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**Clem Tisdell[*] and Clevo Wilson[†]**

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[*] School of Economics, University of Queensland, Brisbane, QLD 4072, Australia.
E-mail: c.tisdell@economics.uq.edu.au

[†] School of Economics, School of Economics, University of Queensland, Brisbane, QLD 4072, Australia.
E-mail: clevo.wilson@uq.edu.au

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For more information write to Professor Clem Tisdell, School of Economics, University of Queensland, Brisbane 4072, Australia.

# The public's knowledge of and support for conservation of Australia's tree-kangaroos

**Abstract**

After providing some brief background on *Dendrolagus* species in Australia, two consecutive surveys of Brisbane's residents are used to assess public knowledge of tree-kangaroos and the stated degree of support for their conservation in Australia. The responses of participants in Survey I are based on their pre-survey knowledge of wildlife. The same additional set of participants completed Survey II after being provided with information on all the wildlife species mentioned in Survey I. Changes in the attitudes of respondents and their degree of support for the protection and conservation of Australia's tree-kangaroos are measured, including changes in their contingent valuations and stated willingness to provide financial support for such conservation. Reasons for wanting to protect tree-kangaroos are specified and analyzed. Furthermore, changes that occur in the relative importance of these reasons with increased knowledge are also examined.

Support for the conservation of tree-kangaroos is found to increase with the additional knowledge supplied. Furthermore, support for the conservation of Australia's less well-known tropical mammals is shown to increase relative to better known mammals (icons) present in temperate areas, such as koalas and red kangaroos with this increased knowledge. Possible implications of the results for government conservation policies in Australia are examined.

**Keywords:** Australia's tropical wildlife, conservation policy, contingent valuation, *Dendrolagus bennettianus*, *Dendrolagus lumholtzi*, knowledge and conservation, tree-kangaroos.

# The public's knowledge of and support for conservation of Australia's tree-kangaroos

## Introduction

Both Australia and New Guinea have endemic species of tree-kangaroos. Australia's species, *Dendrolagus bennettianus* and *Dendrolagus lumholtzi*, occur only in the rainforests of northeast Queensland. Australians, as a whole, are believed to have little knowledge of the existence of Australia's tree-kangaroos and this is considered to result in less public support for their conservation than for better known species such as koalas. This may partly be a consequence of the fact that a major portion of Australia's population is located well below the Tropic of Capricorn and has little contact with Australia's tropical wildlife. Furthermore, their rare status, their habitat distribution in isolated areas and their secretive habits (Newell, 1999a) make them difficult to observe and this could be a contributory factor.

In relation to this specific topic, Newell (1999b, p.9) states:

> "The general public are mostly ignorant of tree-kangaroos. While most Australians are familiar with koalas as an arboreal folivore and as a quintessential Australian animal, most would not know that some species of kangaroo spent their life in trees. As with many issues until the general public becomes aware of animals such as tree-kangaroos which are fortunately but cynically a charismatic megafaunal species, it is unlikely that there will be significant advances in measures for their conservation".

To date, no specific assessment of the knowledge of Australians about tree-kangaroos and support for their conservation has been undertaken. To fill this gap the authors conducted a survey of Brisbane residents. The results are reported and discussed.

After providing some background on the status of Australia's tree-kangaroos, this article outlines the nature of the survey and its objectives. The results are then reported about the knowledge the surveyed group displayed about Australia's tree-kangaroos, their attitudes to tree-kangaroos, and their support, economic and otherwise, for the conservation of Australia's tree-kangaroos. The associations between changes in knowledge and support for the conservation of tree-kangaroos are analyzed.

The results presented are from two surveys conducted among a sample of residents from Brisbane. The first survey is based on respondents' initial knowledge and the second survey was based on their knowledge after they were supplied with additional information about a selected set of wildlife species, including Australia's tree-kangaroos. The penultimate section includes considerations of the comparative results about the knowledge and support for the conservation of members of a selected sets of mammals, which include koalas and red kangaroos, as well as some tropical species of mammals that may be little known by the general public. The final section discusses the overall results and conclusions.

**Some background on Australia's tree-kangaroos**

Knowledge about the ecology and conservation of Australia's tree-kangaroos has increased in recent years (Newell, 1999b). However, knowledge is still limited and it is even less for Bennett's tree-kangaroos than for Lumholtz's. This is probably because Bennett's is more secretive, difficult to observe and occurs in areas having less human settlement.

Currently most of the population of Lumholtz's tree-kangaroo occurs south of the Black Mountain corridor located just north of Cairns. The focal point of the population is in the Atherton Tablelands with their range extending south to the southern end of the Cardwell range behind Ingham. Bennett's tree-kangaroos on the other hand occur only to the north of this corridor which is about 40 kilometres wide (Winter, 1997, p. 407). Today, some overlap of populations of Lumholtz's and Bennett's tree-kangaroos occur just north of the corridor in the Carbine uplands (1997, p.502), but basically the populations of these two species are geographically disjoint.

Winter (1997) considers that it may be because *D. lumholtzi* is more tolerant of cooler temperatures than *D. bennettianus* which seems to thrive best in warmer weather conditions. *D. lumholtzi* prefers cooler, drier rainforests (Kanowski et al. 2001). Winter (1997) suggests that at times in the past populations of these two species of tree-kangaroos were completely isolated due to climatic conditions, but in the last 3,600 years or so some cooling has occurred resulting in movement of populations of *D. lumholtzi* northward and towards lower elevations. A community survey on the Atherton Tablelands found that populations of *D. lumholtzi* are observed mostly at altitudes of 600 –1,200 metres above sea level, mainly on the basalt soils and in rainforests, as well as on marginally cleared land (Kanowski et al.

2001. p. 84). There are very few sightings reported at lower elevations. On the other hand, in its range *D. bennettianus* seems to be well adapted to both upland areas and those of lower elevations containing wet rainforests. In the past, they have been mostly restricted to mountainous areas (parks). Martin (1992) hypothesized that this was due to aboriginal hunting at lower elevations where dogs were used to help locate the animals. Due to a reduction in aboriginal hunting, the distribution of the population within its range appears to have extended. The population of Bennett's tree-kangaroos is not known, but is believed to be small and increasing. Furthermore, its population is considered to be relatively secure and most of its population is located in protected areas. However, along with the D. *lumholtzi*, it is considered to be rare (Newell, 1999a).

While *D. lumholtzi* is not in immediate danger of extinction, there is concern that most of its previous habitat has been converted to agricultural use and that a substantial portion of its remaining habitat is on private land and not fully protected. Furthermore, increasing urbanization in the Atherton Tablelands and closer human settlement pose increasing dangers to the population of these species. This process usually results in increased vegetation loss, escalating road deaths and the presence of more dogs that predate on *D. lumholtzi* (cf. Newell, 1999b). Both species of tree-kangaroos are arboreal folivores and are the largest of such species in Australia. Tree-kangaroos are less able to move between trees than possums without descending to ground level. This makes them more vulnerable to predation by dogs.

Tree-kangaroos are highly territorial (Newell, 1999c). This means that offspring on attaining adulthood must establish their own territory. During this period, they travel some distance from their mother at which time they are vulnerable to attacks by canids, especially if they have to journey through open country such as cleared farms. On the Atherton Tablelands, The Tree Kangaroo and Mammal Group Inc, a voluntary group, in conjunction with other organizations is encouraging landholders to provide tree corridors. This is aimed at reducing predation on *D. lumholtzi* and preventing their populations from being isolated in pockets, thus improving the chances of survival of the species (Saunders and Hobbs, 1991). Tree corridors can also improve the relatively low levels of genetic diversity of *D. lumholtzi* population in the Atherton Tablelands (Bowyer et al. 2002).

The rate of reproduction of tree-kangaroos is relatively slow. The young remain with their mothers for up to two years and females may not produce more than six offspring in a life-

time (Newell, 1999b). Recovery from reductions in their population is therefore, likely to be slow.

**Objectives and nature of the survey**

In order to obtain information about the public's knowledge of Australia's tree-kangaroos, a sample of 204 respondents from Brisbane, Queensland, Australia, were surveyed using structured questionnaires. The questionnaires were also designed to elicit information about respondents' attitudes to tree-kangaroos and their willingness to support their conservation, financially and otherwise. A circular was put primarily in letter boxes in Brisbane in a variety of suburbs in an attempt to obtain a sample of respondents with different socio-economic backgrounds. The circular told that a survey would be conducted on the use and conservation of Australia's tropical resources and that interested persons would be required to come to The University of Queensland at St Lucia to participate. The leaflets informed them that they would also be a presentation followed by refreshments. They were asked to call a number if they were interested and to obtain further information. Participants were given Aus $20.00 to participate and a chance to win Aus $200.00. They were not told in advance that the focus of the survey would be on wildlife conservation in tropical Australia so as not to bias the sample towards conservationists.

Respondents were divided into five groups of about 40 persons each to attend different sessions. Two of these sessions were held during the working week and two on Saturday at The University of Queensland, with a fifth session being conducted at a church hall on Sunday. This was intended to provide sufficient scope for employed persons to participate.

On arrival, each group was given a structured questionnaire to complete. This took approximately one hour. On completion, the questionnaires were collected and respondents were provided with refreshments. We shall refer to the initial questionnaire as Survey I. It provided information on the initial knowledge of respondents about a selected set of Australian wildlife including tree-kangaroos as well as temperate Australian species. Information was also obtained about their attitudes towards these species and their support for their conservation.

After refreshments, Dr Steven Van Dyck, Curator of Mammals and Birds at the Queensland Museum gave a general presentation primarily about the mahogany glider, but with some

mention of tree-kangaroos. Specimens of both these species were provided for viewing by the audience. Respondents were also provided with a booklet containing coloured photographs of all wild species in the survey and a short description of them to take home. They were requested to read this material before completing the second questionnaire which contained some overlapping questions with the first one. The completed questionnaires were to be returned in a postage prepaid envelope. The second questionnaire will be referred to as Survey II. It provided information on how the knowledge of respondents had changed and on how their attitudes and support for conservation of species altered compared to Survey I.

One of the main objectives of the survey was to determine how the respondents' evaluation of wildlife species would alter as more information was provided. The study in particular was aimed at determining how their evaluation of tree-kangaroos would alter and how the respondents' support for conservation of tree-kangaroos would change.

**Knowledge of tree-kangaroos**

Of the 204 respondents, 74 (36%) respondents said they knew of the existence of tree-kangaroos and the remainder did not. In Survey I, only 24.9% of the sample said that their knowledge of tree-kangaroos is good or very good. Most (56.9%) said it was poor with the remainder having no knowledge of these animals. More specific questions in Survey I confirmed the paucity of knowledge of respondents about the tree-kangaroos. In response to the specific question about whether they are present in northern (tropical) Australia, only 42.6% of respondents answered 'Yes'. Furthermore, only 19.6% stated that tree-kangaroos occur outside Australia. Most were, therefore, unaware of the occurrence of *Dendrolagus* species in New Guinea. Only 3.4% of the sample was aware that two species of tree-kangaroos are present in Australia. The knowledge of respondents on the distribution and the number of species of tree-kangaroos found in Australia are shown in Table 1.

**Table 1**

**Responses to the question "How many tree-kangaroo species occur in Australia" in Survey I**

| Number of species | Number of responses | Relative frequency (%) |
|---|---|---|
| 00 | 00 | 00 |
| 01 | 10 | 4.9 |
| 02 | 07 | 3.4 |
| 03 | 04 | 2.0 |
| 04 | 02 | 1.0 |
| More than 4 | 07 | 3.4 |
| Do not know | 172 | 84.3 |
| No response | 02 | 01 |
| **Total** | **204** | **100** |

Slightly more than half of the sample (51.5%) said that tree-kangaroos are rare. On the other hand, 4.4% thought that they were not and 42.6% did not know. As can be seen from Table 2, only 27.9% of the sample could identify where tree-kangaroos occur in Australia.

**Table 2**

**Distribution of responses to the question asked in Survey I "Where do tree-kangaroos occur in Australia"**

| Place of occurence | Number of responses | Relative frequency (%) |
|---|---|---|
| Nowhere | 03 | 1.5 |
| Rainforests of northern Qld only | 57 | 27.9 |
| In Qld and elsewhere in Australia | 51 | 25.0 |
| Do not know | 89 | 43.6 |
| Others* | 04 | 2.0 |
| **Total** | **204** | **100** |

- No response or unsure

Knowledge about the types of food eaten by tree-kangaroos was also poor. In relation to the following question:

"What do **tree-kangaroos** normally eat? (you may tick more than one box)

❑ Mostly grass ❑ Leaves ❑ Fruit ❑ Leaves and Fruit ❑ Sometimes vegetables

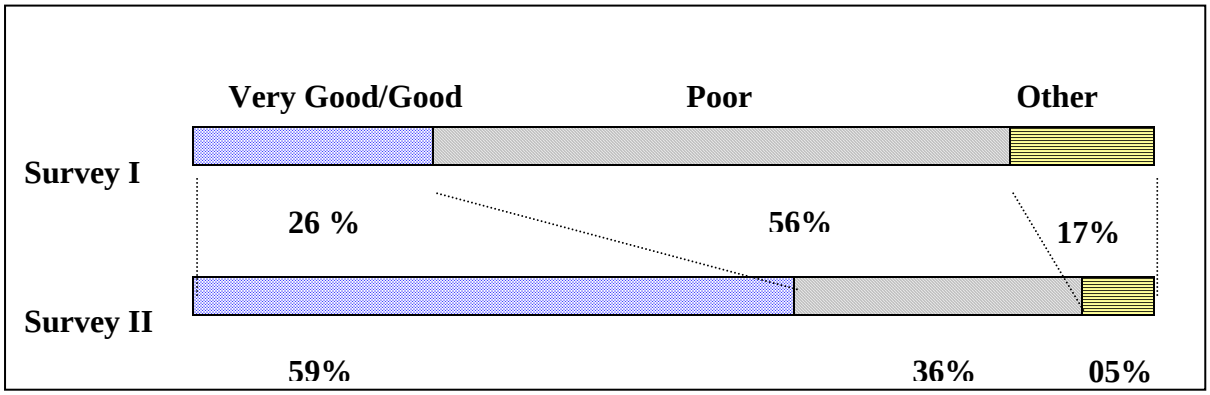
❑ Sometimes corn ❑ Small animals ❑ All of the above ❑ Do not know ",

41% replied that they did not know what tree-kangaroos ate, 2% did not reply and another 14% of the answers given were incorrect. For instance, 8% of respondents stated that tree-kangaroos mostly ate grass. According to each respondent's self-rating on a scale of knowledge (nonexistent; poor, good, very good) the percentage of those rating their knowledge as very good or good increased from 25.9% to 58.8% in Survey II compared to Survey I. The comparative responses are shown in Figure 1. Still, even in Survey II, 37.3% of the respondents considered their knowledge of tree-kangaroos to be poor or non-existent. Overall, however, a clear increase in knowledge occurred as a result of this exercise.

**Figure 1**

**Self-rating of respondents' knowledge of tree-kangaroos**

**(Survey I and Survey II)**




As for whether individuals like or dislike tree-kangaroos, changes in responses between Survey I and Survey II can be seen from Table 3. Between the surveys the number of respondents' uncertainty about their feelings decreased. While the total number saying that they like or strongly like tree-kangaroos increased from 177 to 185, those who said they liked them strongly decreased from 87 to 75. Whereas no one expressed a dislike for tree-kangaroos in Survey I, two did so in Survey II. This may have been because the museum preserved specimens (skins) shown to respondents had sharp front claws and some respondents were not used to contact with the remains of dead animals.

**Table 3**

**Feelings of respondents towards tree-kangaroos (Surveys I and II)**

**Frequency and relative frequency of responses**

| | SURVEY I | | SURVEY II | |
|---|---|---|---|---|
| **Feelings towards tree-kangaroos** | **Number of Responses** | **Relative frequency (%)** | **Number of Responses** | **Relative frequency (%)** |
| Like strongly | 87 | 42.60 | 75 | 36.80 |
| Like | 90 | 44.10 | 110 | 53.90 |
| Dislike | 0 | 0.00 | 2 | 1.00 |
| Strongly dislike | 0 | 0.00 | 0 | 0.00 |
| Uncertain | 23 | 11.30 | 10 | 4.90 |
| Others* | 4 | 2.00 | 7 | 3.40 |
| **Total** | **204** | **100.00** | **204** | **100.00** |

* No response or unsure

Most respondents were in favour of the survival of tree-kangaroos. In Survey I, 196 respondents (96.1%) were in favour, but this fell slightly to 195 in the second survey and the number of respondents not in favour moved from 1 to 2. The results are summarized in Table 4. It seems that many individuals initially had little or no knowledge of tree-kangaroos, but yet favoured their survival. More knowledge did not necessarily increase their support. Most individuals (at least 92.2%), however, remained committed to tree kangaroo survival in both surveys.

**Table 4**

**Frequency and relative frequency (Survey I and II) of responses to the question:**

**Are you in favour of the survival of tree-kangaroos as a species:**

| | SURVEY I | | SURVEY II | |
|---|---|---|---|---|
| | **Number of responses** | **Relative frequency (%)** | **Number of responses** | **Relative frequency (%)** |
| Yes | 196 | 96.10 | 195 | 95.60 |
| No | 1 | 0.50 | 2 | 1.00 |
| Indifferent | 2 | 1.00 | 1 | 0.50 |
| Others | 5 | 2.50 | 6 | 2.90 |
| **Total** | **204** | **100.00** | **204** | **100.00** |

While Table 4 suggests no significant increase in support for the conservation of tree-kangaroos as between the two surveys, answers to other questions suggest a positive increase

in support for the conservation of tree-kangaroos mainly because a large proportion of those who were unsure in Survey I responded positively in favour of conservation measures in Survey II. There were two relevant questions:

(a) Should sustainable harvesting of tree-kangaroos from the wild be allowed?

(b) Do you think that tree-kangaroos should be protected?

The responses to the questions are set out in Table 5 and 6 respectively. As shown in Table 5, opposition to the sustainable harvesting increased and support for it declined in Survey II. As can be seen from Table 6 support for the protection of tree-kangaroos increased in Survey II, no one opposed it, and the number that were unsure about it declined substantially. Thus, it does seem, after all, that greater knowledge was associated with greater support for the conservation of tree-kangaroos.

**Table 5**

**Frequency and relative frequency of responses in (Survey I and Survey II) to the question: "Should sustainable harvesting of tree-kangaroos from the wild be allowed?"**

| | SURVEY I | | SURVEY II | |
|---|---|---|---|---|
| | Number of responses | **Relative frequency (%)** | Number of responses | **Relative frequency (%)** |
| Yes | 38 | 18.60 | 28 | 13.70 |
| No | 121 | 59.30 | 143 | 70.10 |
| Indifferent | 5 | 2.50 | 8 | 3.90 |
| Unsure | 34 | 16.70 | 16 | 7.80 |
| Others* | 6 | 3.00 | 9 | 4.40 |
| **Total** | **204** | **100.00** | **204** | **100.00** |

* No response or unsure

**Table 6.**

**Frequency and relative frequency of responses in Survey I and II to the question:**

**"Do you think tree-kangaroos should be protected?"**

| | SURVEY I | | SURVEY II | |
|---|---|---|---|---|
| | **Number of responses** | **Relative frequency (%)** | **Number of responses** | **Relative frequency (%)** |
| Yes | 175 | 85.80 | 199 | 97.50 |
| No | 1 | 0.50 | 0 | 0.00 |
| Unsure | 26 | 12.70 | 4 | 2.00 |
| Others* | 2 | 1.00 | 1 | 0.50 |
| **Total** | **204** | **100.00** | **204** | **100.00** |

* No response or unsure

Respondents were asked for their reasons for wanting to protect tree-kangaroos. They could tick one or more reasons in a list, or give other reasons. The responses are summarized in Table 7.

In Survey I, the most frequently given reason for protecting tree-kangaroos was that "we have a responsibility to protect all species". This may be regarded as an ecocentric rather than a homocentric value. Existence values ranked second, followed by the appeal of their uniqueness and their bequest values. The use value (opportunity of the respondents to see tree-kangaroos in the wild), ranked fifth. Their protection to provide food and skin for native people received little weight. Overall, non-use values and non-egoistic values predominated as reasons for their protection of tree-kangaroos in Survey I.

**Table 7**

**Frequency and relative frequency of reasons given for protecting tree-kangaroos**

**(Survey I and Survey II)**

| Reasons | Survey I | | Survey II | | Change | |
|---|---|---|---|---|---|---|
| | No. | %[(a)] | No. | %[(b)] | No. | %[(c)] |
| They are unique | 111 | 63 | 163 | 82 | 52 | 47 |
| I would like an opportunity to see them in the wild | 104 | 59 | 135 | 68 | 31 | 30 |
| I would like my children or others to have a chance to see them in the wild | 109 | 62 | 140 | 70 | 31 | 28 |
| I would be happy to know they continue to exist in the wild | 109 | 76 | 173 | 87 | 40 | 30 |
| We have a responsibility to protect all the species | 133 | 85 | 169 | 85 | 20 | 13 |
| They are an interesting evolutionary phenomenon | 149 | 44 | 101 | 51 | 24 | 31 |
| They perform certain ecological functions | 77 | 53 | 108 | 54 | 16 | 17 |
| They provide food and skins for native peoples | 92 | 10 | 16 | 08 | -2 | -11 |
| Other reasons | 18 | 04 | 05 | 03 | -2 | -29 |

Notes:

(a) Percentage of 175 respondents who said in Survey I that tree-kangaroos should be protected.

(b) Percentage of 199 respondents who said in Survey II that tree-kangaroos should be protected.

(c) Percentage change in number between Survey I and II.

This overall situation did not change fundamentally in Survey II. However, emphasis on existence values increased to become the most frequently cited reason for wanting to protect tree-kangaroos. Relative frequency of responsibility to protect all species remained unchanged, but it was ranked second in relation to frequency as a reason to protect tree-kangaroos. Other rankings remained unaltered and the relative frequency of all measures increased, except provision of food and skins for native people. With greater knowledge, the non-use values of tree-kangaroos increased. Analysis of respondents' willingness to pay or to provide financial support for the conservation of tree-kangaroos (discussed below) lends further support to this view and it indicates the overwhelming importance of non-use values as a reason to protect tree-kangaroos.

To find out whether a bandwagon (snowball) effect might be present in the public's support for conservation of tree-kangaroos, the following question was asked in the initial survey (Survey I):

"Would you increase your degree of support for the conservation of **tree-kangaroos**, if there was even stronger (very strong) support from other members of our community for their conservation than at present?

Yes ❑ No ❑ Unsure ❑ "

The majority of respondents (58%) said that they would increase their support if most of the community did, 15% said they would not and 33% did not answer. Thus on the whole, a bandwagon (snowball) effect seems to exist for the protection of tree-kangaroos.

In Survey I and Survey II, the following series of questions were asked to determine the willingness of respondents to pay (to contribute financially) for the conservation of tree-kangaroos:

*Please consider the following questions about the conservation of **tree-kangaroos** that occur in Australia (please do not change any of your previous answers in view of this knowledge).*

***Tree-kangaroos***

*Conducting research on **tree-kangaroos** to conserve and to protect them in Australia costs money. In order to meet the costs of research, protection and conservation (such as buying land), money will have to be raised by the Government or a non-governmental organization.*

***These questions are being asked to determine how much individuals are willing to pay for tree kangaroo research, protection and conservation (Please bear in mind that this is only one of many issues which may cost you money and that this may have to come from your/family budget). However, assume this to be your only extra commitment beyond your present plans to support nature conservation.***

*1. Would you be willing to have your take-home income or income from elsewhere reduced by $2 dollars a week, that is about $100 per year, for the next ten years to conduct research, protect and conserve tree-kangaroos that occur in some areas of*

*Australia's tropical rainforests?*

Yes ❑ Would like to pay more ❑ Would like to pay less ❑

2. *If you are willing to **pay more (or less)** than $ 2.00 per week, then what is the weekly amount you would be willing to pay to support research, protect and conserve tree kangaroos (such as buying land) that occur in Australia's tropical rainforests for the next ten years?*

*Aus $ …… a week*

The Contingent Valuation Method (CVM) which encompasses total economic values (Pearce, 1993) was used not only to determine how much the respondents were willing to pay for the conservation of different species of wildlife, but also to determine how much the public's valuation of species changed after the provision of additional information. The CVM was first proposed by Davis (1963) and has since been used widely with much refinement and adaptation over the years. For recent overviews about CVM see Carson et al. (2001); Hanley and Spash (1993). The impacts of knowledge on contingent valuation of wildlife is still an ongoing area of research and subject to continuing debate, as pointed out in Jakobsson and Dragun (1996, pp. 86-87). Our study illustrates some issues of interest in this area.

For this study CVM was adopted using a suggested bid of $2.00 per week as the starting point. Unfortunately the number of those not responding to these questions increased between Survey I and II. The average value of those responding (most of the sample) remained virtually unchanged between surveys. In Survey I it was $1.46 for a week ($75.92 per year), and in Survey II it was $1.45 per week ($75.40 per year).

Respondents were also asked: "What percentage of your selected payment depends on your personal chances of being able to see tree-kangaroos in the wild (use values)?" The results are summarized in Table 8. It can be seen that this form of use value was of minor importance for most respondents and it became relatively less important when they had no knowledge about Australia's tree-kangaroos. This indicates that the relative importance of

non-use values increased with greater knowledge of tree-kangaroos. This is consistent with the results reported in Table 8.

**Table 8**

**Frequency and relative frequency of responses in Survey I and II to the question: "What percentage of stated payment depends on your personal chances of being able to see tree-kangaroos in the wild (use vales)?"**

| | Survey I | | Survey II | |
|---|---|---|---|---|
| | **Number of responses** | **Relative frequency (%)** | **Number of responses** | **Relative frequency (%)** |
| 1-20 | 116 | 56.90 | 121 | 59.30 |
| 21-40 | 21 | 10.30 | 24 | 11.80 |
| 41-60 | 19 | 9.30 | 14 | 6.90 |
| 61-80 | 13 | 6.40 | 12 | 5.90 |
| 81-100 | 10 | 4.90 | 3 | 1.50 |
| Others | 25 | 12.30 | 30 | 14.70 |
| **Total** | **204** | **100.00** | **204** | **100.00** |

* No response or unsure

In order to provide a further measure of economic willingness of respondents to pay for tree kangaroo conservation, the following question was asked:

*The above questions were asked to determine how much you or your family would be willing to pay for the conservation of **only one species** of wildlife that occurs in **northern Australia.** Now assume that there is a campaign to raise money for all **three species** mentioned above (tree-kangaroos, golden-shouldered parrots and hawksbill sea turtles) at the same time. In this case what is the **maximum** amount you would be willing to pay for **each** of the species? (**Please bear in mind that this is only one of many issues which may cost you money and that this may have to come from your/family budget**).*

*Maximum amount for **tree-kangaroo** conservation in Australia **a week** for the next 10 years*

*Aus $ …… a week*

In this case, willingness to pay for conservation rose substantially between the two surveys. It increased from Aus $1.13 per week (Aus $58.76 per year) per respondent to Aus $1.42 per week (Aus $73.82 per year).

This latter figure of $1.42 per week is comparable to the contingent valuation figure of Aus $1.45 per week for Survey II, mentioned above. On the other hand, the former figure of Aus $1.13 is lower than for the earlier contingent valuation figure for Survey I, namely Aus $1.46 per week. While the first economic evaluation exercise suggested hardly any change in economic willingness to support tree-kangaroo conservation with changed information, the second economic evaluation exercise indicates a substantial increase in willingness to pay for tree-kangaroo conservation with increased information. Both evaluations suggest that respondents, after provision of information, are willing to pay more than Aus $70 per year to support tree kangaroo conservation. If the results could be extrapolated to the whole of Australia's adult population, it would indicate considerable financial support for tree-kangaroo conservation.

**Support for conservation of tree-kangaroos compared with other Australian wild mammals**

While extra knowledge about species may increase support of that public for the conservation of a species, if knowledge about several other species is simultaneously increased, the public's willingness to pay for the conservation of all may not increase. This may arise for several reasons. As additional information on several species is provided, their relative appeal to members of the public may alter. Furthermore, the public's evaluation may be altered by differences in the amount of additional knowledge provided about rare species and the way in which it is presented. In addition, the level of income of respondents eventually acts as a constraint on their ability and willingness to pay for conservation of species. A partial increase in knowledge may have a distorted impact.

This can be illustrated by the results from the following choice to put respondents in Surveys I and II:

***Again suppose that you are given Aus $1,000. This time you can only donate it to organizations in Australia to help conserve mammals in Australia, including marsupials, in the list below. What percentage of it would you allocate for the conservation of each of the mammals listed below? Your total should add up to 100%.***

| ***Animals (Mammals)*** | ***(%)*** |
|---|---|
| *Tree-kangaroos* | |
| *Red kangarooss* | |
| *Koalas* | |
| *Mahogany gliders (similar to the squirrel glider)* | |
| *Dugongs (a sea cow, not related to seals or whales)* | |
| *Northern Quolls (a native marsupial cat)* | |
| *Northern Bettongs (a small kangaroo-like marsupial)* | |
| *Northern Hairy-nosed Wombats (two related species are found in southern Australia)* | |
| *Eastern Pebble-mound Mouse (four related species are found in Australia)* | |
| **Total** | ***100*** |

The average (mean) responses of respondents are shown in Figure 2. Some data were omitted. Omissions consist of:

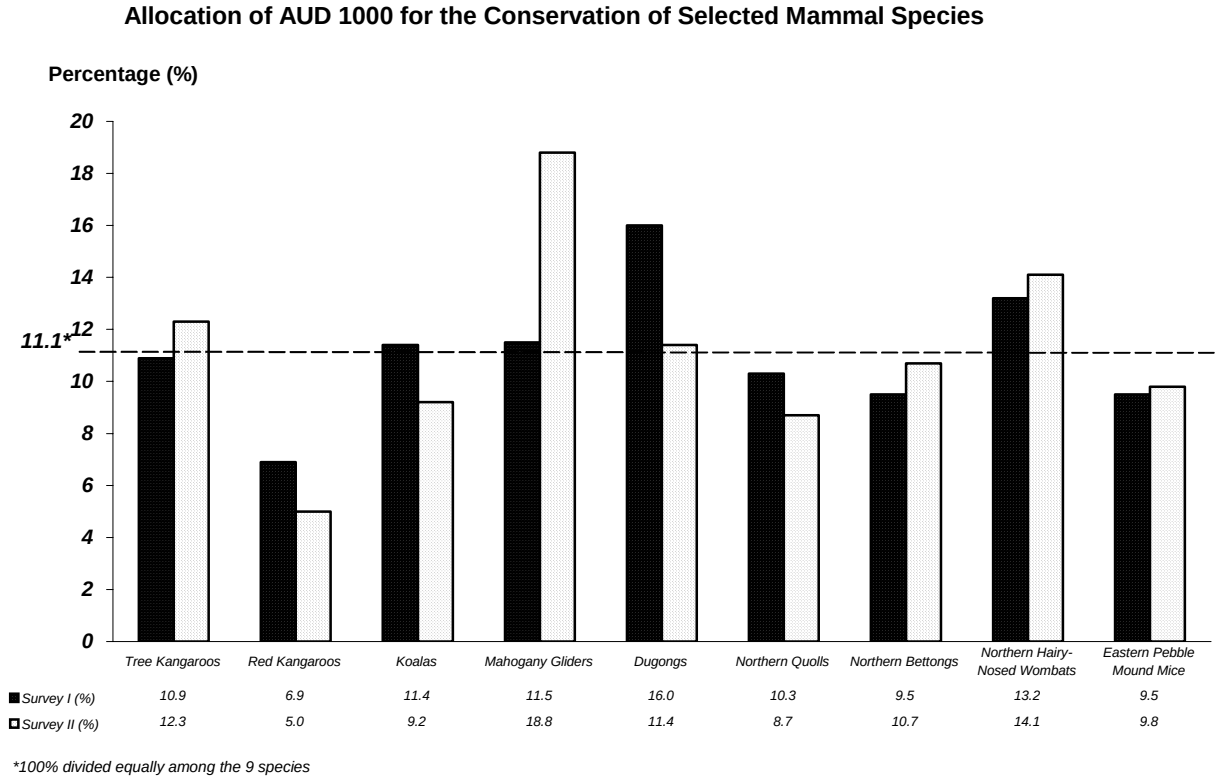
(i) Responses across species per respondent that *do not* add up to 100% (i.e. those whose total exceed 100% by more than a ± 1% error). There are twenty such cases in Survey I and eight in Survey II;

(ii) Respondents who did not respond at all. Five such cases are found in Survey I and three in Survey II;

(iii) Respondents whose responses are other than what was requested (e.g. “Let the experts decide”). Three such cases exist in Survey I while there were none in Survey II.

**Figure 2**

**Bar chart showing mean hypothetical allocation of Aus $1000 by respondents for the conservation of selected Australian mammal species in Survey I and II.**




For Survey I, the 'clean' data used in the calculations are from 176 respondents out of a total of 204 respondents (86% of the data set). Omitted data thus make up 14% of the collected data for Survey II. The 'clean' data used in the calculations are from 193 respondents out of a total of 204 respondents (95% of the data set). Omitted data makes up only 5% of the survey.

Given the initial information of respondents, the allocation of the $1,000 in declining amounts for Survey I is (1) dugongs (2) northern hairy-nosed wombats (3) mahogany gliders (4) koalas (5) tree-kangaroos (6) northern quolls (7) northern bettongs and equally eastern pebble-mound mice, followed by red kangaroos in last place.

In Survey I support for the conservation of dugongs was by far the strongest, with that for northern hairy-nosed wombat, mahogany gliders and koalas being above 11.11 percent - the allocation giving equal sums of Aus $1,000 to all species listed. As suggested by Newell

(1999b) to be likely, support for the icon species, koalas, was strong, but not for red kangaroos. Species also considered to be endangered such as northern hairy-nosed wombats and mahogany gliders had strong support, as did dugongs which are believed to be vulnerable (Strahan,1995).

An approximately equal amount of information about each of these species was provided to respondents in their 'take-home' booklet which they were urged to read before completing Survey II. In addition, respondents were exposed to an interesting presentation by Dr Steven Van Dyck, principally on mahogany gliders, including his 'rediscovery' of them in tropical Australia. This talk was enetertaining and supported by preserved specimens, colour slides and a video clip. He also brought a *D. lumholtzi* specimen plus a northern quoll and at most sessions briefly mentioned tree-kangaroos and the eastern pebble-mound mouse, discovered relatively recently. Taking into account the content and nature of Dr Van Dyck's presentation the relative response of participants in supporting the mahogany gliders was greatest.

In Survey II, the mahogany glider received the greatest support for conservation by respondents displacing dugongs as the first preference. In all probability, this is a consequence of the amount of information provided about it relative to other species and the interesting and detailed presentation about it. If for example, greater emphasis had been given in the presentation to tree-kangaroos, it might have been anticipated that relative support for the conservation of this species would have increased further in Survey II. Nevertheless, support for conservation of tree-kangaroos increased in Survey II, with an increase in overall information. Their allocation rose above the 11.1 percent mark.

In general, it seems that the provision of information for the <u>whole</u> range of mammals in the set tended to 'crowd out' conservation support for the more common and better known species and increased support for the less well known and less common species. Thus, support for the conservation of koalas and red kangaroos declined. Support for these species was 'crowded out' by support for other mammals in the set. In the case of koalas, the support was initially above 11.1%, but in Survey II, the support declined to less than this, to be ranked third last in degree of support. Northern quoll was the only less common species to lose ground in Survey II.

All species that received more that 11.1 percent support in Survey I continued to do so in Survey II. However, tree-kangaroos joined the group in Survey II, financial support for their conservation increasing from 10.9% to 12.3% of the sum to be allocated.

We find that there was not so much bias in favour of funding the conservation of well known Australian icons such as red kangaroos and koalas as one might have expected from the comments of some scientists (e.g. Newell, 1999b). Most of the Australian public is aware that red kangaroos are not under threat. There is, however, some emotional attachment to the koala and media reports, of which O'Malley (2003) is a recent example about threatening situations facing some of its population (for example, the Brisbane area) are not uncommon, although overall survival of this species remains secure (Martin, 1992). Nevertheless, the general public does not appear to be naïve in its conservation decisions. In the sample considered here, extra information as a whole increased support for the conservation of Australia's tropical and less common mammals, the survival of which are at greater risk than red kangaroos and koalas.

**Concluding comments**

Results from this sample of Brisbane's public indicates that the knowledge of Australia's tree-kangaroos is very poor compared to that about red kangaroos and koalas. But knowledge is only one factor (a significant one) influencing the public's support for the conservation of particular species. Even with the limited information available to respondents initially about tree-kangaroos, they were prepared to allocate more funds to support their conservation than to red kangaroos. This probably reflects the public's perception that the survival of the red kangaroos is less problematic than Australia's tree-kangaroos. On the other hand, the emotional factor probably resulted in koalas being given more financial support for conservation than tree-kangaroos in Survey I. However, with provision of more information, support for conservation of tree-kangaroos gained ground in Survey II and support for red kangaroos and koalas lost ground. In fact in Survey II, tree-kangaroos were ranked well ahead of koalas for financial support.

Similar information for some Australian mammals in the focus group was made available to respondents in a booklet following Survey I and prior to their completion of Survey II. Steven Van Dyck also made a presentation concentrating primarily on the mahogany glider. This presentation increased support of participants for the conservation of the mahogany glider,

which already had considerable support in Survey I. In Survey II, greatest support was for the conservation of the mahogany glider whereas it was for the dugong in Survey I. Although both tree-kangaroos and mahogany gliders occur in tropical Australia, they occupy different habitats. Tree-kangaroos occur in rainforests (and their vicinity) whereas, mahogany gliders occupy coastal swampy woodlands and heathlands in a limited geographical area in the wet tropics. Hence, the conservation requirements of these species differ, and the threat to the habitat of the mahogany glider from expansion of farming and human settlement appears to be greater.

On average, respondents in Survey II indicated a willingness to pay over Aus $70 annually from their own income to support the conservation of tree-kangaroos. Most of this payment did not depend on use values, but on non-use values of tree-kangaroos (e.g. existence, bequest values) and the relative importance of the non-use values increased with additional provision of information. Ecocentric values were strongly represented in both surveys with 85% of respondents saying that one of their reasons for wanting to protect tree-kangaroos is that "we have a responsibility to protect all species". With greater knowledge, there was more appreciation of the relatively unique nature of tree-kangaroos with the relative importance of this 'reason' for protecting tree-kangaroos increasing by more than any other.

Thus utilitarianism seems to play only a minor role in the valuation of tree-kangaroos by the general public. Non-use and even non-economic values seem to be more important in relation to the public's support for the conservation of these animals. There is also strong evidence that the provision of additional information about these species can be effective in raising support for their conservation in Australia. This is also true for other tropical Australian wildlife species that are not well known outside tropical Australia.

The question may be raised of how representative the Brisbane sample is for Australia. With Brisbane being located several hundred kilometers south from the Tropic of Capricorn (which passes through Rockhampton), one might expect Brisbane residents to have more knowledge of Australia's tropical wildlife than residents further south (e.g. Sydney/ Melbourne). Most of Australia's population live below the Tropic of Capricorn and in fact, south of Brisbane. Consequently, most of Australia's population could be even less informed about Australia's tropical wildlife than the Brisbane sample, given that they have less opportunity to come into contact with such wildlife. Nonetheless, it seems that this population would show greater

support for the protection of tree-kangaroos and for the conservation of Australia's tropical wildlife if better information about these species were provided. Furthermore, it is anticipated that they would be prepared to increase their relative financial and other support for conserving species that are less well known compared to species that are relatively common and well known in the south of Australia, such as koalas and red kangaroos.

More comprehensive and balanced information about Australia's wildlife species as a whole could, both increase the support of the Australian public for wildlife conservation and reduce the geographical bias in nature conservation efforts in Australia. Nature conservation within Australian States is principally the responsibility of State Governments and their dissemination of information is likely to be concentrated within the particular State. Possibly, there is a role for the Commonwealth Government through Environment Australia to provide or support the provision of more information about endemic wildlife species that may not be widely known in Australia and provide some financial support for their conservation, especially because the perceived benefits from conservation extend beyond state boundaries, as is the case of non-use values of wildlife. At present, support for the conservation from the Commonwealth Government is *ad hoc*, but not completely absent. For example, the Commonwealth provides some financial support to the States in relation to international agreements (for e.g. World Heritage Areas of which the Wet Tropics is one). Furthermore, some support for nature conservation on private land via the Natural Heritage Trust and Threatened Species Network is provided by the Commonwealth Government. These and other sources are being tapped by The Tree Kangaroo and Mammal Protection Group Inc to encourage landholders in the Atherton Tablelands to cooperate in providing tree corridors for tree-kangaroos and other tropical wildlife.

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