

# **ECONOMICS, ECOLOGY AND THE ENVIRONMENT**

**Working Paper No. 112**

**Economics, Wildlife Tourism and  
Conservation: Three Case Studies**

**by**

**Clem Tisdell and Clevo Wilson**

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Three Case Studies<sup>1</sup>**

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**Clem Tisdell<sup>2</sup> and Clevo Wilson<sup>3</sup>**

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# ECONOMICS, WILDLIFE TOURISM AND CONSERVATION

## Three Case Studies

*By Clem Tisdell and Clevo Wilson*

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## SUMMARY

This report presents the results of an economics component of the National Interdisciplinary Project (NIP) on wildlife tourism in Australia.

### Objectives of Study

The main objectives of the study were:

- to outline and assess the role that economics can play in the valuation and management of wildlife-based tourism;
- to undertake appropriate case studies to highlight the value of economics and its limits in assessing wildlife tourism in each case;
- given the importance of nature conservation for sustainable tourism, including for the sustainability of its economic value, take into account relevant environmental issues involved in wildlife tourism; and
- to make recommendations on the basis of these studies that will help managers of wildlife tourism to sustain and/or increase its commercial or economic value.

### Pattern of Presentation

In order to pursue these aims, this report covers the subject matter in the following order: after a brief introduction, the general role of economics in relation to the valuation of wildlife tourism, its relevance to environmental conservation and some of its implications for the management of wildlife tourism are outlined. Then drawing on concepts introduced in this background section, the results from three quite diverse case studies are presented and analysed in turn. These involve consideration of the following, amongst other things:

- The comparative importance of birds as a tourist attraction to the O'Reilly's/Green Mountains site in Lamington National Park;
- The importance of wildlife as a drawcard for Antarctic tourists as revealed by a sample of tourists travelling on the Antarctic cruise ship, the 'Akademik Ioffe'; and
- The economic value of glow worms to independent visitors to the Natural Bridge colony in Springbrook National Park and the economics of potential value-adding activities there.

Concluding comments then complete this report. They include an outline of some limitations of the study and/or its implications for those in the tourism industry.

### Selection of Case Studies and their Relevance in the Context of Australian Wildlife Tourism

The range of possible issues that can be covered by the topic of the economics of Australian wildlife tourism is very wide. In view of the limited time and funding for this project (AUS\$10,000), it was necessary to be careful in selecting case studies and in the coverage of material attempted. Therefore, cases were selected with the following attributes in mind:

- Should be natural areas where non-captive wildlife is likely to be an important attraction for visitors.
- Should be public rather than private property.
- Should be areas where the CRC for Sustainable Tourism has funded or is funding, non-economic research on interactions between wildlife and tourists.
- Should have good prospects for successful survey work to be completed economically, given our limited budget.
- Should be capable of demonstrating applications of economic techniques to the assessment or evaluation of wildlife tourism and their limitations.
- Should involve important or potentially important conservation and environmental issues.

All the case studies selected satisfy the above conditions. They do not, however, cover the economics of non-captive wildlife-based tourism on private land (such as on farms or private rural properties or the Penguin Parade

at Phillip Island) or on the land of NGOs nor tourism based on animals (as in zoos) or semi-captive wildlife. Coverage of these would be desirable but was beyond the resources available for this project, and some studies of the CRC for Sustainable Tourism have focused on these areas.

## **Key Findings**

## **Background Points**

Some of the significant points made in the background portion of this study are:

- The applications of economics to wildlife tourism are extremely varied. They include predictions of the demand for such tourism, its economic impacts, its valuation, and the scope for using economic instruments to manage and finance the management of such tourism.
- The economic impact (the commercial economic gain from such tourism) and its social economic value are all different concepts and the call for different techniques of measurement, some of which are outlined. Each has a relevant application but they should not be confused.
- In assessing the social economic benefit of wildlife tourism, use of the concept of total economic value can be fruitful. This concept is introduced and its relationship to wildlife tourism is discussed. Along with the concept of environmental spillovers or externalities and various sustainability considerations, it provides a link between the development of wildlife tourism and environmental conservation.
- Some of the significant findings from the case studies are as follows:

### **Case I – Lamington National Park - Birds**

- After the rainforest, visitors surveyed at the O'Reilly's/Green Mountains site in Lamington National Park, rated the presence of birds as the most important attraction.
- In the absence of birds at this site, it was estimated that visits to it would fall by more than 40 per cent. Given an estimated primary expenditure of AUS\$15 million dollars annually at the O'Reilly's/Green Mountain site and in its neighbourhood, the absence of birds at this site would reduce this expenditure by almost AUS\$7 million annually.
- It is estimated that the primary tourist expenditure generated annually by Lamington National Park is at least AUS\$35 million annually. This is a conservative estimate. Virtually all of that can be attributed to the presence of wildlife (in some form or other in the park).
- Different groups of visitors to the O'Reilly's/Green Mountains site value different attributes of birds differently, and measures are provided of their ratings of the different attributes. There is social conflict between those who favour diversity of birds, the presence of rare birds, bird sounds and so on, and those who favour brightly coloured birds and physical or close contact with birds. The latter visitors often feed birds at this site.
- Several tourists mentioned environmental problems at this site such as congestion and inadequate amenities. However, the overwhelming majority of Australians were against the introduction of an entry fee which might be used to limit visitor numbers. Overseas visitors were much less opposed to this. Nevertheless, Australians were more willing to accept such a fee if they could be sure it would be used to improve facilities and conservation at the site or in this park.

### **Case II – Antarctic Wildlife**

- Most respondents in the Antarctica case study rated the presence of Antarctic wildlife as a crucial factor in their decision to visit Antarctica, and following their visit, as an important influence on their enjoyment from their journey. In a pre-visit survey of Antarctic tourists, nearly two-thirds of respondents said that the presence of Antarctic wildlife was a very important or important factor in their decision to visit Antarctica. Following their visit to Antarctica, 96% said that seeing Antarctic wildlife during their visit was important or very important to them.
- In a rating of various attributes or characteristics of Antarctica and the tour that visitors might value, its landscapes and seascapes were rated most highly by visiting tourists closely followed by the presence of

Antarctic wildlife.

- Nevertheless, in the absence of Antarctic wildlife, 30% of respondents said that they would not visit Antarctica even if the cost of doing so were much reduced.
- Therefore, the absence of Antarctic wildlife would reduce expenditure on Antarctic tourism by at least 30%. Primary expenditure on Antarctic tourism involving landings in 2002-03 is estimated to be at least AUS\$200 million. Hence, in the absence of Antarctic wildlife, expenditure on Antarctic tourism in that year would have been reduced by at least AUS\$60 million.
- The Antarctic tourists surveyed raised serious environmental concerns about Antarctica, including concerns about the possible environmental impact of an increasing number of tourist visits to Antarctica. Opinion was divided about whether the number of tourists visiting Antarctica should be restricted. However, the majority favoured no increase in the number of visits.
- There was strong support amongst Antarctic tourists for keeping Antarctica in a pristine state.
- Present arrangements for managing Antarctica's environment seems to be inadequate but the voluntary code of conduct adopted by the International Association of Antarctic Tour Operators (IAATO) is a positive contribution to sustaining the Antarctic's natural environment.

### **Case III – Glow Worms at Natural Bridge**

- The presence of glow worms at Natural Bridge in Springbrook National Park generates regional economic impacts and economic benefits that would not be obtained in their absence.
- On average, around 80 per cent of visitors to Natural Bridge coming to view glow worms come on conducted tours, and most of these are foreigners. Of the 20% of independent visitors, the majority are Australians. They constituted 84% of the visitors in the sample used for this case study which restricted itself to independent visitors.
- The economic impact of the independent visitors is relatively small. Primary expenditure by independent visitors is estimated to be just under AUS\$100,000 annually. Only a very small proportion of that expenditure is made in the local community.
- Respondents on average reported a significant net economic benefit from their visit to see glow worms at Natural Bridge as measured by the willingness to incur extra costs to visit the site. Independent visitors' economic surplus in aggregate is estimated to be at the very least AUS\$46,000 per year but it is probably in excess of AUS\$100,000 annually. This is an economic benefit even though independent visitors pay no entry fee.
- Forty per cent of independent visitors surveyed stated that they experienced inconvenience from other visitors. Nevertheless, 73% of the visitors surveyed opposed a fee for independent visitors and only 24% favoured it.
- There was some demand amongst independent visitors for a booklet about glow worms and for an interpretative centre. A substantial proportion of respondents indicated that they would purchase such a booklet at a moderate price and would be willing to pay to visit an interpretative centre. The economics of those possible value-adding aspects are discussed. The economic viability of an interpretation centre at Natural Bridge would seem to depend on the willingness of visitors from bus tours to visit it and pay.

### **General Observations**

- In each of the studies, information is provided on the socio-economic background of the respondents. On average those in the Antarctic sample have the highest income, the highest levels of education and are the oldest; then come visitors in the sample for visits to Lamington National Park, followed by the sample of independent visitors coming to Natural Bridge to see glow worms.
- It might be noted that overseas visitors are very well represented in the Lamington National park sample. Birds at the O'Reilly's/Green Mountains site help to earn Australia significant amounts of foreign exchange. The same can be said of glow worms at Natural Bridge, when visits from bus tours are taken into account.

### **General Findings/Implications**

- The economic importance of non-captive wildlife is found to be substantial in each of the three case studies and is greater than might be realised in the absence of a study of this nature.



- The presence of birds at the O'Reilly's Green Mountains site accounts for about 40% of visitor expenditure attributable to the site. In the absence of birds, visitor expenditure attributable to this site would fall to be about 7 million per year.
- In the absence of Antarctic wildlife, tourist visits to Antarctica can be expected to fall by at least 30%. Total annual expenditure for such visits would decline by at least AUS\$60 million per year.
- In the absence of glow worms at the Natural Bridge site in Springbrook National Park, virtually no visitors would visit the site at night. Expenditure on visits by independent visitors would fall by around AUS\$100,000 per year but the loss in total expenditure resulting from visitors on bus tours could be expected to be much greater.
- Some measures of economic value of the natural areas covered in the case studies proved difficult to apply in practice and yielded unreliable estimates. For example, the economic surplus of visitors to the O'Reilly's/Green Mountain site is under reported by those surveyed. Strategic bias is present in the responses. This bias occurs because the overwhelming majority of Australians surveyed oppose the charging of entry fees to national parks. They, therefore, under reported their willingness to pay. However, a more indirect form of qualifying of independent visitors coming to view glow worms at Natural Bridge, revealed an economic surplus on average of almost AUS\$20 per respondent. That is probably relatively accurate. Also measuring the economic surplus of respondents visiting Antarctica proved to be elusive, probably because of hypothetical bias.
- The two Australian-based case studies suggest that economic value and potential of Australian birds and insects as tourist attractions have been under rated.
- In all three cases, significant environmental concerns, arising in part from rising visitor numbers, were mentioned by respondents. These are outlined and discussed.

## **Industry Recommendations**

- There should be greater recognition of the economic importance of wildlife as a tourist attraction in Australia, particularly the actual and potential economic importance of Australian birds and insects as tourist attractions.
- Although most Australians oppose fees for entry to national parks (where they may view or interact with wildlife), they are less likely to object to these if they can be assured that revenue collected will be used for improving amenities and conservation where the fees are paid. Political acceptability of fees required them to be linked to packages of this nature.
- There is much less objection to paying for optional extra activities or access to optional added facilities such as interpretation centres, or other optional items (such as booklets) in national parks or in state protected areas. Such extra facilities could provide extra income for a body such as QPWS, add to visitors' wildlife experiences, and help to increase their support for nature conservation. However, every commercial case needs to be considered on its individual merits and assessed using cost-benefit analysis, as the glow worm case reveals. Such facilities need not be operated by QPWS. Suitable and limited commercial developments in and near national parks can add significantly to their economic and conservation value. Those facilities within protected areas can provide a source of income for the provider of the protected area. These commercial aspects are worthy of greater consideration in relation to wildlife tourism in Queensland.
- A considerable number of respondents in all the case studies raised environmental concerns about all the wildlife sites visited. These problems included adverse impacts arising from, or expected to result from, growing visitor numbers. No fully effective policy instruments appear to be in place to deal with many of these problems. Policy options are restricted because the charging of entry fees is mostly ruled out in Queensland as a rationing device due to widespread opposition of Queenslanders to it. In Antarctica, there appears to be a lack of fully effective governance. This hampers the management of tourism there. The tourism industry needs to consider the options involved in dealing with these congestion/crowding problems carefully because they have the capacity to reduce the economic value of the wildlife that attracts tourists. Studies of these aspects would be worthy of support.
- Specific recommendations and suggestions accompany the particular case studies. Many of these are area or site specific.

## **INTRODUCTION**

Wildlife-based tourism is a major tourism activity and is increasing in popularity. For many international tourists visiting Australia, viewing Australian wildlife forms a major part of their visit (Fredline and Faulkner, 2001). For domestic tourists, viewing wildlife and sometimes interacting with it is also an important activity, and it caters for specialists and generalists alike.

During the last two decades, wildlife-based tourism has recorded substantial growth highlighted by a growing interest in ecotourism. The viewing of particular species (such as penguins, whales and sea turtles) by tourists has expanded. Wildlife tourism brings pleasure to (gives utility to) those who engage in it. In many cases, it results in expenditure that generates employment and this may be of particular importance in local regions (Tisdell and Bandara, 2003). Some Australian examples of wildlife/ecotourism viewing that generate substantial revenue and employment include penguin and whale watching and nature-based activities at O'Reilly's and Binna Burra.

The research for this report on the economics of wildlife tourism and conservation has been undertaken as a part of the National Interdisciplinary Project. This is appropriate because there can be little doubt that the study of wildlife tourism and its managerial implications calls for an interdisciplinary approach. Although our main aim is to present economic information about wildlife tourism, we have tried to evaluate such tourism on a wider basis than a purely economics one, and to consider its implications for wildlife conservation and environmental sustainability. Hence, the approach adopted here is a holistic one which places greatest emphasis on economic aspects of the cases studied.

On the whole, economics appears to be under represented in studies of wildlife-based tourism. The reasons are unclear. It could reflect the fact that not many economists study wildlife tourism. In addition, collecting economic data on such tourism is difficult and is usually labour-intensive because primary data normally has to be collected, as has been done for the research results reported here.

Furthermore, widespread misunderstanding exists about the nature and role of economics as a guide to resource management. For example, there is a common, but false, view that economics is only concerned with commercial transactions, especially those involving the exchange of money. While these transactions are of interest to economists, as will become clear from this report, this conception is too narrow. Much of the economic value of wildlife, including much of its economic value for tourism, is not the subject of commercial exchange. This needs to be accounted for in the development of and management of wildlife-based tourism and its evaluation.

The next section of this report outlines the basics of the economics of wildlife tourism. This is followed by three detailed case studies of wildlife-based tourism. The first (covered in Section 3) concentrates on the importance of birds as a tourist attraction at Lamington National Park and the economic consequences of their presence. It also provides insights into tourism management issues that have arisen at the Green Mountains/O'Reilly's site, especially environmental issues. The reactions of visitors to the possibility of charging an entry fee or a parking fee to address these problems are considered.

The case study conducted in this national park, well known for its subtropical rainforest, is followed by a second case study (Section 4) concentrating on Antarctic wildlife as a tourist attraction for visitors to Antarctica. The research results reported and interpreted are based on surveys of travellers on board an Australian chartered tourist ship. Information is provided about the socio-economic background of these Antarctic tourists, their expenditure for their Antarctic journey, the importance of Antarctic wildlife for their journey, their views about the conservation of such wildlife and their attitudes to associated environmental issues.

Australia has a particular interest in the development of Antarctic tourism. Australia claims by far the largest territory of any nation in Antarctica (The Australian Antarctic Territory), and it is an initial signatory to the Antarctic Treaty. Furthermore, Australians are well represented among tourists visiting Antarctica.

The third case study concentrates on 'walk-in' visitors who come to view glow worms at the Natural Bridge site at Springbrook National Park. These visitors pay no entry fee, unlike those who come on organised commercial bus tours (mostly overseas visitors). We use a variant of the travel cost method to estimate the economic surplus of these 'walk-in' visitors and demonstrate how this surplus adds to the economic value of Springbrook National Park. Various other results from the survey and their managerial implications are also reported. In all the case studies, we collected socio-economic data on all the respondents and this enables socio-economic comparisons to be made between tourists engaging in these different forms of tourism.

The final section presents the conclusions of the study.

It was necessary to select the case studies carefully because of limited time and the limited availability of CRC funds (AUS\$10,000) for this project. Particular care was needed because the collection of primary data

using surveys can be very costly and risky.

It was decided to select cases having the following characteristics:

- Natural areas where non-captive wildlife is likely to be an important attraction for visitors, but for which its degree of economic importance is unknown.
- Natural areas that are public property (eg. national parks and protected areas in public domain) but not private property.
- Areas where the CRC for Sustainable Tourism has funded or is funding non-economic research on interactions between wildlife and tourists. In such a case, economic considerations add an extra dimension to the research on wildlife tourism.
- Areas where successful survey work is likely to be completed economically, that is within our budget constraint. This also requires consideration of practical logistics of the survey work.
- Good potential to demonstrate applications of economic techniques for the assessment and evaluation of wildlife tourism and their limitations.
- Areas involving important or potentially important conservation and environmental issues. This is important because the economic sustainability of wildlife tourism often requires the effective management of conservation and environmental phenomena.

The three case studies covered in this report satisfy all of the above criteria.

Note that the case studies do not include situations involving the economics of non-captive wildlife-based tourism on private land (such as on farms or private rural properties, or the Penguin Parade at Phillip Island) or on the land of NGOs, nor tourism based on captive animals (as in zoos) or semi-captive wildlife. While a wider coverage and range of cases would be desirable, this was completely impractical given the available resources for this particular study. However, the CRC for Sustainable Tourism has supported some studies that deal with aspects of this form of tourism.

In the three cases considered here, the tourists sampled pay no fees to view or interact with the wildlife in the areas they visit. It might be easy in such cases to believe that such wildlife has no economic value. However, as these studies will show that is a false conclusion. The economic value of such wildlife for tourism and the economic impact of its presence can be much greater than imagined at first sight. Let us now consider the general sights in that economics provides in relation to these aspects and then concentrate on the individual cases.

## **ECONOMICS, VALUE OF WILDLIFE TOURISM AND CONSERVATION IMPLICATIONS**

### **Introduction**

Economics has a variety of applications to wildlife tourism. Issues covered in the economics of wildlife tourism include estimates of the impact of expenditures by wildlife tourists on incomes and employment (a branch of economic impact analysis), consideration of the economic value of wildlife for satisfying human wants for tourism and other purposes, and the implications of these values for the optimal economic management of wildlife. Furthermore, there is the potential for economic policy instruments to be used to achieve improved outcomes for the wildlife-based tourism industry. Economics can also provide a basis for predicting or forecasting the demand for wildlife tourism (useful for planning purposes), and can be used to assess economic aspects of environmental change arising from such tourism (see for example, Tisdell 2001, 2002) and to examine sustainability issues pertinent to wildlife management, as will be discussed in the case study on Antarctic tourism.

Sustainability issues involving wildlife conservation, tourism and economics are complex (Isaacs 2000; Gowdy 2000). Economic systems can be a threat to sustainable development and can imperil the conservation of biodiversity, especially in fragile environments. In such cases, the commercial development of wildlife tourism can contribute to these unfavourable results and often calls for regulation of tourism.

### **Economic Impact of Wildlife Tourism on Income and Employment**

Wildlife-based tourism is an important segment of tourism (Higginbottom, 2004, in Ch. 2) and has grown rapidly in many countries in recent decades (see Field, 2001; Wilkie and Carpenter, 1999) and is becoming a major industry (see The US Fish and Wildlife Service, 2001). Wildlife-based tourism is a popular tourist activity in Australia, both for foreign visitors and Australians). For many tourists, a significant reason for visiting a country/region or extending their stay is the presence of wildlife and Australia is no exception (Fredline and Faulkner, 2001).

The demand for wildlife tourism comes from a wide group of visitors, both domestic and foreign (Higginbottom, 2004, Chapter 9) as well as specialists and generalists (see Wilson and Tisdell, 2001). Similarly the amount of money generated from such tourism varies according to species (Wilson and Tisdell, 2003a), foreigners and locals (Case Study I) and on average, specialists such as birdwatchers, spend more money than generalists (Sekercioglu, 2002). Furthermore, a large percentage of visitors would not visit an area if it were not for the presence of wildlife, and tourists often spend extra days in an area because of the presence of wildlife, as illustrated in Tisdell and Wilson, (2002a). Some of these aspects are highlighted in Case Study I and Case Study II.

Wildlife-based tourism is an important economic activity and can be measured in different ways. However, the appropriate method depends on the purpose of the exercise and care must be exercised in gathering information and interpreting results. For example, estimating *all* the costs associated with wildlife tourism (e.g. travelling, accommodation and food) can be difficult. Furthermore, visitors often want to see a multitude of attractions during a journey, including wildlife. Such multiple-purpose journeys usually involve several sites and pose problems for valuation techniques such as the Travel Cost Method. However, despite such difficulties, many studies have shown that the expenditures incurred as a result of wildlife tourism are large (see The US Fish and Wildlife Service, 2001; Benson, 2001; Upeneja et al. 2001; Zawacki et al. 2000; The International Ecotourism Society, 2000) but can vary a great deal, as shown in the three case studies reported here. Some studies show that the primary employment generated from wildlife tourism related expenditure is large and after allowing for the multiplier effect, the total employment impacts are even larger (see World Tourism Organisation, 1999; Howarth Tourism and Leisure Consulting, 1981).

Large estimates of income and employment generated from wildlife tourism and its multipliers for a country or region, are politically appealing. Nevertheless, despite the large national estimates often indicated in the mentioned literature, the benefits to the local area where the wildlife viewing takes place are sometimes small because most of the expenditures take place outside the local area or leaks away quickly. This can be illustrated by the case of glow worm-based tourism in southeast Queensland (Case Study III). Furthermore, an important

issue that should be borne in mind is that these economic impacts only arise from market expenditures and they do not represent total economic values, as will be explained.

Because of the problems and issues involved in estimating *all* the expenditures on wildlife tourism, it may be most realistic and relevant to estimate the economic benefits to the local area or region arising from wildlife tourism, although this approach is also not without problems.

Case study II provides estimates of the average expenditure per visitor. Judging by some of these estimates (Case study I) the income generated can be considerable and the employment created by the initial wildlife tourism expenditure can be large. Other studies conducted by Tisdell and Wilson (2002a) and Wilson and Tisdell (2003a) also show that the local income and employment created by wildlife tourism in Australia can be considerable.

While the case studies I, II and III can indicate primary impacts of economic value of wildlife tourism in generating income and employment, such impact analysis does not represent economic value or worth, as ably explained by Bishop (1987). It should also be borne in mind that in the absence of wildlife viewing money may be spent on something else that would also generate income and employment. This can be illustrated by the following hypothetical example. Suppose that annual expenditure on wildlife tourism in a region is estimated to be \$100m annually. This will support income and employment in the locality. Now imagine that the wildlife disappears and with it wildlife tourism in the region. In such a case, the land previously utilised by wildlife may be converted to farms, or alternative economic uses. Then \$100m annual expenditure on wildlife tourism in the region might be diverted to purchase those alternative products or spent in other regions. For instance, \$70 million might be spent in the local region purchasing these products. Therefore, because of these issues it is important to take into account the net economic impact of wildlife tourism for a country/region.

Since wildlife-based tourism has the potential to create monetary benefits and employment, governments, states or local councils may have an incentive (in some cases) to conserve wildlife even though all the benefits cannot be estimated or may not remain in the areas or regions where wildlife is viewed. Economic benefits can attract private providers of wildlife and complementary services as illustrated in case studies outlined here. Monetary benefits from wildlife often provide an important incentive for government intervention in conserving wildlife because the overall benefits to a country from wildlife tourism are positive (despite some leakages abroad), although all of these benefits may not accrue to local areas or communities where wildlife tourism occurs. In the absence of suitable wildlife for viewing, some groups of tourists may by-pass the country or spend fewer days in a region or country. This is more likely to be the case with specialists such as birdwatchers. Furthermore, even if wildlife-based tourism does not bring about substantial tangible economic benefits to the immediate local economy or region, there still can be substantial biological total economic benefits.

## **Total Economic Value of Wildlife and Tourism: Some Issues**

Welfare economics tries to express all the economic values that humans assign to resources in terms of money. These economic values are derived solely for the purpose of addressing the basic economic resource allocation problem (the problem of reducing economic scarcity), as envisaged by economists. This is one of the main reasons why economists calculate economic values and as Bishop (1987) states, non-economists should give greater attention to why this is done. Most frequently these monetary values are based on the willingness of individuals to pay for the use of a resource and its conservation, for example, a particular species of wildlife. The management of wildlife to satisfy tourism demands constitutes a resource-use and it is important to examine the concept of the total economic value of wildlife in relation to tourism. It has many implications including the economic allocation of scarce resources (e.g. land) between wildlife conservation and alternative uses such as farming.

The total economic value of a resource (this includes wildlife) has been defined as being equal to its *total economic use value plus its total economic non-use value* (Pearce et al. 1994) and these values are all measured in money terms, for example, dollars.

Market and other systems sometimes fail to satisfy human wants to the extent possible because they do not take full account of total economic value. They may, for example, fail to conserve wildlife resources to the extent desirable for tourism and other purposes, because the relevant monetary payment in the market system for these resources is much less than their total economic value, as measured, for example, by the maximum amount that individuals would be prepared to pay for these resources. Market systems fail to take into account unmarketed values. This is because owners of resources providing unmarketed or unmarketable economic values obtain no financial benefit by taking these values into account in their decision-making. Market failures can call for government intervention in the economic system to take account of unmarketed economic values, for example, to protect wildlife by providing national parks or to prevent an economic activity (e.g. farming) or restrict its activities, such as vegetation clearing.

Non-use economic values usually involve relatively intangible attributes of resources. In the case of a

wildlife species, non-use value includes the economic pure existence value of the species, its bequest value and option values. However, some textbooks in environmental economics categorise option values under use values (for example, Pearce et al., 1994) because of the possibility of using the resource in question in the future. Individuals often place an economic value on species they will never use nor see as shown by their willingness to pay for their continuing existence. This is pure existence value. Some individuals wish to conserve species for future generations and are prepared to pay for this. Willingness of individuals to pay for the conservation of wildlife for this reason represents an economic bequest. Option value refers to the willingness to pay for keeping open the option of possibly using a species in the future, even if it is not being used now, or the value of conserving it to accommodate a possible change in its non-use values. This, for example, is illustrated by the conservation of glow worms (case study III). At present, glow worms have primarily non-consumptive tourism use values, but tourism can result in the conservation of glow worm colonies for future economic use values and non-use values. In the case of Antarctic wildlife and Antarctic's environment, (case study II), non-use economic values are considered to be very important by the sample of Antarctic tourists surveyed.

Studies conducted by Tisdell and Wilson (forthcoming, a) and Bandara and Tisdell (2004) show that for some species non-use economic value accounts for the major part of their total value. Use value, including (sometimes) tourism use value, can constitute a low fraction of total value. For example, Tisdell and Wilson (forthcoming, a) found that non-use value accounted for 80 per cent, or more, of the total economic value of Australian tree-kangaroos for more than half of a sample of over 200 respondents in Brisbane, Australia. Bandara and Tisdell (2004) found from a sample of 300 residents in Colombo, Sri Lanka, that the tourism economic value of the Asian wild elephant only accounted for 26 per cent of its economic value, and that more than half the economic value of the Asian elephant could be attributed to its non-use value. Both Asian elephants and tree kangaroos in the wild are used for tourism purposes. Nevertheless, both non-use values and tourism can help foster political support for their conservation.

The economic value derived from wildlife tourism is an economic use value. Tourism use of wildlife may be consumptive, as in the case of recreational fishing or hunting, or it may be non-consumptive, as in the case of whale watching or in the viewing of wildlife generally. Often tourism use of wildlife is not marketed or priced, as in many national parks or protected areas where entry is free, or it is underpriced. This can result in the false conclusion that the wildlife concerned has little or no economic value and in turn, can result in inappropriate social decisions about wildlife conservation. For example, in case III visitors coming to view glow worms at Natural Bridge pay no entry fee if they are not part of a bus tour. But they do obtain an economic surplus from visiting. As pointed out in case study III, this adds to the economic value obtained from Springbrook National Park. We estimate the economic value (surplus) obtained by these visitors.

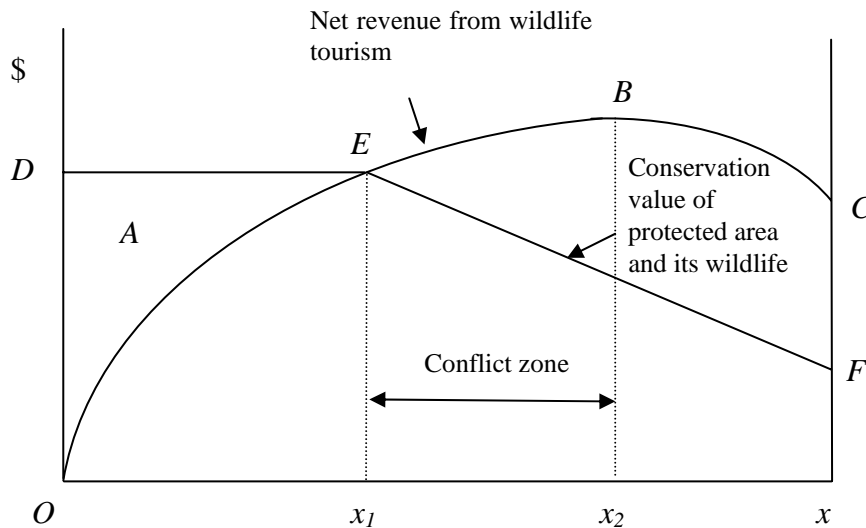
Consider the economics of the decision to allocate the land in Springbrook for a national park. Suppose that the most profitable alternative use of this area is for the grazing of beef cattle. This alternative may provide a profit of \$1 million per year to graziers, but renders the land unsuitable for wildlife tourism due to loss of wildlife species and habitat change. If, however, the economic value (including economic surpluses of visitors) of the area for wildlife tourism exceeds \$1 million, it is socially optimal, in terms of satisfying wants, to protect the land and use it for wildlife tourism rather than use it for cattle grazing. The decision about which is the better resource-use alternative in economic terms requires careful measurements to be made of the economic value of tourist use. Even if tourist use value is less than \$1 million, the addition to it of non-use economic values of the protected area in order to obtain total economic value may imply that the best economic use of the land is one involving nature conservation and its use for tourism. This, for example, would be so if this tourism alternative results in a non-use value of \$400,000 per year for the area plus a use value for tourism of \$800,000 per year.

It should be noted that while the standard economic theory of total economic value assumes that the components of total economic value are additive, there may be interaction between the components and consequently the additivity assumption is then not satisfied. For example, the non-use economic values of a wildlife species may be increased by watching it and by favourable ecotouristic experiences (Tisdell and Wilson 2002a; forthcoming b). Case study II based on Antarctic wildlife viewing provides further evidence of some changes in individuals' valuations as a result of increases in their knowledge and experience.

Furthermore, it should be borne in mind that there can be a conflict between maximising tourist receipts from a natural area and sustaining wildlife and conservation values. This is illustrated in Figure 1. In Figure 1, let curve OABC represent the net revenue which a protected area with wildlife can earn from wildlife tourism, and let the curve DEF represent the conservation value of this area and its wildlife, which may be indicated by an index. In this case the protected area could be used for wildlife tourism up to an intensity  $X_1$  without compromising the conservation value of the area and its wildlife. In this case wildlife tourism and conservation are not incompatible. However, any expansion of the wildlife tourism beyond this point to generate extra revenue, say to level  $X_2$  may compromise the conservation value of the area and its wildlife. This is sometimes a serious problem in countries such as China (Tisdell, 1999a) and leads to situations where wildlife tourism and conservation are in conflict. This is the downside of wildlife-based tourism and such tourism can do more harm than good for the conservation of wildlife. Despite the potential of some wildlife to generate revenue for the

national park and the local economy and at the same time raise money for their conservation it is important to bear in mind that there can be a conflict between wildlife tourism and the conservation of wildlife. However, wildlife managers are often able to adopt policies that reduce this conflict once they become aware of it.

**Figure 1: Possible conflict between wildlife tourism and conservation of wildlife**



Source: Adapted from Wen and Tisdell (2001)

Prices or fees may be employed to restrict tourist use of wildlife resources. However, the question of whether tourists and recreationists should be charged a fee for visiting national parks and viewing wildlife, and how high the fee should be, is a complex one. It involves economic efficiency issues as well as matters of equity and justice, as is evident from Case I, Section 3.6.

### **Empirical Estimates of the Importance of Wildlife Tourism: Economic Implications**

Many studies (Higginbottom, 2004, in Ch 1) have shown that large expenditures are made annually on wildlife tourism and recreation. This indicates that there is substantial demand for wildlife tourism and associated activities.

These estimates imply that much income and employment is generated by wildlife tourism. Employment and income is directly created by wildlife tourism results at the first stage from initial expenditure on wildlife tourism. A good example is case study I. When some of this income is spent by the recipients, this creates further income and employment and economists call it a multiplier effect. Filion et al. (1994) suggests that on average this multiplier for wildlife tourism is approximately 2. This means that each dollar spent initially on wildlife tourism creates two dollars worth of income. Or if this represents the employment multiplier, it implies for each person directly employed in wildlife tourism on average another person is employed in the economy as a consequence. There is no doubt that such economic impacts assume political significance and sway politicians, especially if the alternatives available are poor. In this case, the revenue and employment generated can be used as a powerful argument for the conservation of wildlife. However, as pointed earlier, income and employment can also be generated by alternative economic activities to tourism and expenditure on tourism does not represent a net economic benefit or net economic value.

Nevertheless, in this regard Prasad and Tisdell (1998) found that in Fiji, tourism (some of which is nature based) had a larger economic impact on the Fijian economy than sugar cane production because the income multiplier of the sugar industry was lower than that of the tourism industry after allowing for import leakages

Income and employment analysis can be especially useful at a regional level. Given income distribution concerns, governments are often anxious to encourage the development of industries that can promote development and create employment in depressed regions. Regional income and employment multipliers can be utilised to compare the potential of alternative industries to create regional employment and income. Due to economic leakages from the local economy, these multipliers will be much lower than national or global

multipliers. Leakages are usually higher in peripheral regions (Hohl and Tisdell, 1995, reprinted in Tisdell, 2001) and small economies than in central regions and large economies. Yet, the money generated from wildlife-based tourism can be an important incentive for the conservation of wildlife.

Furthermore, the development of wildlife tourism can be a valuable means of promoting economic activity in depressed and remote regions despite the problem of high economic leakages. Wen and Tisdell (2001), concentrating mainly on wildlife tourism in Xishuangbanna Prefecture, found that growth in ecotourism contributed significantly to the economic development of Yunnan Province, China. In Australia, Hohl and Tisdell (1995, reprinted in Tisdell, 2001) found that nature-based tourism, despite economic leakages, provided significant economic opportunities for the residents of Cape York Peninsula.

The number of persons engaging in wildlife tourism is often used to highlight its importance. Higginbottom (2004, Chapter 1) gives estimates that each year millions engage in wildlife tourism in the United States. Globally the numbers run to many millions. But mere numbers of participants may not be accurate indicators either of the economic impact nor of the net economic value of wildlife tourism, as pointed out by Tisdell and Wen (1997a, reprinted in Tisdell, 2001). Case study II on glow worm-based tourism illustrates this point. Despite more than 60,000 visitors a year (more than for sea turtle viewing and a little less than for whale watching) the economic impact on the immediate local economy is small. Several reasons have been cited in Case Study III.

On the other hand, few persons may engage in some types of wildlife tourism or recreation yet the economic value placed on it by participants can be much greater than for activities in which many engage. For example, trophy hunting attracts comparatively few tourists, but per capita expenditure by trophy hunters is very high and their economic impact can also be high. Furthermore, not many visitors visit Antarctica to watch its wildlife but the money spent by these visitors is large (case study II). We cannot judge the economic impact nor the economic value of different forms of wildlife tourism merely by comparing the numbers of persons participating in these. However, participation figures may interest politicians in gauging the number of stakeholders, even if numbers do not adequately reflect the intensity of the interest of participants.

Most available monetary estimates of the 'economic worth' of wildlife tourism do not actually measure its economic value but rather concentrate on costs or expenditure involved in it. Although, these dollar sums if accurately calculated, indicate primary economic impact, they do not reflect net economic worth (net economic value) and do not include non-use values. Net economic value is relevant if the economic focus is on resource use and one wants to minimise collective economic scarcity.

