managing Koalas in NSW*. ed. Lunney, D. Urquart, C.A. and Reed, P.C. National Parks and Wildlife Service PO Box 1967 Hurstville NSW 2220.

Jurskis V, Rowell D, and Ridley D (1994*). Survey Techniques and Aspects of the Ecology of the Koala near Eden.* Research Division SFNSW PO Box 2119 Beecroft NSW 2119

Jurskis V and Shields J (1996) *Koalas in Southeast NSW: Habitat Assessment and Management Across a Diverse Landscape.* Research Division SFNSW PO Box 2119 Beecroft NSW 2119

Jurskis and Potter (1997)

Lunney, D., Esson, C., Moon, C. and Ellis, M. (1997). A community-based survey of the Koala Phascolarctos cinerus in the Eden region of SENSW. *Aust. Wildl. Res*. 1997 **24.** 111-128.

Lunney, D. and Leary, T. (1988). The impact on native mammals of land-use changes and exotic species in the Bega district NSW, since settlement. *Australian Journal of Ecology* 1988 **13** 67-92.

Lunney, D. and Reed, P. C. (1990). Habitat loss: the key problem for the long-term survival of Koalas in NSW. Koala Summit: *Managing Koalas in NSW*. ed. Lunney, D. Urquart, C.A. and Reed, P.C. National Parks and Wildlife Service PO Box 1967 Hurstville NSW 2220.

Lunney, D.. Urquart, C. A. and Reed, P. C. (1990) *Koala Summit: Managing Koalas in NSW*. National Parks and Wildlife Service PO Box 1967 Hurstville NSW 2220.

Lunney,D., Esson, C., Moon, C., Ellis, M. & Mathews, A. 1997. *A community-based survey of the koala, Phascolarctos cinereus, in the Eden region of south-eastern New South Wales.* Wildlife Research 24: 111-128.

Lyon, R.H., Runnalls, R.G., Forward, G.Y. and Tyers, J. *Territorial Bell Miners and Other Birds Affecting Populations of Insect Prey.* Forests Commission, Mountain Forest Research Station, Sherbrooke Victoria, 3789. Zoology Department, Monash University, Clayton Victoria 3168.

Margules and Partners Pty Ltd. 1986. *Draft EIS for the Eden (NSW)* Export Woodchip Operation 1989 - 2009

Martin R W and Handasyde K A (1991). Statement on remnant koala populations of SENSW. *In Allen C D (1992) Koala Habitat Survey of the Devils Ck Catchment* Unpublished submission to the Australian Heritage Commission

Martin R W (1992) Koalas in Tantawangalo State Forest. Unpublished report the NPWS Hurstville NSW 2220

Martin R W (1993) The Remnant Koala Population in the Cathcart State Forest: South East Forests Conservation Council v. Director of National Parks and Wildlife Service and Forestry Commission NSW. *Statement prepared for Land and Environment Court regarding the proposed logging of Compartment 1381, Cathcart Special Prescription Area*

Norton T W (1993). Can the Koala survive current NSW government policy? Paper presented at *Australian Koala Foundation conference Sydney* June 1993. AKF GPO Box 9899 Brisbane 4001

Platts L (1989). *Bygone Days of Cathcart*. Pirie Printers Sales P.L. Fishwick AC

Phillips (2000)

Possingham H P (1992) South East Forests Conservation Council v. Director of

National Parks and Wildlife Service and Forestry Commission NSW. *Statement prepared for Land and Environment Court regarding the proposed logging of Compartment 1381, Cathcart Special Prescription Area*

Recher, H.F., Shields, J., Kavanagh, R., and Webb, G. Retaining Remnant Mature Forest for the Nature Conservation at Eden, New South Wales: *A Review of Theory and Practice. Nature Conservation: The role of Remnant Vegetation.* Surrey Beatty and Sons Pty Ltd in association with CSIRO and CALM, 1987.

Phillips, S., (submitted) *Does size really matter?* Australian Koala Foundation GPO Box 9899 Brisbane 4001.

Reed, P. C. and Lunney, D. (1989). Habitat loss; the key problem for the survival of Koalas in NSW In *Koala Summit* pp 9-31 ed By D. Lunney. C.A. Urquhart and P. Reed. NSW National Parks and Wildlife Service, Hurstville, Sydney 2220

South East Forests Conservation Council (1998) Final Report of the South East Forests Koala Research Project. SEFCC PO Box 797 Bega 2550

South Gippsland Development League (1972) The Land of the Lyrebird.

State Forests NSW (1995) *Response to EIS Submissions for the Eden Management Area*. Unpublished document. State Forests NSW, Pennant Hills, Sydney

State Forests NSW, Narooma District Harvesting Plans, Cpt 2102 (1993), Cpts. 2180,2181 (1994) Cpts. 2047, 2049 (1995) Cpt 93 (1997)

State Forests NSW (1995) *Proposed Operations in the Eden Management Area: Environmental Impact statement.* State Forests NSW, Pennant Hills, Sydney

State Forests NSW (1995) Response to EIS Submissions for the Eden Management Area. Unpublished document. State Forests NSW, Pennant Hills, Sydney

Stone, C., (1996) Australian Journal of Ecology. The role of psyllids (*Hemiptera:Psyllidae*) and bell miners (*Manorina melanophrys*) in canopy dieback of Sydney blue gum (Eucalyptus saligna Sm.). Research Division, State Forests of New South Wales, PO Box 100, Beecroft, NSW 2119.

Tanton, M. (1995). *Proposed Operations in the Eden Management Area: Environmental Impact statement 1994*. State Forests NSW, Pennant Hills, Sydney. Saxon M and Shepherd T (1992) An Assessment of the Significance of Current and proposed Harvesting in Tantawangalo State Forest on Endangered Fauna. Unpublished Report NPWS Hurstville NSW 2220.

Williams (1999)

Also maybe include the following somewhere

These remnants have extremely high conservation value because of their geographic location (Lunney and Reed 1989, Tantawangalo Catchment Protection Association 1990), distinct genetic profile (Martin and Handasyde 1991, Allen 1992, Martin 1992, Saxon and Shepherd 1992, Possingham 1993 and Norton 1993), and probably relatively high level of individual genetic diversity (Martin 1992, Possingham 1993 and Emmins 1995).

Another study where eight animals were radio-tracked by State Forests NSW (SFNSW) experienced a 50% death rate.

Martin and Handasyde (1991) Martin (1992) Possingham (1993) and Norton (1993) all suggested that the regional population is probably genetically distinct. Emmins (1994) undertook genetic analysis from a small number of Koalas from the region; the Genetic Similarity Coefficients suggest that they are genetically distinct from both the Victorian and Gold Coast Koalas.

Others may be scattered throughout the region but it is highly unlikely that a population the size of that in the Murrah would have escaped detection given the level of public interest and the amount of fauna research and surveys that have been undertaken in the region.

1.9 NPWS Wildlife Atlas

Examination of the koala sightings recorded in the NPWS Wildlife Atlas also indicates that, since the increased public awareness in the issue of koala conservation in 1991, koala numbers appear to have declined dramatically: