A COMMUNITY-BASED SURVEY OF THE KOALA PHASCOLARCTOS CINEREUS IN THE LISMORE REGION OF NORTH-EASTERN NEW SOUTH WALES

JAMIE M. HARRIS AND ROSS L. GOLDINGAY


A community-based survey was undertaken in the Lismore Local Government Area (LGA) of north-eastern New South Wales to provide a basis for the development of a Shire-wide koala management plan. A questionnaire and maps were distributed to identify community attitudes towards P. cinereus conservation and management, as well as to document locations of sightings. There were 1121 surveys returned from 23,751 distributed (4.7% returned) across 18,000 ratepayers (6.2% response). Respondents indicated the frequency with which P. cinereus were seen in different suburbs, whether they had young or were sick, and provided 840 map-based records. Ten percent of respondents saw P. cinereus on at least a weekly basis, highlighting the importance of this LGA for the conservation of this species. More than 80% of respondents considered that roving dogs, land clearing, road traffic and housing development were serious threats to long-term P. cinereus survival. More than 90% of respondents supported restrictions on dogs, tree-planting programs, as well as planning activities to protect P. cinereus habitat while 85% approved of protection zones to control development within P. cinereus habitat. These results if representative of the entire community suggest strong support for the development of conservation options for P. cinereus. The study also confirms the usefulness of conducting such community-wide surveys for conspicuous threatened species.

Key words: community-based survey, koala, Phascolarctos, Lismore, conservation.

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THE koala (Phascolarctos cinereus) is classified as ‘Vulnerable’ in New South Wales (NSW) under the Threatened Species Conservation Act 1995 and has become the focus of a national conservation strategy (ANZECC 1998). Within the Lismore region of north-eastern NSW, the status of P. cinereus has been a matter of public concern and interest since the 1950s (Gall 1980). However, there is a lack of basic ecological information on regional P. cinereus distribution and conservation status, as well as limited local resources and policy direction for conservation purposes, which have hindered local authorities and the community in developing plans to ensure the survival of the species within the region.

With the introduction of the NSW State Environmental Planning Policy (SEPP) No. 44 – Koala Habitat Protection in 1995, local authorities and the community have been provided with a policy framework for koala planning and management. SEPP 44 guides and focuses the efforts of local government in its responsibilities under the Environmental Planning and Assessment Act 1979 and promotes the preparation of a ‘Comprehensive Koala Plan of Management’ (hereafter ‘a plan’) at the Shire-wide level. The NSW Department of Urban Affairs and Planning (now NSW Planning) has circulated guidelines to local councils in relation to the preparation of these plans and recommends a procedure that involves both community-based survey and site survey (habitat mapping) (DUAP 1995).

The first community-based survey for P. cinereus was undertaken within NSW in 1949 (Fauna Protection Panel 1949; cited in Reed et al. 1990). The study received 109 reports and concluded that the greatest density of P. cinereus in NSW was on the north coast as 26 reports came from localities north of the Clarence River. Colonies were also identified in the Central Tablelands, Newcastle, greater Sydney region, South Coast, and Southern Tablelands.
In 1967, the NSW National Parks and Wildlife Service (NPWS) distributed a survey to every government school in the state. Unfortunately, part of the raw data from this survey was lost, and consequently no *P. cinereus* records from this time could be found that related to the north coast area (see Reed et al. 1990).

A survey conducted in 1975 (Gall and Rohan-Jones 1978) was co-ordinated by the NPWS and the Forestry Commission (now State Forests) of NSW and forwarded to agency staff to determine *P. cinereus* distribution, principally within Crown reserves. Reports of 353 sightings were received between 1 January 1970 and 1 March 1976 (Gall and Rohan-Jones 1978). Due to the small number of National Parks (NPs), Nature Reserves (NRs) or State Forests (SFs) within the Lismore Shire at that time, no detailed *P. cinereus* records were made during the 1975 study. Tucki Tucki NR in Lismore Shire was reported as featuring ‘regular sightings’.

A 1987-1988 national koala survey (Phillips 1990) was the most comprehensive attempt up to that time, to make an informed assessment of the conservation status of the species on a national basis. The NSW component of this survey (reported by Reed et al. 1990), concluded that *P. cinereus* occurred mainly on the north coast of NSW with Lismore, Coffs Harbour, Port Macquarie and Port Stephens responsible for a large number of records. Koalas were uncommon or rare in the majority of localities throughout the state. Only 24% of sightings obtained by the NSW survey were in NPs, NRs or SFs. The majority of sightings were on private rural lands, suggesting that the remaining habitat areas may be focussed on private landholdings.

More recently, community-based surveys have been conducted at Barrenjoey Peninsula (Smith and Smith 1990), Iluka (Lunney et al. 1996), Gunnedah (Smith 1992), Port Stephens (Callaghan et al. 1994; Leathley et al. 1995; O’Connor and Leathley 1996; Lunney et al. 1998), Eden (Lunney et al. 1997), Campbelltown (Ward and Close 1998), Coffs Harbour (Lunney et al. 1999; Lunney et al. 2000), and in the Hawkesbury River area (Yengo National Park) (Curtin et al. 2002).

The aim of this study was to conduct a community-based koala survey in the Lismore Local Government Area (LGA) to collate community information that could ultimately be used in preparing a Comprehensive Koala Plan of Management.

**METHODS**

**Study area**

Lismore is located on the Wilsons River within the Richmond River Catchment in north-eastern NSW (Fig. 1). The Lismore Local Government Area (LGA) has a population of approximately 43,551 people (18,000 ratepayers) (ABS 1998), and an area of 126,700 ha. The Whian Whian and Bungabbee SFs are contained within the LGA and comprise 3,377.3 ha, or 3% of the LGA. The area of NPs and NRs is 8,974.4 ha (7%) and includes Nightcap NP, Wilson NR, Tucki Tucki NR, Tuckean NR, Boatharbour NR and Bungabbee NR. The area of other land (mostly freehold but including some crown land) is 114,388 ha (90%).

**Survey format**

A survey questionnaire was devised based on the format used by Lunney et al. (1999). Householders were sent 16 questions (see Appendix 1) and three maps at different scales to mark the geographical location of sightings. Once completed, the survey could be folded together to form an envelope, where a return address and freepost was provided.

**Printing, distribution and collection**

The survey was inserted in the *Northern Rivers Echo*, a free home-delivered urban-area weekly newspaper at a cost of $45 per 1000 (4.5c per item). With a weekly print run of 18,300 copies, the cost was $810. Rural areas received coverage by either direct residential delivery or by providing copies of the survey for counter collection at rural Post Offices and general stores. The printing cost for 25,000 copies of the survey, and folding of 6000 to a DL (standard letter) size and 19,000 to A4-size was $2430. Delivery of the survey to a rural residence was 9c and with 4331 addresses, the cost was $390. Delivery of surveys to rural stores and Post Offices was $107 for 1120 copies, and provision of the freepost was $446 (for 949 returns at 47c each). The total cost of printing, distribution and collection was thus $4183. Delivery of the survey to a rural residence was 9c and with 4331 addresses, the cost was $390. Delivery of surveys to rural stores and Post Offices was $107 for 1120 copies, and provision of the freepost was $446 (for 949 returns at 47c each). The total cost of printing, distribution and collection was thus $4183. The residents were given 29 days to complete the survey (from 9 March to 8 April 1999). The survey could be returned to one of 15 collection boxes distributed to rural stores and Post Offices throughout the LGA, or by using the freepost option.

**Media promotion**

A media release was issued on 10 March 1999 to promote the survey. Media coverage was received from a number of local newspapers, NBN-TV news, and ABC regional radio news.
Collation and analysis

The questionnaire results were collated by area within the LGA. Answers for Q3 were categorised as either ‘<1 year’, ‘1-5 years’, ‘6-10 years’ or ‘>10 years’. Non-categorical data for historical records (Q11), other threats (Q12), other conservation options (Q13), and further comments (Q14) were included within a larger report forwarded to Lismore City Council (hereafter ‘the Council’), but for brevity are not reproduced in full here.

Use of Map Info Professional, a geographic information system (GIS) allowed the geographical information collected by the survey to be expressed and analysed in a map-based form. The location of each record drawn by the respondent on the maps was taken as the centre point(s) if the location of the _P. cinereus_ sighting was drawn as an area.

Analysis was conducted on information provided by all respondents and for suburbs with at least 10 respondents. The suburbs with less than 10 respondents were pooled and listed as ‘other areas’ in tables. The ‘other areas’ were Alphadale, Alstonville, Ballina, Bentley, Bishops Creek, Blakebrook, Blue Knob, Boatharbour, Boorrie Creek, Brunswick, Chilcotts Grass, City Acres, Coraki, Corndale, Dorrroughby, Dungarubba, Eltham, Eureka, Federal, Fernside, Georgica, Girards Hill, Goolmangar, Goonengerry, Horshow Creek, Keerong, Koonorigan, Leeville, Leycester, Lillian Rock, Lindendale, Marom Creek, McKees Hill, Monaltrie, Mountain Top, North Lismore, Repentence Creek, Rock Valley, Ruthven, South Woodburn, Spring Grove, Strikers Siding, Stoney Chute, Tanalawn, Tatham, Terania Creek, Tucki, Tuckurimba, Tullera, Tuncerester, Tuntable Creek, Uralba, Wadeville, Whian Whian and Wongavale. The low response from these localities may be due to the low human population in these areas, but nevertheless these areas may contain koala populations worthy of consideration for regional management plans.

RESULTS

Answers to survey questions

From 23,751 surveys distributed, a total of 1121 (4.7%) were returned by 8 April 1999. Of these, 958 forms (85%) were returned by post, and 163 (15%) were returned via the collection boxes. Householders were first asked to consider the ‘importance’ of _P. cinereus_ in the Lismore area. The future local conservation of the species was ranked ‘very important’ by 906 respondents (80%), ‘important’ by 176 respondents (16%), and ‘not important’ by 39 respondents (4%).

Respondents were spread widely through the LGA, though the greatest number resided in the City or Goonellabah (Table 1). Eleven percent of respondents had lived in their suburb for <1 year, 30% for 1-5 years, 21% for 6-10 years, and 39% for >10 years. Fifty-four percent of respondents had seen a _P. cinereus_ at least once in their residential area, while 46% had never seen one in their area (Table 1). Some respondents saw koalas on a daily basis while 10% of respondents saw them on at least a weekly basis. Most respondents (55%) ‘didn’t know’ whether the _P. cinereus_ population had ‘increased’, ‘decreased’ or ‘stayed the same’, though 22% believed it had decreased (Table 2). Details of sightings outside a respondent’s suburban area were also sought. Of 694 responses, the most commonly reported localities were Goonellabah (268 respondents), Tucki (108), East Lismore (108), Wyrrallah (50), and Tregeagle (23).

A total of 157 respondents had observed a sick _P. cinereus_ in their area (Table 3), which is 26% of the 606 respondents who had seen a _P. cinereus_. In the Goonellabah area, one-third of the 203 respondents who had seen a _P. cinereus_ had seen a sick individual. A total of 257 respondents had seen koalas with young (Table 3). This represents 42% of respondents who had seen a _P. cinereus_. There were 211 respondents reporting deaths, with road traffic (137 reports) and dogs (66) representing the majority of cases of mortality (Table 3). There were 51 reports where the cause was listed as ‘other’, and 18 of these deaths had causes which were not specified. The other causes specified by respondents included ‘sickness or disease’ (10), ‘old age or natural causes’ (8), ‘fell out of tree’ (4), ‘logging’ (3), ‘people’ (2), ‘shooting’ (2), ‘poison’ (1), ‘stress’ (1) and ‘ticks’ (1). Numerous survey forms had multiple boxes ticked for ‘cause of death’, or respondents indicated such in writing. These were treated as multiple records.
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<th>Weekly</th>
<th>Monthly</th>
<th>Quarterly</th>
<th>Yearly</th>
<th>Occasionally</th>
<th>Once only</th>
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<th>Total</th>
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<td>12 (75)</td>
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<td>46 (4.1)</td>
<td>33</td>
<td>241 (21.5)</td>
<td>105 (9.4)</td>
<td>515 (45.9)</td>
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Table 1. Frequency with which respondents see *P. cinereus* in different areas. Values are the number (and percentage) of respondents. The total for 'Other areas' was calculated from the combined tallies for suburbs with less than 10 respondents.

<table>
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<th>The same</th>
<th>Decreased</th>
<th>Don’t know</th>
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<td>78 (7)</td>
<td>184 (16)</td>
<td>246 (22)</td>
<td>613 (55)</td>
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</table>

Table 2. The number of respondents, by area, who indicated the number of *P. cinereus* in their area had ‘increased’, ‘stayed the same’, ‘decreased’, or ‘don’t know’. Values are the number of respondents (and percentage).
A total of 38 respondents provided historic records relating to the period 1949 - 1998. This included details on the establishment and improvement of ‘Tucki Park’ in the 1960s and several Northern Star newspaper articles from the 1970s. There were also reports of a big hailstorm in 1979 that apparently killed large numbers of *P. cinereus*. Additionally, there were reports of *P. cinereus* seen in the Central Business District, urban residential areas, and on private rural lands during this period.

When questioned about potential serious threats to the survival of *P. cinereus* in Lismore, a majority of respondents indicated ‘yes’ to roving dogs (92% of respondents), land clearing (86%), roads/traffic (83%), housing development (82%), feral predators (e.g., foxes or cats) (77%), and bushfires (57%). Seventy-one percent disagreed that swimming pools were a serious threat.

Respondents clearly supported many listed conservation options: restrictions on dogs (support by 93% of respondents), tree planting (93%), planning and protection (91%), environmental protection zones (85%), traffic restrictions (76%), and using ‘public money to buy land for koala reserves’ (61%). The majority of respondents supported all listed conservation options, and 192 people made ‘other’ suggestions. These included: tourist ventures; establishing additional protected areas; including school children and community service organisations in the management process; and providing incentives for *P. cinereus* habitat protection on private lands.

A total of 420 respondents provided comments on various issues and concerns such as the impact of dogs in specific locations, or the likely impact of proposed residential developments on *P. cinereus*. Several comments indicate opposition to *P. cinereus* conservation, and three respondents were strongly opposed to restrictions on tree removal. A total of 121 respondents would participate in a volunteer program to help *P. cinereus*, with the majority preferring to raise seedlings or plant trees. Some people indicated that they preferred to collect seed (33 people), help with administrative duties (14 people), fund-raising (8 people), and property assessments (9 people). Seven respondents indicated that they had land available for potential *P. cinereus* corridors, if appropriate, but required material or technical assistance.

**Map-based responses**

A total of 808 map locations of live *P. cinereus* sightings was obtained, with most occurring to the south-east of the Lismore urban area (Fig. 2). Of 808 live records, 425 records (53%) occurred within 50 m of a road, and 583 (72%) occurred within 100 m of a road. Only 28 live records (3%) were located within areas dedicated specifically as habitat protection (i.e., NPs and NRs). Most sightings occurred on freehold or leasehold land adjoining roads.
Fig. 2. Location of *P. cinereus* sightings within the Lismore Local Government Area.
Soil type | Hectares (% of Shire) | Number of records (%) |
--- | --- | --- |
Not stated (urban areas) | 2,477 (1.9) | 224 (26.6) |
Alluvial kraznozems | 4,461 (3.5) | 6 (0.7) |
Mildly leached chocolate lithosols | 33,115 (25.8) | 253 (30.1) |
Drainable black clayey alluvials | 13,737 (10.7) | 30 (3.8) |
Krasnozems | 29,284 (22.8) | 218 (30.0) |
Red and yellow podzolics | 20,952 (16.3) | 60 (7.1) |
Wet dark clayey alluvials | 11,658 (9.1) | 32 (3.8) |
Brown alluvials | 7,799 (6.1) | 2 (0.2) |
Dark loamy alluvials overlying clays, peats and sands | 9,15 (0.7) | 1 (0.1) |
Disturbed soils | 69 (0.1) | 7 (0.8) |
Podzols | 593 (0.5) | 2 (0.2) |
Red earths | 89 (0.1) | 0 |
Siliceous sands | 556 (0.4) | 0 |
Total | 12,891 | 840 |

Table 4. *Phascolarctos cinereus* sightings and soil abundance (ha) for each type.

Only 32 specific mortality locations were obtained, yet 211 respondents reported that they had seen a dead *P. cinereus*. Of these map-based responses, 25 (78%) occurred on roads or in the immediate vicinity. ‘Blackspots’ for road-based *P. cinereus* mortality records in the LGA were located on Ballina Road, Cynthia Wilson Drive, Oliver Avenue roundabout, Rous Road to Tregeagle, Bruxner Highway near Olley Drive and Winchester Street.

The number of *P. cinereus* sightings was compared to the abundance of soil types in the Shire (Table 4). A contingency table analysis was performed for 10 soil types by pooling one set of four soils which each covered less than 1,000 ha of the Shire. This revealed that the number of *P. cinereus* sightings was dependent on soil type ($\chi^2 = 2651.3, P = 0.0001, d.f. = 9$). There were more records than expected on soils occurring in the urban area (17.5 expected), less than expected on drainable black clayey alluvials (89.1), red and yellow podzolics (136.0), wet dark clayey alluvials (75.7), and brown alluvials (50.5). The number was approximately as expected for mildly leached chocolate soils (216.0), krasnozems (191.0) and others (4.5).

**DISCUSSION**

**The survey**

The survey produced 1,121 completed forms. Records of *P. cinereus* on both public and private lands across the Lismore LGA were obtained. However, the return rate of 4.7% of available questionnaires (6.2% of ratepayers) is relatively low compared to similar studies in other areas. A 20.2% return rate (from 141 responses) was obtained for Iluka, 18.0% (2,995 returns) for Port Stephens, 16.8% (139 returns) for Yengo, 10.8% (2,018 returns) for Coffs Harbour, 10.3% (1,198 returns) for Eden, and 3.2% (445 returns) for Barrenjoey, while a return rate of 6.1% was obtained for a survey distributed throughout NSW (2,564 returns). The relatively low response rate in Lismore may indicate some apathy toward *P. cinereus* conservation or that media promotion of the survey was inadequate. Alternatively, it may reflect an absence of this species in parts of the study area. Surveys such as this may be more likely to elicit a response if people have seen koalas.

Sightings of *P. cinereus* were clumped in areas of highest human population or visitation. There was a high percentage of sightings near the urban areas and near roads. Of the total returns, 17% were from residents in the City, and another 25% from residents in Goonellabah. These locations are the primary urban population centres of the Lismore LGA, and hence may provide a bias if drawing conclusions for the whole LGA. Future surveys could determine whether the high frequency of sightings near Lismore City is a function of the larger number of observers or reflects a denser *P. cinereus* population. Despite the shortcomings, this type of survey provides invaluable information on species such as *P. cinereus* that could not be readily surveyed so comprehensively in such a short period or so economically. The large number of long-term residents (60% at > 6 years) responding to this survey indicates the high number of person years of observation and experience integrated in this report. Long-term residents can provide historic records and longer residency provides more experience with aspects of *P. cinereus* ecology.
Koala sightings

A total of 77% of respondents saw koalas ‘occasionally’, ‘once only’ or ‘never’ in their suburb, suggesting that this species is seen infrequently across the study area. However, in some areas such as the City and Goonellabah, many people saw P. cinereus at least weekly, suggesting that these areas have resident animals and contain prime habitat. Monthly or more frequent sightings made in other areas suggest the presence of resident populations. Overall, approximately 10% of respondents saw P. cinereus at least once a week. This compares to 2% of respondents in the Coffs Harbour LGA (Lunney et al. 1990) and suggests that the Lismore LGA does contain important P. cinereus populations. Indeed, koalas with young were seen in most areas with the greatest numbers seen in the City and Goonellabah. Specific areas where breeding females are seen regularly should be monitored and targeted for habitat protection and management.

From the 606 respondents who saw a koala, 26% observed a sick individual. The most well-known sickness in free-ranging P. cinereus is associated with the organism Chlamydia. The various problems caused by the bacterium (e.g., urinary tract disease (‘dirty-tail’ or ‘wet-bottom’) and keratoconjunctivitis (‘pink-eye’)) have been given much attention (e.g., Reed et al. 1990; Glassick 1990; Phillips et al. 2000; Ward 2002). Differing soil landscapes and other variables of the soil, such as nutrient availability, are considered to influence the suitability and palatability of several tree species. It is thought that habitat on nutrient rich soils, along drainage lines and coastal flats, is favoured by P. cinereus. However, most of the forests on high fertility soils have been deliberately cleared for agricultural, pastoral and, more recently, urban purposes (Reed et al. 1990; Lunney and Matthews 1997). Our assessment of the influence of soil type on the number of P. cinereus records showed that undesigned urban soils accounted for a far greater proportion of records than their availability expected from their total area. It is likely that this reflects the large human population in the small urban areas. Chocolate and krasnozem soils occupy approximately 52% of the Shire. Slightly more records occurred on these soils, accounting for 60% of all records. This at the least suggests that these soils are associated with areas of important P. cinereus habitat.

The majority of P. cinereus sightings (Fig. 2) was on freehold or leasehold land, indicating considerable stands of food trees and travel corridors across these land tenures. P. cinereus were seen more frequently on these lands in the LGA than within NPs or NRs. This may reflect an observer bias because more survey effort is spent by respondents on their own properties compared to on public land. However, this finding is consistent with that of Reed et al. (1990) and those of extensive arboreal mammal surveys conducted in north-eastern NSW (Kavanagh et al. 1995; Catling et al. 1997). Thus, the public reserve system alone appears inadequate for effective P. cinereus conservation. This is especially true in the Lismore LGA, as most reserves are dominated by sub-tropical rainforest which does not provide optimal P. cinereus habitat. Accordingly, local government will be required to recognise the importance and urgency of pro-active planning for the conservation of P. cinereus.

Community concern for koala conservation

More than 80% of respondents considered that the future conservation of P. cinereus in the Lismore area was ‘very important’. The importance placed by the respondents on P. cinereus conservation is probably a result of interest in this species and a perception that they have both cultural and ecological value. The attitude of some respondents that P. cinereus conservation is ‘not important’ or ‘important’ again indicates that not all residents perceive P. cinereus conservation as a priority, and
that certain planning and habitat protection issues are contentious among parts of the community. Despite this, more than 1000 respondents were in support of planning to protect *P. cinereus* habitats.

Most respondents did not know the status of the local *P. cinereus* population, though 246 respondents concluded that the population had decreased in their area while 78 suggested that the population size had increased. *P. cinereus* population sizes are dynamic and will differ from area to area within a region (Lunney et al. 1998). Thus it is important that local trends are monitored and mechanisms to quantify these, such as ongoing community observation, are included in the management process.

Roving dogs, land clearing, road traffic and housing development were all viewed by respondents as serious threats to the survival of *P. cinereus* in Lismore. Land clearing and the resulting habitat degradation is the most crucial factor affecting the survival of populations, and therefore the conservation of suitable habitat is the key problem for the species’ long-term persistence (Hume 1990; Pahl et al. 1990; Reed and Lunney 1990; ANZECC 1998). However, land clearing is piecemeal and incremental, and the impact on *P. cinereus* is probably not fully appreciated by the general public. ‘Roving dogs’ and ‘road traffic’ are more likely to be identified by the public in surveys such as this one as these factors are observed or reported more frequently in the media. For example, prior to this survey, a front-page article appeared in the *Northern Rivers Echo* (10 September 1998) reporting that dogs and cars were responsible for nearly all of the 42 *P. cinereus* that have been rescued, only to die, in Lismore in the past year. The impact of land clearing and housing development on local *P. cinereus* populations has not received equal media attention.

**Conservation options**

All the conservation options listed in the questionnaire were strongly supported by respondents. However, given the low response, it is not known how indicative this is of the broader community. The greatest support in relation to conservation options was for restrictions on dogs, tree-planting programs, and planning to protect *P. cinereus* habitat. To achieve effective dog control, the community should be continually made aware of the impacts of dogs on *P. cinereus*, the requirements of the law and the penalties for breaches of the *Companion Animals Act* 1998 (*CA Act*). Council officers should also conduct regular patrols, including night patrols, in areas where attacks have been reported or where dogs may roam in the vicinity of *P. cinereus* habitat, and enforce the provisions of the *CA Act*. Some educational and media material has been distributed by the Council, but this distribution must be conducted annually. We suggest that this could be done in association with the annual figures for the ‘rescued’ *P. cinereus* and in conjunction with dog registration renewals.

Tree-planting programs near areas containing resident *P. cinereus* would reduce browsing pressure on the available food resource, and enable koalas to move more easily within and between habitat areas. *P. cinereus* habitat protection, rehabilitation and management will require planning authorities to implement the strategies recommended by SEPP 44 (i.e., tree preservation orders, voluntary conservation agreements, development control plans, and gazettal of environmental protection zones under local and regional environment plans). A total of 121 people were prepared to volunteer for a conservation program to help *P. cinereus*. The Council should therefore formulate programs to utilise such volunteer participation.

**Conclusions**

The results of this survey confirm the importance of the Lismore LGA for *P. cinereus* conservation and suggest support within the community for the development of conservation options for this species, despite the problem of extrapolating from 1,121 replies to 18,000 ratepayers. We suggest that the Council use the records presented here together with habitat mapping to prepare a Shire-wide plan. The records should enable some targeting of management effort (i.e., where planning protection zones may need to be applied). Questions could be added to future surveys to determine the influence of observer bias and whether respondents are on rural land. This would enable the nature of the responses from people that will be affected by changes such as zoning reclassification or tree preservation orders to be determined. Surveys are also needed in the protected areas to determine whether the low frequencies of sightings there represent the converse of the situation on other land tenures.

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**REFERENCES**


APPENDIX 1

Lismore City Council Koala Survey

Survey Instructions: Please tick appropriate box or give details as requested.

Mailing Instructions: Please fold as indicated, seal the edges with tape and post back to the above address (not given here) or drop into specially marked boxes in coffee shops and rural stores. No postage is required. Please return this questionnaire by Monday, March 29, 1999. If your do not have enough space for your valued comments, please enclose additional pages or send a separate submission to Lismore City Council at the above address. If you require any further information regarding this survey, please do not hesitate to contact the Council.

1. How important do you consider the future conservation of the koala?
   - Very Important
   - Important
   - Not important

2. In what area of the Lismore Local Government Area do you live?
   - Bexhill
   - City
   - Clunes
   - Dunoon
   - Goonellabah (East)
   - Goonellabah
   - Goonellabah (West)
   - Gundurimba
   - McLeans Ridges
   - Nimbin
   - South Woodburn
   - Tregeagle
   - Tucki
   - Wyrallah
   - Other (Please Specify)

3. How long have you lived in this location? __________________

4. How often do you see koalas in your area?
   - Daily
   - Weekly
   - Monthly
   - Quarterly
   - Yearly
   - Occasionally
   - Once Only
   - Never

5. Have you seen koalas in another area of Lismore? Yes / No
   If yes, which area? _____________________________________________________________

6. In your knowledge and observation, over the time you have lived in your area has the number of koalas:
   - Increased
   - Stayed the same
   - Decreased
   - Don’t know

7. Have you ever noticed sick koalas in your area? Yes / No
8. Have you seen koalas with young in your area? Yes / No
9. Have you ever seen any dead koalas in the Lismore Local Government Area? Yes / No
   In your observation was the death caused by:
   - Dogs
   - Road traffic
   - Other (please specify) _______________________________

10. Could you mark the location and dates of all your koala sightings within the maps.

11. Do you have any old records or historical information on koalas in the Local Government Area?
    Can you please give details.
12. In your opinion, are any of the following serious threats to the long-term survival of koalas in Lismore?

   (1) Roads/Traffic  Yes / No
   (2) Housing Development  Yes / No
   (3) Swimming Pools  Yes / No
   (4) Roving Dogs  Yes / No
   (5) Land Clearing  Yes / No
   (6) Feral Predators (e.g. foxes or cats)  Yes / No
   (7) Bushfires  Yes / No
   (8) Don’t Know  Yes / No
   (9) Other (Please Specify) _________________________________________________

13. Options for conserving koalas in Lismore include some restriction or other costs. Would you support any of the following to help conserve koalas in Lismore?

   (1) Traffic Restriction (e.g. speed limits at night in areas with koalas)  Yes / No
   (2) Restrictions on dogs (e.g. stop dogs roving at night)  Yes / No
   (3) Planning to protect koala habitats  Yes / No
   (4) Tree-planting programs (to increase koalas’ food supply)  Yes / No
   (5) Environmental Protection Zones (to control development in koalas areas)  Yes / No
   (6) Use public money (from rates or taxes) to buy land for koala reserves  Yes / No
   (7) Other suggestions (please specify) _________________________________________

14. Do you have any additional comments? ___________________________________________

15. May we contact you for more details of you koala or other animal sightings? Yes / No

16. Would you be prepared to volunteer and participate in a program to help koalas by collecting seeds, raising seedlings, planting trees, assisting Friends of the Koala (carers) or with administrative duties, fund raising, grant applications or property assessments. Please indicate the type of work preferred

   ____________________________________________________________

NAME ___________________ ADDRESS ________________________PHONE _______