Thus, measures of the importance of wildlife tourism need careful scrutiny from an economics viewpoint, and vary in economic relevance according to the policy or purpose to be considered. In particular, expenditures or costs incurred in engaging in or catering for wildlife tourism are a poor indicator of the net economic value of wildlife tourism in satisfying economic wants collectively.

There are certain general economic features that influence the demand for wildlife tourism but they have not been summarised in one place. However, on the basis of empirical evidence and analysis, Tisdell, (1974, reprinted in Tisdell, 2001, p.285) observed:

'Such factors as (1) rising incomes, (2) more education, (3) more available leisure time, (4) improvements in transportation, (5) the falling costs of recreational equipment relative to incomes and (6) economic development generally have accelerated the demand to use natural areas for recreational purposes. At the same time as the demand for natural areas has increased, the supply of these has dwindled because increased amounts of land have been appropriated for agriculture, for industry for mining, to accommodate urban sprawl, to provide housing at holiday resorts and to meet other demands of a high consumption society with a rising population. On the face of it, the relative value of saving natural areas for recreational and conservational purposes seems high and indeed, there may be a case for reconverting some developed land to a more natural state.'

Sinden (1977) provided Australian evidence in support of the above generalisations, which also apply to wildlife tourism. These observations are also consistent with the observations of Rankin and Sinden (1971).

As a result of economic development or economic growth, we can expect both the comparative net economic value or worth of wildlife for tourism to grow and also the economic impacts of wildlife tourism to increase. Since species extinction is as yet irreversible, this provides a powerful argument (over and above total valuation considerations) to conserve wildlife species and resources to cater for future economic needs, including those of future generations.

Much can also be said about the economics of tourist demand at the level of individual and in particular localities. The three case studies can be considered as examples. However, influences on the demand of individuals for wildlife tourism are covered extensively by Higginbottom (2004, in Ch. 9), and useful guidelines about demand for regional wildlife resources can be found in McNeely et al. (1992) and in Tisdell (1996).



## **Economic Instruments and Wildlife Tourism – Their Purpose and Usefulness**

The management and conservation of wildlife for tourism, not only needs relevant incentives, but also controls so that available resources are not over utilised, but used on a sustainable basis. This is applicable for both the public and private provision of wildlife for tourism purposes and the three cases studies illustrate several of the issues involved.

A variety of policy instruments for managing wildlife tourism have been used/discussed in the economic literature. These policy instruments can be used not only to provide incentives or place controls on providers of wildlife for tourism (operators) but can also be aimed at users of wildlife (tourists). Apart from the use of policy instruments to provide incentives or controls, these instruments may also be aimed at generating revenue which could be used to develop infrastructure facilities and for conservation purposes.

Sustainable use of resources is a major current policy objective and Davis et al. (2001) have shown that a wide range of economic policy instruments can be used in managing wildlife tourism to meet the aims and objectives of administrators, which of course change from situation to situation. In other words, one set of economic instruments that works in a particular situation may not be the best in another situation or place. Outcomes from policy instruments can vary a great deal according to circumstances. Some of the available policy instruments are summarised and discussed in detail in Higginbottom (2004, Ch. 11). Instruments that fall into the category of 'charges, taxes and fees' and 'market creation' are most widely recognised as involving market or economic instruments, but those coming under 'regulations and standards' and 'liability legislation' also involve aspects of institutional economics.

The choice of instruments by administrators depends upon many considerations and not just economic efficiency. Criteria that administrators may consider apart from economic efficiency include low information costs, equity, dependability, adaptability, provision of incentives and political acceptability (Turner et al. 1994). Despite the large array of economic policy instruments available, direct regulatory instruments are the most commonly used (Turner, et al. 1994). This is so for the management of wildlife tourism (Higginbottom, 2004, Ch. 11). These direct regulatory instruments are often preferred because of precautionary principle, especially when outcomes are unknown. Furthermore, regulatory instruments require less information than economic-type instruments, are more dependable (subject to adequate policing) and have a higher degree of political and administrative acceptance (Turner, et al. 1994). However, these instruments allow minimum flexibility, involve 'maximum' government intervention and are top-down 'control oriented'. An example of a regulatory instrument in wildlife-based tourism is the licensing of wildlife-tourism providers. The latter sometime falls into the category of economic instruments. For instance, whale-shark tour operators in the Ningaloo Marine Park and commercial tourism operators on the Great Barrier Reef, Australia have to be licensed, pay an annual fee and operate within stipulated guidelines. This limits the number of operators and can prevent the over-use of resources. Licensing involving fees also generates revenue. Another commonly used economic instrument is the levying of fees and charges on tourists to view wildlife. Tour operators charge a fee, part of which is paid to the managing authority such as in the case of whale shark or the Great Barrier Reef viewing. Fees may also be charged to enter nature reserves/national parks such as in the case of many national parks in the US or some Australian national parks, such as Kakadu National Park in the Northern Territory. Fees are often charged to enter nature reserves managed by non-governmental organisations, such as the Royal Society for the Protection of Birds (RSPB) in the UK.

Apart from generating revenue, fees can be used to regulate the number of visitors to a site, but their effectiveness in doing this depends on the responsiveness of demand to changes in fees.

There is scope for greater use of some economic instruments. For example, there has been little use of market-based instruments involving tradable permits. This is the case not only in wildlife tourism, but in other sectors as well. Hanley et al. (1997) point out that lack of market-based instruments is due partly to ignorance on the part of policy-makers, practical problems, institutional problems and opposition from administrators and policy-makers. However, market-based instruments based on tradable rights are used in wildlife tourism in a limited way in some countries (Tisdell and Wilson, 2004b). The potential exists for the further use of these instruments in wildlife tourism as suggested, for example, by Davis et al. (2001) and Davis and Tisdell (1999), for instance, in the trading of licenses of the whale shark and those of the Great Barrier Reef commercial tourist operators.

Despite the existence of many policy instruments several wildlife tourism activities operate without public regulation or with limited regulation. This includes some providers of Antarctic wildlife-based tourism activities (case study II). Another example is the 'jumping crocodile' cruises conducted on the Adelaide river in the Northern Territory, Australia. Entry and exit of operators are not regulated and there is no tenure in the use of the river for crocodile watching tours. Lack of tenure could create economic disincentives for investing in these tourism businesses.

Lack of appropriate incentives/controls can retard the growth of a sustainable wildlife tourism industry.

Furthermore, a lack of public regulation may lead to particular forms of wildlife tourism that endanger tourists and thereby have negative consequences for wildlife tourism as a whole.

## **Discussion**

Wildlife has economic use and non-use values and the sum of these two components makes up its total economic value. Use values of wildlife may or may not be priced or marketed. Wildlife tourism creates market use values for some species but not others. The mere absence of market values for wildlife species does not mean that such species lack economic values. Non-marketed values of wildlife include indirect use values (such as the ecological values they provide in the environment) and their non-use economic values for humans. Often the non-market values of species exceed their market economic values. Therefore, it is imperative that non-market economic values of wildlife are considered in the decision-making process when land use is considered.

Tisdell and Wilson (2002c), suggest that often there is a strong correlation between numbers of wildlife tourists and the frequency of sightings of wildlife. If the frequency of sightings is low or sightings cannot be guaranteed, then the number of wildlife tourism visitors is likely to fall. Hence, demand for wildlife tourism can require the maintenance of sizeable populations of wildlife, and this can result in positive outcomes from the viewpoint of conservation. Therefore, wildlife tourism and conservation outcomes need not be incompatible. However, there are instances where these are in conflict as illustrated in Figure 1.

Various policy instruments, including economic ones, can be used to bring about sustainable outcomes for both wildlife tourism as well as for nature conservation. If these policy instruments are well used, then a social economic improvement is possible. Economics, therefore, could play a major role in ensuring positive outcomes for wildlife tourism as well as for conservation.

There are many important issues in wildlife tourism that need to be addressed in future research. Some of these include:

(1) How much exchange of money does wildlife tourism generate and how much of this should be used for conservation. Furthermore, it is important to examine the economic benefits to property owners from wildlife tourism; (2) There is a need to consider not only the economic use values from wildlife tourism but also consider non-use values arising from it; (3) The role market-based instruments can play in wildlife tourism and the conservation of wildlife needs more attention. At present, the use of such instruments for wildlife tourism purposes is limited; (4) The welfare effects of charging entry fees to publicly managed national parks and wildlife tourism sites need further consideration. Conservation implications and provision of infrastructure from entry fees should also be examined; and (5) The reasons for the increasing degradation of wildlife resources despite the large sums of money generated from wildlife tourism as shown in Higginbottom (2004, in Ch.1) need to be better understood.

These issues have important implications for planning, design and management of wildlife tourism for various stakeholders. Wildlife is a valuable resource and has tourism and other economic values, but needs to be utilised with conservation in mind. These objectives should be separated. If they are, there is a risk that wildlife tourism will become unsustainable because its main resource-base will disappear. Furthermore, the potential for developing new ventures in wildlife tourism exists but business aspects have to be taken into account (see Higginbottom, 2004, Chapter 10). Because of the various economic values of wildlife, commercial developers of land should weigh all options before deciding on the appropriate use of land. It may well be that wildlife tourism can be more profitable than producing agricultural commodities, especially in the long-term. It is also important for conservation managers and wildlife tourism operators to consider the non-use values of wildlife because for many species, non-use values exceed the use values. Furthermore, wildlife tourism can increase the perceived non-use economic values individuals place on species. All this could increase the total economic value placed on conserving wildlife.

## CASE STUDY I: BIRDS AS A VISITOR ATTRACTION TO LAMINGTON NATIONAL PARK

### INTRODUCTION

Lamington National Park (LNP), located in the hinterland of the Gold Coast in southeast Queensland, Australia is an important natural tourist attraction, both for Australians and overseas visitors. It is well known for its rainforests and is World Heritage listed as part of the Central Eastern Rainforest Reserves of Australia (CERRA). LNP receives both day visitors and those staying for one or more nights. Overnight tourists may stay within the park area in the privately provided lodge accommodation at O'Reilly's Rainforest Retreat located in the Green Mountains area or at Binna Burra Mountain Lodge located at Binna Burra, or camp near these sites on grounds provided by the Queensland Parks and Wildlife Service (QPWS) at both sites and by private operators at Binna Burra. A limited amount of private accommodation is also available within a short driving distance of LNP. The location of the park is shown in Map 1 and the Binna Burra and O'Reilly's/Green Mountains sites are marked.

LNP is the most frequently visited national park in Queensland (Moon and Moon, 2000) and was declared a national park in 1915 (Jarrott, 1990) and is one of Australia's oldest national parks. According to vehicle counters, QPWS recorded 108,551 vehicles entering at Binna Burra in 2001 and 77,209 at Green Mountains (personal communication, QPWS, 2003).

Visitors are attracted by the recreational attributes of the park (eg. family outings, entertaining visitors), its subtropical rainforest, abundant wildlife, scenic beauty, bush walking, and the history of the Stinson crash in the 1930s and of the O'Reilly's family (cf. O'Reilly, 1983). Birdlife is abundant and some threatened species such as the Albert's lyrebird, rufous scrub bird, eastern bristlebird and the Coxen's fig parrot are found in the park (cf. Nielsen, 1991). The uncommon mammals include the endangered southern tiger quoll (Moon and Moon, 2000). The park is also an important habitat for a wide range of frogs (cf. Barker et al. 1995), reptiles, insects (e.g. glowworms) and fishes. Bush-walking and the tree-top walk are also popular activities (cf. Martin, 1991; Buchanan, 1987) and some visitors are attracted by the park's World Heritage values.

**Map 1: Generalised location map of Lamington National Park (LNP)**



Source: Based on the Joint Tourism Committee (2000) regional map of Southeast Queensland published in 'The Guide'.

Note: National park area is shaded in grey and private properties within the park are shown in white. Main roads are shown by solid lines.

The emphasis of both O'Reilly's and Binna Burra lodges, (two private operators) is on ecotourism (Weaver and Lawton, 2001) and they rely heavily on the use and attributes of LNP for the economic viability and sustainability of their business. Most visitors to LNP come to the areas where these parcels of private property adjoin the national park. Many day visitors, for example, who mainly visit the attractions of O'Reilly's, use the

adjoining Green Mountains car park partly located on QPWS property (see Map 2). Given our limited resources, we decided to concentrate on surveying visitors to the O'Reilly's/Green Mountains site.

Visitors to the O'Reilly's/Green Mountains site were surveyed in the period October, 2001 to March, 2002 using a structured questionnaire (Appendix A). An important purpose of this survey was to provide a socio-economic profile of visitors, and identify their reasons for visiting this site, especially the comparative importance of the attributes of LNP attracting them. Particular attention was given to birds and their attributes as attractions and to the economic significance of birds as an attraction to the site.

Bird-watching is a significant attraction to LNP, both for generalist visitors and specialist bird-watchers. For example, *Birding Tours Worldwide* (2003), published in America, features O'Reilly's as an important birding location for their tours in Australia. LNP is also promoted by the O'Reilly's Rainforest Retreat and the Binna Burra Mountain Lodge tourist operators as a bird-watching destination.

Our study gave particular attention to measuring the relative importance of birds and their attributes as factors influencing visitors' travel to LNP. This is partly because although birds are the most visible, brightly hued (especially parrots and wrens) and vocal form of Australian animal wildlife, particularly by day. Little assessment has been done of the relative importance for visitors of the different components of Australia's protected areas having multiple natural attributes, such as LNP.

This exercise also enables some local economic impacts of visitors to the O'Reilly's/Green mountains site to be estimated generally, and some predictions to be made of the difference that the presence of birds might make to visitation rates, and duration of stays at this site, along with economic consequences of their presence. It is known that bird-watchers often make substantial financial contributions to the localities they visit (cf. Kerlinger and Brett, 1995, US Department of the Interior, Fish and Wildlife Service and US Department of Commerce, Bureau of the Census, 1996). Furthermore, information is also provided on the willingness of individuals to pay for entry to LNP as well as the time that respondents allocated to different activities in LNP. The question of whether entry fees should be charged is especially important in the present climate in which many park agencies moving towards greater commercialisation (Figgis, 2000).

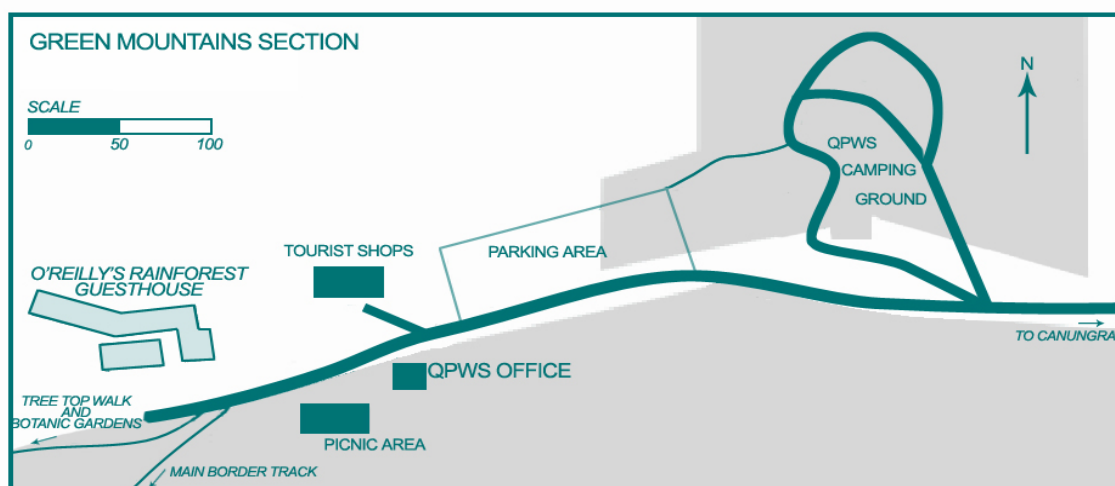
## **The Nature of the Survey and the Socio-Economic Profile of Respondents**

Potential respondents were given the structured questionnaire (reproduced in Appendix A) in the period October 2001 to March 2002 in as random a fashion as possible. Approximately 225 (with a 34% response rate) were distributed by O'Reilly's Rainforest Retreat to their guests. A further 1,536 (with a 35% response rate) were handed out at (or near) the Green Mountains Car Park adjoining O'Reilly's (see Map 1) so as to ensure that a selection of day visitors was included in the sample as well as some visitors from the nearby QPWS camping ground. The days of the week which survey forms were distributed was varied so as to avoid possible biases in the sample for day-visitors. Potential respondents were provided with a postage-paid return envelope as well as the survey form. One form per family, party, or an individual travelling on his/her own were distributed. In total, 599 respondents were accompanied by 1,937 adults and 364 children. So the total size of the parties together was 2,301 with an average party size of 3.85<sup>4</sup>.

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<sup>4</sup> These figures do not include pilot survey data. There were 23 pilot forms completed and 599 non-pilot. The pilot survey collected slightly less data than the post pilot survey. Pilot survey data is, however, used in this article along with main survey data when they cover the same set.

**Map 2: Site map showing Green Mountains Section of LNP and O'Reilly's property**



Source: Based on QPWS (2001) information brochure on Lamington National Park.  
 Note: Grey shading shows national parks property and white area shows private property.

While the response rate may seem low, such response rates are not unusual for surveys of this nature. In fact, responses are frequently in the low 30s (cf. Jakobsson and Dragun, 1996). There were 622 completed forms (pilot plus post-pilot ones). The majority of respondents were day visitors or did not stay at or near this site (385 or 62 per cent), whereas 237 (38 per cent) did. Of those staying overnight at this site or nearby, the majority (148)<sup>5</sup> or 62 per cent stayed at O'Reilly's Rainforest Retreat, 47 (20 per cent) stayed at the QPWS camping ground and 42 (18 per cent) had accommodation nearby.

The relative frequency distribution of visits was of a U-shape, as can be seen from the last column of Table 1. Visitors either tended to be on their first visit or to have visited more than three times. This was so for both day and overnight visitors and may indicate a high degree of visitor 'loyalty' to this site.

**Table 1: Sampled visitors classified by frequency of their visits to O'Reilly's/Green Mountains, Lamington National Park**

Number of visits	Day visitors		Overnight visitors		Total	
	Number	%	Number	%	Number	%
First time visitors	176	(59, 46)	124	(41.3, 52.1)	299	(100, 48.1)
Second time visitors	29	(52, 7.5)	27	(48.2, 11.4)	56	(100, 9)
Third time visitors	33	(62.3, 8.5)	20	(37.7, 8.5)	53	(100, 8.5)
More than three times	144	(68.5, 37)	66	(31.4, 28)	210	(100, 33.7)
No response	03	(75, 0.78)	01	(25, 0.42)	04	(10, 0.6)
<b>Total</b>	<b>385</b>	<b>(61.3, 100)</b>	<b>237</b>	<b>(38.1, 100)</b>	<b>622</b>	<b>(100, 100)</b>

The modal age of respondents was in the 50-60 years range and more than 80 per cent of respondents were over 30 years of age. At least two-thirds of the sample had tertiary educational qualifications with 15 per cent having postgraduate degrees. The educational background of respondents was well above the average in the Australian population. Furthermore, the family annual income of respondents was relatively high. Their modal family income was \$60,000 pa or above and the median around \$50,000 pa. This may be a reflection of the presence of a high proportion of ecotourists, especially bird-watchers who are in general well educated and have above

<sup>5</sup> Three of the O'Reilly's Rainforest Retreat visitors also stayed at the QPWS camping grounds for part of their visit.

average incomes (Sekercioglu, 2002; Ceballos-Lascurain, 1996). According to Cordell and Herbert (2002), the income of an average bird-watcher in the USA is US\$50,000 and about a third of the birdwatchers have at least a college degree. Apart from being well educated, bird-watchers also have a high degree of ecological knowledge and a high awareness of conservation issues (Cordell and Herbert, 2002). But the results in our sample are not solely explained by the presence of specialist bird-watchers since they constitute only a 6-8 per cent of the sample.

Of the respondents, 499 (80.22 per cent) were from Australia, 121 from overseas (19.45 per cent) and 2 (0.32 per cent) did not answer this question. Of those responding, more than 68 per cent of the Australian visitors were from Queensland. This is largely explained by proximity factors. A visit to O'Reilly's is a convenient day trip from southeast Queensland (e.g. Brisbane and the Gold Coast). The composition of respondents by country, or if Australian, by state, is shown in Table 2. Because of the language barrier, Japanese in all probability were under represented in our sample. British Commonwealth countries, the USA and Germany top the list of visitors to this site. As can be seen from Table 2, Green Mountains is very popular with overseas tourists from the UK.

**Table 2: Country and state of origin of Australian visitors to O'Reilly's/Green Mountains, LNP**

<b>Overseas visitors</b>	<b>No</b>	<b>%</b>	<b>Australian visitors</b>	<b>No</b>	<b>%</b>
UK	41	33	QLD	339	68
USA	19	15	NSW	82	16
Germany	18	14	VIC	29	06
NZ	10	08	ACT	00	0
Canada	09	07	SA	14	03
Ireland	04	03	WA	09	02
Japan	03	02	TAS	03	0.6
Other*	17	14	NT	02	0.4
			NR+	21	04
<b>Total</b>	<b>121</b>	<b>100</b>	<b>Total</b>	<b>499</b>	<b>100</b>

\* Includes two respondents who did not indicate their nationality. + Did not indicate their State of origin. Note: Two respondents did not indicate their nationality.

As might be expected, the relative frequency of day visitors (mostly from Queensland) was greater for Australian visitors than for foreign visitors and vice versa for overnight visitors. This is shown in Table 3.

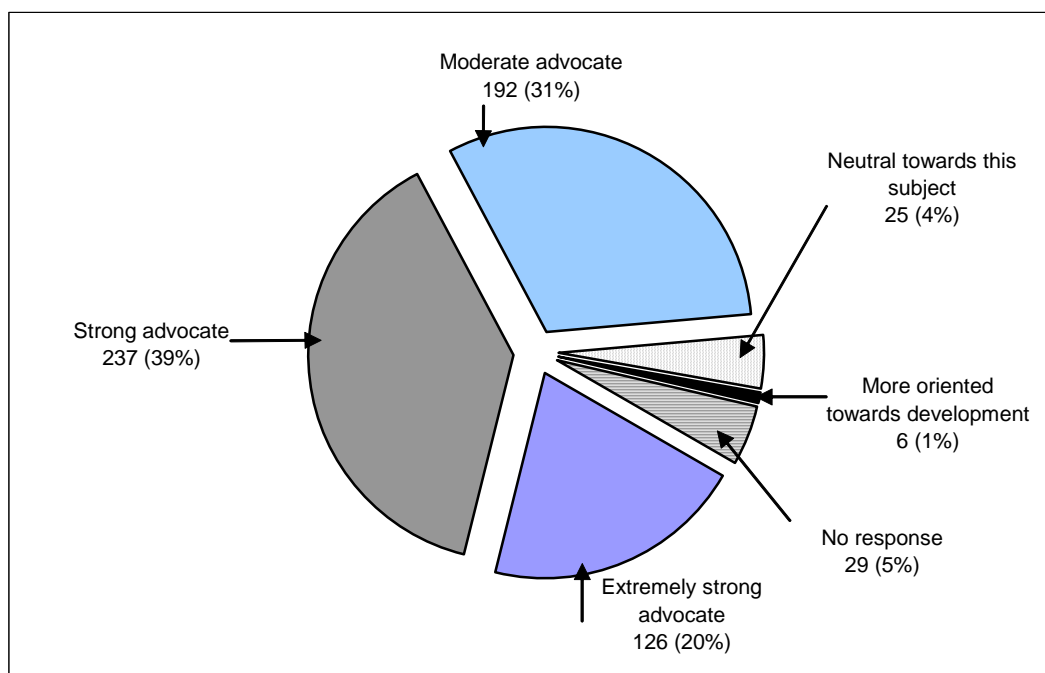
**Table 3: Composition of sampled visitors to O'Reilly's/Green Mountains, LNP by duration of stay and country of origin**

<b>Country</b>	<b>Day Visitors</b>		<b>Overnight Visitors</b>		<b>Total</b>	
	<b>Number</b>	<b>%</b>	<b>Number</b>	<b>%</b>	<b>Number</b>	<b>%</b>
Australia	332	(66.5, 82.2)	167	(33.4, 70.4)	499	(100, 80.2)
Overseas	51	(42.1, 17.8)	70	(57.8, 29.5)	121	(100, 19.4)
No response	02	(100, 0.52)	-	-	02	(100, 0.3)
<b>Total</b>	<b>385</b>	<b>(61.9, 100)</b>	<b>237</b>	<b>(38.1, 100)</b>	<b>622</b>	<b>(100, 100)</b>

Only 20 per cent (124) of the respondents said that they are members of any nature conservation group, 75 per cent (464) said they are not, and 34 (5 per cent) did not answer this question. Nevertheless, 59 per cent (the majority), as can be seen in Figure 2 were extremely strong or strong advocates of nature conservation. This may indicate that most 'free ride' by not being a member of any nature conservation organisation and rely completely on the government in that regard to provide for nature conservation<sup>6</sup>. It was found that those who are members of one nature conservation group often belonged to several.

<sup>6</sup> This means that many Australians rely completely on their payment of taxes to support nature conservation but may also benefit from the efforts of others in supporting voluntary nature organizations. No moral judgement is being made in this regard. In particular it is not being argued that nature protection be the exclusive domain of private and voluntary organizations (cf. Tisdell, 2002).

**Figure 2: Frequency of attitudes of sampled visitors towards nature conservation**



### Stated Reasons for Visiting O'Reilly's/Green Mountain Site and Activities Engaged In

Respondents were asked an *open-ended* question, 'What is your main reason for visiting this site this time?' Their responses are summarised in Table 4. The most frequently mentioned reasons were (1) bush-walking; (2) the appeal of the rainforest; (3) sightseeing; (4) accompanying visitors; (5) having a picnic day out with children/family; (6) bird-watching; (7) relaxation.

**Table 4: Main reason given by sampled visitors (in an open-ended question) for visiting O' Reilly's/Green Mountains, LNP**

Activity	Total		Day Visitors		Overnight Visitors	
	Number	%	Number	%	Number	%
Bush-walking	125	(100, 20.2)	86	(68.8, 22.5)	39	(31.2, 16.5)
Rainforest	83	(100, 13.4)	49	(59, 12.8)	34	(41, 14.3)
Show to visitors	58	(100, 9.4)	50	(86.2, 13.1)	8	(13.8, 3.4)
Sightseeing	57	(100, 9)	41	(71.4, 10.4)	16	(28.6, 6.8)
Bird-watching	46	(100, 7.4)	23	(50, 6)	23	(50, 9.7)
Holiday	45	(100, 7.3)	8	(17.8, 2.1)	37	(82.2, 15.6)
Picnic with family	37	(100, 6)	34	(91.9, 8.9)	3	(8.1, 1.3)
Relaxation	37	(100, 6)	13	(35.1, 3.4)	24	(64.9, 10.1)
Treetop walk	36	(100, 5.8)	33	(91.7, 8.6)	3	(8.3, 1.3)
Heard from others	22	(100, 3.5)	11	(50, 2.9)	11	(50, 4.6)
Camping	12	(100, 1.9)	0	(0,0)	12	(100, 5.1)
Education/field	10	(100, 1.6)	2	(20, 0.5)	8	(80, 3.4)
Four wheel drive	4	(100, 0.6)	4	(100, 1)	0	(0,0)
Other reasons	27	(100, 4.4)	13	(48.1, 3.4)	14	(51.9, 5.9)
Not responded	23	(100, 3.5)	18	(77.3, 4.4)	5	(22.7, 2.1)
<b>Total</b>	<b>622</b>	(100, 100)	<b>385</b>	(61.8, 100)	<b>237</b>	(38.2, 100)

A more structured question was asked to assess the importance of various features at the O'Reilly's/Green Mountains site. It was presented in the following way: *'We are trying to assess the importance of a number of features at this site and we would like your input. It would help us if you could say whether the following features of this site were 'very important', 'important' or 'unimportant' reasons for your decision to visit it'*.

The pattern of responses is reported in Table 5. Using the weighting indicated, the presence of rainforest, followed by the presence of birds and getting close to nature are the main factors attracting visitors to this site. World Heritage listing comes relatively low on the list. This shows that mere listing of properties as World Heritage sites does not necessarily increase tourist visitation numbers significantly, as argued by Tisdell and Wilson (2002b). This table demonstrates that the presence of birds is one of the most important visitor attractions of the O'Reilly's/Green Mountains site.

**Table 5: The relative importance of reasons for visiting O'Reilly's/Green Mountains features at the site as stated by respondents**

Factor influencing decision to visit	Very Important		Important		Unimportant		N/r		Total	Weighted Average*
	No	%	No	%	No	%	No	%		
The presence of rainforest	553	89	67	11	1	0	1	0	622	1.89
The presence of birds	471	76	134	22	15	2	2	0	622	1.74
Getting close to nature	450	72	148	24	19	3	5	1	622	1.68
Rare ecosystem	344	55	217	35	41	7	20	3	622	1.45
Considerable biodiversity present	332	53	225	36	43	7	22	4	622	1.42
Good starting point for walks	331	53	218	35	58	9	15	2	622	1.41
Place to get away from routine	318	51	220	35	67	11	17	3	622	1.37
World Heritage listed	278	45	202	32	131	21	11	2	622	1.22
Cool Green spot	188	30	294	47	123	20	17	3	622	1.07
Bring visitors	154	26	198	33	212	35	35	6	599*	0.85
Good picnic spot	99	16	230	37	268	43	25	4	622	0.69
Other+	76	12	13	02	10	02	523	84	622	0.27

\* Does not include pilot survey data. N/r = No response. The method of weighting is: 0 for unimportant, 1 for important and 2 for very important.

+ A variety of reasons were cited by the respondents ranging from the Stinson crash, tree top walk, history of O'Reilly's, photography and filming, etc.

## Particular Attributes/Aspects of Birds as Attractions to the O'Reilly's/Green Mountains Site

As reported above, birds at the O'Reilly's/Green Mountains site are one of its most important attractions. The presence of birds was in fact ranked only second to the presence of the rainforest. Given their significance, it is useful to consider the attributes of birds that visitors consider to be important. A list of attributes was provided and respondents were approached with the following statement: *'We would like to assess the value of birdlife at this site. Please help us by indicating the importance to you (in terms of whether they are 'very important', 'important', or 'unimportant') of the following attributes of birdlife at this site'*. The responses are summarised in Table 6. Using an index of importance<sup>7</sup>, it was found that hearing birds was to be the most important attribute followed closely by a large variety or diversity of birds as well as seeing lots of birds. For this group as a whole, seeing brightly coloured birds and having close physical contact with birds was of least importance. At the O'Reilly's site, Crimson Rosellas and King Parrots (brightly coloured) and to a lesser extent Regent and Satin Bower Birds (males are brightly hued) are regularly fed by tourists. There is also close physical contact with these birds as well as brush turkeys and some other species of rainforest birds.

<sup>7</sup> This was calculated as a linear weighted average of these ratings. It can be sensitive to the weights used.



**Table 6: Importance to visitors of various attributes of birdlife at O'Reilly's/Green Mountains site – frequency of responses**

Attribute of birds	Very important		Important		Unimportant		No response		Total	Index of importance*
	No	%	No	%	No	%	No	%		
Hearing birds	375	60	231	37	14	2	2	0	622	1.57
Large variety or diversity of birds	353	57	236	38	27	4	6	1	622	1.52
Seeing lots of birds	351	56	245	39	20	3	6	1	622	1.51
Presence of rare birds	324	52	217	35	66	11	15	2	622	1.39
Close physical contact with birds	218	35	217	35	176	28	11	2	622	1.05
Brightly coloured birds	200	32	257	41	146	23	19	3	622	1.05

\*Index of importance has been calculated using the following weights:  
Very important 2; Important 1; Unimportant 0.

Two clusters of individuals seem to be represented as can be inferred from the cross tabulation matrix shown in Table 7. Those who found close physical contact with birds or those who thought that brightly coloured birds were important attributes at this site were less likely than others to rate the seeing of lots of birds, hearing birds, large variety of birds and the presence of rare birds as important.

**Table 7: Cross tabulation of relative frequencies in per cent with which respondents rated specified attributes of birds as important or very important for their visit to the survey site**

Attribute of birds	Seeing lots of birds	Hearing birds	Large variety of birds	Presence of rare birds	Physical contact with birds	Brightly coloured birds
Seeing lots of birds	100	83	79	73	66	71
Hearing birds	85	100	80	75	63	68
Large variety of birds	78	78	100	84	62	67
Presence of rare birds	66	67	77	100	59	61
Physical contact with birds	48	45	46	48	100	66
Brightly coloured birds	55	51	52	52	69	100

Respondents were found to place a higher value on a greater diversity of species of birds at this site than for a large numbers of birds, though marked differences are not apparent from Table 7. Respondents were also asked, 'If you had to choose between (a) seeing lots of birds at this site, and (b) seeing half as many birds, but more varied species, what do you think you would prefer?' Sixty seven per cent (417) opted for diversity, 27 per cent (167) opted for quantity and 6 per cent (38) did not answer.

In an open-ended question, bower birds and parrots (including rosellas) were most frequently mentioned as birds most appreciated at this site. Overall, 85 per cent of respondents said that it was very important to protect birds at this site, 12 per cent said that it is important, less than 0.5 per cent said it is unimportant and 2 per cent did not answer this question.

The importance of birds as an attraction to this site is evident by the fact that 16 per cent (99) of the respondents said that they would not visit this site in the absence of birds and that a further 27 per cent would reduce the frequency of their visits. In all a reduction of visits by at least 43 per cent of current respondents could be anticipated. Taking into account non-responses, the actual reductions in visits would be slightly higher. The absence of birds would, therefore, reduce the economic value of the site substantially and, as discussed below, would have a significant negative local/regional economic impact. Conversely, it can be said that the presence of birds is very important in generating visits to this site and adds significantly to its tourist value and its

local/regional economic impacts.

Only 37 per cent of respondents said that they had obtained information about birdlife and its role in the ecosystem during their visit to this site, 60 per cent said they did not, and 3 per cent did not answer. For these visitors as a whole, most obtained little added information about birds as a result of their visit. Hence, one of the criteria for ecotourism may only be partially achieved. However, only 31 per cent of respondents said they would have liked more information in this regard, 58 per cent would not have liked more information, and 11 per cent did not respond. Thus, there is a demand for provision of extra information about birdlife at this site by at least one-third of the visitors, but not all. The majority of visitors did not want such extra information. Some of these visitors may already have been well informed. Furthermore, not all individuals seek extra knowledge, especially if they are on holiday or in leisure-mode.

In our sample of respondents, 24 per cent of the visitors rated their knowledge of birds as being below the general average, 59 per cent thought it was average, 13 per cent (78) thought it was above average and 4 per cent did not respond. Of the group stating their knowledge to be 'above average', 48 (61 per cent) considered themselves to be bird-watching specialists or hobbyists, that is, almost 8 per cent of the total sample. Of these, 40 (6.5 per cent) of the total respondents said that they were carrying specialist bird-watching gear, the main items being binoculars (36 respondents), a field guide (35), a specialist camera (15) and a telescope (8). A playback recorder, GPS and a video were reported in one case.

## Economic Impacts and Economic Issues

Respondents were asked how much they spent (within 60 kilometres of O'Reilly's/Green Mountains) on the day of receipt of the survey form. For example, O'Reilly's as well as the guesthouses just outside the national park offer a range of accommodation charging different rates. It is not always easy to work out the exact amounts visitors spent within this area because there are special offers from time to time and pensioners, children and regular patrons are offered concessions. There are also company and family guests for whom expenditures have already been pre-paid. Hence, such visitors' true expenditures are not captured accurately. The QPWS camping rates are low (AUS\$4 dollars per adult and AUS\$16 per family of up to 6) and most campers bring their food and other requirements from home.

As can be seen from Table 8, visitors staying at O'Reilly's Rainforest Retreat spent the highest amount locally, followed by those staying overnight at guesthouses just outside the national park. The QPWS campers' expenditures were much lower followed by that of day trippers. While these figures may be lower bounds of the real expenditures, they provide an accurate indication of relative expenditures.

**Table 8: Average expenditures per person per day within a 60 kilometre radius of O'Reilly's/Green Mountains site as reported by respondents**

Origin of Visitors	Day trippers AUS\$	O'Reilly's guests AUS\$	QPWS campers AUS\$	Those staying just outside the national park AUS\$
Australian visitors	17	141	19	59
Overseas visitors	31	101*	32	71
<b>Total AUS\$</b>	<b>48</b>	<b>242</b>	<b>51</b>	<b>130</b>

\* It appears that overseas visitors have spent less than Australian visitors. This is because most overseas visitors said that they were on organised package tours and hence, were unable to say exactly how much it cost them per day to stay at O'Reilly's.

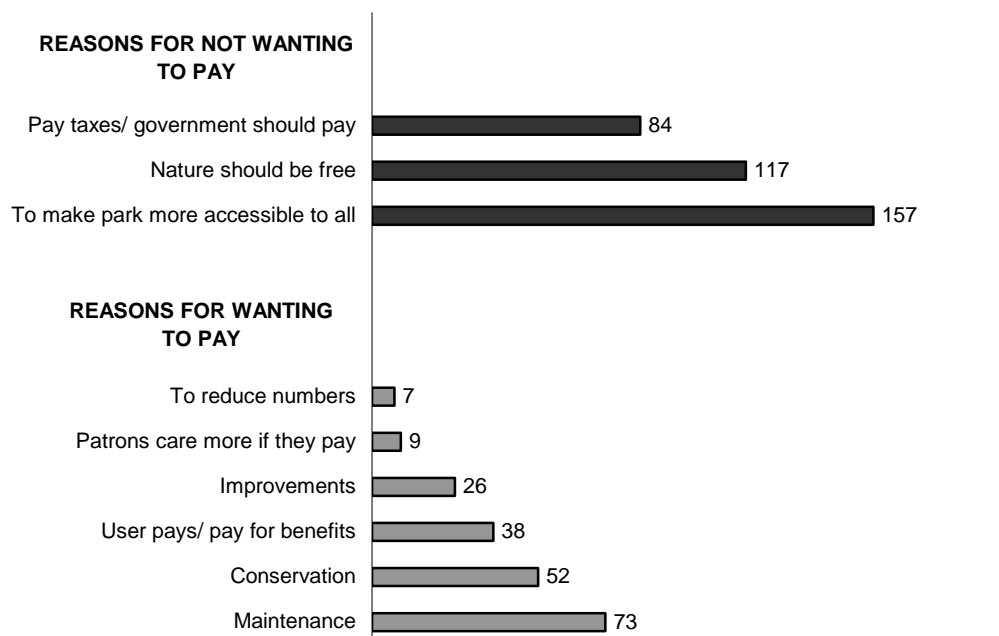
The primary economic impact of LNP is extremely large. It can be conservatively estimated as follows: QPWS recorded approximately 77,000 vehicle entries to the Green Mountain site for 2001. Assume on average that each vehicle entry carried a group of 3.85 persons (the average size of a party from our survey) and suppose that on average each person spends AUS\$50 per day at the O'Reilly's/Green Mountains site or within a 60 kilometre radius of it. From Table 8, this can be seen to be a conservative estimate because about 38% of our sample were overnight visitors. These could however, be somewhat over represented in our sample. Even so, the figure of AUS\$50 is quite conservative. On this basis the primary economic impact from the O'Reilly's/Green Mountains site is just under AUS\$15 million annually (77,000 x 3.85 x \$50). approximately 108,000 vehicle entries were recorded at Binna Burra in 2001. If we assume similar party sizes and the conservative 'local' expenditure figure of \$50 at that site, its primary impact is in excess of AUS\$20 million annually. Therefore, the presence of LNP has a primary 'local' economic impact of **at least** AUS\$35 million annually. Its economic impact is clearly very large.

While it is difficult to estimate accurately the consequences for local primary income of birds being absent from this site, from the self-stated reduction in visits, expenditure at or within a 60 kilometre radius of this site would be likely to be reduced by around 30-40% if birds were absent. The percentage reduction in the initial level of expenditure locally would probably be similar to the inferred relative reduction in the number of visits to this site, is 43 per cent, as specified in the previous section. If so, it would result in a AUS\$6.45 million reduction in primary local expenditure generated by the O'Reilly's/Green Mountains site. This was inferred by answers to the following questions: 'If there were no birds at this site would you still visit? If yes, would you reduce the frequency of your visits? If yes, by 25%, 50% or 75%?' There is the possibility of hypothetical bias in the answers. The main point, however, is that the expected reduction is sizeable.

## Attitudes to Charging Entry Fees to LNP

Respondents were asked if visitors should pay to visit LNP. Of these visitors, 67 per cent said 'no', 29 per cent said 'yes' and 4 per cent gave no response. Respondents were asked to give two reasons why visitors should or should not pay to visit LNP. Some respondents gave two reasons, others just one and some gave no reason at all. Figure 3 summarises the reasons given and states their frequency. However, there was more support for the 'user-pays principle' if the visitors could be assured that the money would be spent at the site. For instance, 64 per cent said they would be more willing to pay if the money collected is spent to improve park facilities and facilitate conservation at this site, 26 per cent said they would not be more willing to pay in this case, and 10 per cent did not reply. Since QPWS earnings often go back to government consolidated revenue, this may be a barrier to the acceptance of payments by Queenslanders for entrance to national parks and protected areas. However, one of the main reasons given by respondents objecting to charges was the view that the park should be available to all, irrespective of their ability to pay. For a detailed analysis of the issues involving visitors' attitudes to paying a user fee see Wilson and Tisdell (2003b).

**Figure 3: Frequency of reasons given by respondents for supporting or opposing a fee to enter LNP**



In response to the question, 'How much do you think a visiting adult should be charged per visit?', 113 Australians said 'nothing' while only 12 foreigners said nothing. However, 334 (more than half the sample) did suggest a charge. The average entry charge suggested by Australians was AUS\$2.70 while foreigners suggested an average charge of AUS\$6.00. A breakdown of suggested amounts can be found in Tisdell and Wilson (2003a).

In response to the question, 'What is the maximum amount that you would pay per visit?', 102 respondents

said 'nothing', and 157 did not answer. Many of the answers probably show 'strategic' bias. In general, the sums are higher than in Table 8. For Australians, the most frequently suggested maximum amount was AUS\$5.00 and for foreigners the mode was AUS\$10. The average maximum entry fee suggested by Australians was AUS\$5 and for foreigners it was AUS\$12. Therefore, on average the maximum amount for entry that foreigners were willing to pay was more than twice that of Australians.

Since entry to this park is free, the amounts suggested should represent the economic surplus of visitors. In this case, the economic surplus is the difference between the maximum a visitor is willing to pay and the actual amount paid for a visit. The surpluses do not appear to be very high. Only a very small number, for example, indicate a surplus of \$20 or more and one's impression is that the stated surpluses are small. Willingness to pay is, however, most likely understated by the respondents to avert the possibility of introduction of fees, or to influence fees to be set at low levels if introduced. This strategic bias is likely to be quite marked for Australians.

From the data collected, it is seen that a much larger proportion of Australians than foreigners thought that visitors to LNP ought not have to pay an entry fee and suggested on average an entry fee of less than half that recommended by foreigners. Of the Australians, Queenslanders were the least willing to pay an entrance fee. On average, the maximum amount that foreigners would be prepared to pay to visit LNP was more than twice that of Australians. These differences could arise from (1) greater incidence of strategic bias in the answers given by Australians; (2) a favourable exchange rate (at the time) for foreign visitors from high income countries which increases their purchasing power in Australia (this reduces the real cost of entry to the park in terms of their home currency); (3) higher income levels on average of overseas visitors than Australian visitors; (4) the presence of entry fees to national parks in the home countries of many visitors leading to their social acceptability of the practice; and (5) a view held by many Australians that they already pay sufficient taxes to cover national park activities and that they should be government supplied and financed.

## **Scope for Environmental Improvement and Better Provision of Information**

Complaints by visitors are often useful pointers for improvements in the management of tourism sites. As mentioned earlier, 194 respondents said they would have liked to have more information provided at this site, and when asked what type of information, the following were most common responses: brochure on birds (62); general brochure (49); brochure on flora and fauna (40); signage on walks (23); and brochure/maps on walks (17). Actually, however, some of the information requested would have been available at QPWS office at this site, but many respondents were unaware of this.

In response to the question, '*do you think the environment could be improved at this site*', 33 per cent of respondents said, 'yes', 48 per cent said, 'no', and 19 per cent did not answer. Between one and three improvements were suggested by 185 of the 203 respondents to this question. These suggested environmental improvements and the frequency with which they are mentioned and listed in Table 9. Some respondents objected to the feeding of birds. A number of the site problems mentioned, such as crowding and parking problems, are likely to increase as visitation rates increase. Some of the environmental changes suggested by respondents apply to the private facilities of O'Reilly's, whereas others affect the QPWS. Most call for extra funds.

In the absence of charges and the earmarking of funds obtained from fees for the LNP area, it may be difficult or impossible for QPWS to deal fully with these problems.

**Table 9: Environmental improvements suggested by respondents for O'Reilly's/Green Mountains, LNP**

Improvement	Number
Improve/Increase walking tracks	24
General signage	22
Reduce/Stop bird feeding	21
Improve litter management	20
Keep number of people at any one time under control	15
Better amenities: toilets, showers, drinking fountains	14
Improve access to LNP (roads, etc)	14
Improve Botanic Gardens	13
More shelters	13
Increase forest area	13
More/Improved picnic facilities	11
Improve parking	10
Reduce commercial development	10
Keep number of vehicles under control	9
Improve boardwalk	8
Improve/Increase camping facilities	7
Make more elderly/handicap friendly	6
Encourage visitors to be quiet	4
Other improvements	67

Note: 185 respondents from the 203 who said that the environment could be improved, provided between 1 and 3 suggested improvements. A total of 301 suggested improvements were recorded.

## Discussion

The majority of visitors to O'Reilly's/Green Mountains site are repeat visitors. On the whole, they are well-educated, have higher incomes than the Australian average, and a higher representation of persons in older age groups than in the general population. In our sample, those in the 50-60 age group formed the largest group, but all age groups over 30 are well represented. While most visitors are from Australia, primarily Queensland, overseas visitors are well represented. In our sample, their population was substantially higher than the annual number of overseas visitors to Australia in proportion to its population. In an open-ended question, respondents were asked to state their main reason for visiting this site. Although bushwalking was mentioned most frequently, other frequent reasons stated were the presence of the rainforest, sightseeing, accompanying visitors, picnic or a day out with children and family and bird-watching.

In a more structured question, the three most important features (on average) attracting visitors were stated to be the presence of the rainforest, the presence of birds and LNP as a place to get close to nature. About 6-8 per cent of the sample reported engaging in bird-watching using specialist equipment.

Birds proved to be one of the major attractions of this site. On the whole, hearing birds at the site was rated by respondents as their most important attribute, followed closely by the diversity of bird species on site, and the presence of lots of birds. Somewhat surprisingly, the occurrence of brightly coloured birds and physical contact with birds (such as occurs with the feeding of rosellas and king parrots at this site) had a much lower rating on average. However, this study suggests this average could be misleading because the distribution of attributes associated with birds favoured by respondents is bimodal. Those who find brightly coloured birds and physical contact important do not rate most of the other attributes as important. The significance of birds at this site is underlined by the fact that 43 per cent of respondents said that they would not have visited this site or would have reduced the frequency of their visits if birds were absent. It was confirmed that this would substantially reduce expenditure by visitors at this site or within a 60 kilometres radius of it.

A large number of desirable environmental improvements at this site were suggested by respondents, some of which relate to O'Reilly's private facilities and others to those of QPWS. Since visitation rates to this site can be expected to grow in the long term, several of these problems are likely to become more pressing (eg. crowding, shortages of car-spaces, of shelters, of toilets and of shower facilities). Conflict between equity in access and the quality of amenities can be expected to deepen. In these circumstances, the introduction of charges (for parking

or entry) may have to be seriously considered by QPWS. If fees are introduced, it would be worthwhile bearing in mind that they are likely to be socially more acceptable if visitors can be assured that the funds are being used (or significantly used) to improve facilities utilised by visitors to this site, and to support associated conservation activities in LNP.

Despite some influential advocacy of user-pays principles (Australian and New Zealand Environmental and Conservation Council, 2000; Cullen, 1985, Herath, 2000) payment for entry to national parks and protected areas remains a controversial political issue in Queensland. The majority of respondents indicated their opposition to the levying of a fee to enter LNP. Nevertheless, most said they would be more willing to pay such a fee if they could be assured that the funds would be used to improve facilities and conservation at this site. Although, there was strong opposition to fees, many respondents were prepared to suggest a 'reasonable' entry fee for adults and also indicated the maximum fee they would be willing to pay. Foreigners suggested larger amounts than Australians for both these categories. Because of the likely presence of strategic behaviour, the figures proposed by respondents are in all probability underestimates.

Significant environmental problems are emerging at the O'Reilly's/Green Mountains site and they will become more serious as the number of visitors increases. One way to address some of these problems could be by the imposition of entry fees, especially if a proportion of funds were directed to investment at the site.

## CASE STUDY II: ANTARCTIC WILDLIFE AS A TOURIST ATTRACTION

### Introduction

This Antarctic case study is quite different to the previous case in terms of its location and the environmental conditions where the wildlife tourism occurs. Furthermore, the cost of an Antarctic journey is much higher than most. Trips to Antarctica usually involve several days, whereas day trips to LNP are common. Nevertheless, this study of Antarctic tourism also aims to evaluate wildlife as a tourist attraction, and gives particular attention to environmental issues of concern to Antarctic tourists and those raised by growing tourism in Antarctica.

This study may be of particular interest in Australia for several reasons. Australia is a major stakeholder in Antarctica. Australia helped broker the Antarctic Treaty and the Australian Antarctic Territory (AAT) accounts for the largest area of Antarctic land claimed by any nation. While the survey undertaken for this case study did not involve a journey by respondents to AAT, the ship on which the survey was undertaken is chartered by an Australian company and Australians constituted the largest national group on board it. Furthermore, relative to its population, Australia is a major source of tourists to Antarctica. It might be noted that the AAT is not yet a significant destination for Antarctic tourists. This is probably because it is more difficult and costly to access compared with the Antarctic Peninsula. Antarctic tourism is focused mainly on this peninsula, and the tourists surveyed as part of this case study were involved in a journey to the Antarctic Peninsula.

This case study is presented in the following way: First some general background is provided on Antarctic tourism and then the nature of the surveys conducted on the cruise ship the 'Akademik Ioffe'. The socio-economic profiles of the respondents are reported, and information is provided about the cost to them of an Antarctic trip and their willingness to pay for it. This is followed by an analysis of their evaluation of Antarctic wildlife as a tourist attraction and by an assessment of respondents' views about Antarctic environmental issues, including whether tourism to Antarctica should be restricted. No previous study of this type of Antarctic tourist appears to have been undertaken.

### Some Background on Antarctic Tourism

While visits by tourists to Antarctica have increased considerably, Antarctica is still far from a mass tourism destination partly because the cost of an Antarctic cruise is quite high (Kriwoken and Rootes, 2000). For example, in January 2003, we asked tourists joining the cruise to Antarctica on the ship the 'Akademik Ioffe'; *'How much do you expect that you/your accompanying partner/family will have spent per person (approximately) specifically for this journey by the time it ends?'*. The mean value mentioned was AU\$15,540 with a median of AU\$15,000. The actual cruise (the route is shown in Map 3 later) was of nine days duration from the Argentinean port of Ushuaia. Approximately 75 per cent of tourists to Antarctica start and finish their journey in this port (Barrio and Roldan, 1997).

Antarctic tourism began in 1958 with ship tours from the Shetland Islands to the Antarctic Peninsula (see Map 3). This Peninsula accounted for around 93 per cent of all landings of tourists in Antarctica in the 2002-2003 season. Therefore, Antarctic tourism is concentrated in this area of Antarctica.

According to IAATO data, in the 1992-93 Antarctic summer season, 6,704 tourists visited Antarctica. By the 2002-03 season, the numbers had more than doubled to 13,571. However, it was projected that there would be over 20,000 landings by tourists in the 2003-04 season (IAATO, 2003, pp. 20-21), implying more than a trebling of numbers in just over a decade. Tourists landing in Antarctica in 2002-03 were mainly drawn from the United States (39.37%), Germany (14.35%), United Kingdom (13.11%), Australia (5.37%), Japan (3.32%) and Canada (3.01%) (IAATO, 2003, p.21). Thus, the overwhelming majority of tourists were drawn from high income countries.

Some Antarctic cruises do not involve landings in Antarctica. Table 10 provides comparative estimates of numbers of tourists involved in different types of tourism utilising Antarctica in the 2003-2004 season. Seaborne tourism accounts for the bulk of these tourists and the majority of seaborne tourism involves landing in Antarctica. Air-land based tourism comprises less than 2.5 per cent of landings in Antarctica but its environmental impacts could potentially be large because it usually involves landings inland and camping there.

**Table 10: Estimates of numbers of tourists utilising Antarctica in the 2003-04 season by tourism types**

Type of tourism	Number	%
Seaborne traditional tourism with landing	20,818	70.9
Seaborne tourism no landing/large ships	5,636	19.2
Air-Land based traditional tourism (ANI and DAP) with landing	330	1.1
Air-Land based non traditional with landing	200	0.7
Air Overflights no landing	2,426	8.2
<b>Total:</b>	<b>29,410</b>	<b>100*</b>

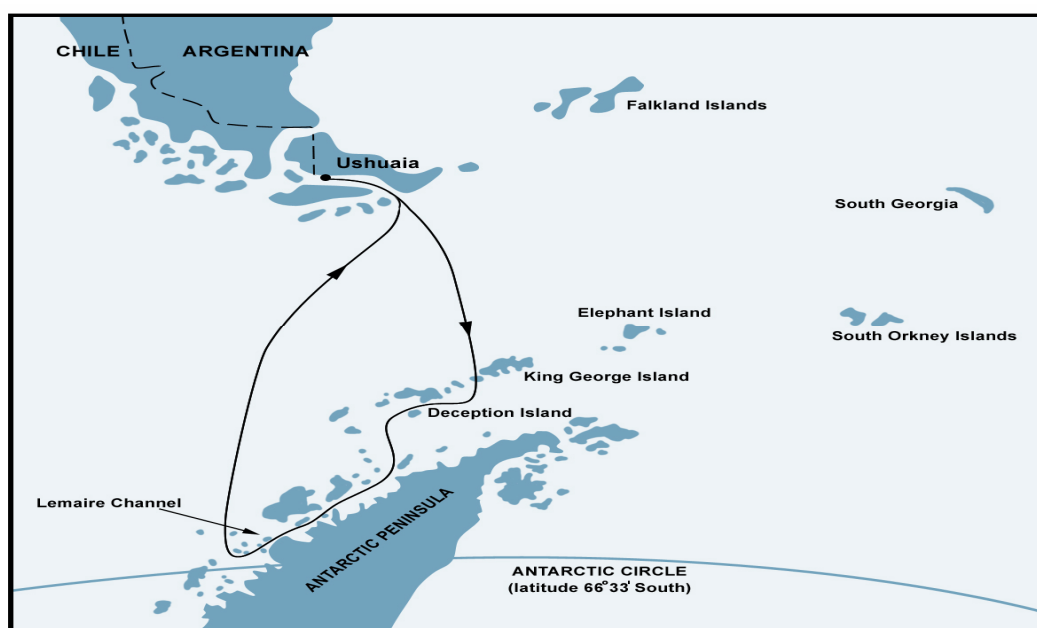
\*Does not exactly add to 100 because of rounding  
Source: Based on IAATO (2003, p.20)

One of the Antarctic tourist ships commencing its tours from the port of Ushuaia in Tierra del Fuego, Argentina, is the 'Akademik Ioffe'. This Russian-built ship, originally used by Russia for Antarctic research, has been converted into a comfortable cruising vessel. According to the International Association of Antarctica Tourist Operators (2003), the maximum capacity of the 'Akademik Ioffe' is 117 passengers and it carries an average of 90 passengers per trip. Because only one completed survey was required per party travelling on this ship, coverage of the survey was relatively complete. Incidentally, the 'Akademik Ioffe' is registered in Russia and chartered by Peregrine Shipping Pty Ltd, Melbourne, Australia.

This ship was the focus of our surveys of Antarctic tourists. These were designed to provide relevant socio-economic data, information about the respondents' valuation of Antarctic wildlife and their attitudes to associated Antarctic environmental issues. Fifty-two passengers filled out the structured pre-visit survey forms on board this vessel on their way to Antarctica. Fifty passengers filled out post-visit survey forms on their return journeys. The survey forms (pre- and post visit are reproduced in the Appendix B). Only one form was completed per party. The questionnaires were designed to detect possible differences between expectations on the outward journey and evaluations after the visit of the tourists to Antarctica.

Passengers on this ship were on Peregrine's Antarctic Explorer trip involving a journey of 10 nights from Ushuaia via the South Shetland Islands and then down the Antarctic Peninsula before returning to Ushuaia. The route is shown in Map 3. The trip details provided by Peregrine states: 'The itinerary focuses on areas with the greatest promise of wildlife – opportunities abound for encountering nesting penguins and seals, and whales seem to be everywhere'. The trip involves some on shore visits in Antarctica.

**Map 3: Map showing the route taken by respondents on the 'Akademik Ioffe' for their Antarctic tour**





Now consider the nature of the surveys, the socioeconomic profiles of respondents', the cost of their journey and their willingness to pay for their Antarctic trip before examining their evaluation of Antarctic wildlife and the attitudes to associated environmental questions involving Antarctica.

## Surveys, Socio-Economic Profile of Respondents, and Their Willingness to Pay for Their Antarctic Trip

Tourists onboard the 'Akademik Ioffe' (also dubbed the 'Peregrine Mariner' by Peregrine Tours) were asked to participate in a survey during the journey from Ushuaia, Argentina to the Antarctic Peninsula, whilst crossing the Drake Passage. The second part of the survey was administered at the completion of their Antarctic trip whilst heading north across the Drake Passage towards Ushuaia. Tourists onboard were briefly introduced to the research and had the option of not participating. The survey was administered on two voyages of this ship in January 2003. There were 68 passengers on each voyage.

A slight majority of respondents were females (51.9 per cent). Most respondents (76.9 per cent) were accompanied, but 23.1 per cent travelled alone. Only one respondent had previously visited the South Polar Region.

The countries in which the respondents normally reside are shown in Table 11. Only one respondent did not indicate their country of residence but otherwise all were from Western countries, with those from Australia, Sweden and the USA accounting for most respondents. A high number of Australians is not usual for Antarctic trips. However, normally, Americans make up the majority of travellers to Antarctica. The high proportion of Australians in our sample is a reflection of the location of Peregrine in Australia.

**Table 11: In which country do you normally reside? (Pre-visit question). Distribution of responses**

Country	Frequency	% of total
Australia	20	38.5
Sweden	15	28.8
USA	6	11.5
UK	4	7.7
Italy	2	3.8
Switzerland	2	3.8
Austria	1	1.9
France	1	1.9
N/r	1	1.9
<b>Total:</b>	<b>52</b>	<b>100</b>

More than half the respondents were over 50 years of age and the modal age group was 51-60 years. The age distribution of respondents is shown in Table 12. Typically respondents are 'empty-nesters' and belong to older age groups. This accords with other studies.

**Table 12: To what age group do you belong? (Pre-visit survey). Distribution of responses**

Age in years	Frequency	% of total
20-30	2	3.8
31-40	8	15.4
41-50	8	15.4
51-60	17	32.7
61-70	12	23.1
71-80	2	3.8
81+	0	0
N/r	3	5.8
<b>Total:</b>	<b>52</b>	<b>100</b>

They possess a high degree of education (see Table 13). This has also been found in other studies (Kriwoken and Rootes, 2000, p.140). Almost 75 per cent had university degrees with most in this group having postgraduate degrees.

**Table 13: Indicate your highest educational qualification (Pre-visit survey). Distribution of responses**

Level of education	Frequency	% of total
Primary only	0	0
Some junior schooling	0	0
Completed year 10 secondary or equivalent	1	1.9
Completed year 12 or equivalent	4	7.7
Trade certificate or equivalent	1	1.9
Diploma or equivalent	3	5.8
Degree or equivalent	16	30.8
Post-graduate degree or equivalent	22	42.3
n/r	5	9.6
<b>Total:</b>	<b>52</b>	<b>100</b>

For most of the cruise ship passengers, the family income was found to be high. Other studies have also found this (Kriwoken and Rootes, 2000, p.140). However, this needs clarification. In the survey the respondents were asked to state their family income in their home currency since there are many passengers from different nationalities using various currencies. An income comparison using various currencies is inappropriate and hence, the various currencies were converted into Australian dollars using the prevailing exchange rates at the time. The adjusted family income levels are shown in Table 14. Of the 52 respondents in the survey, 77 per cent of the respondents answered this question and the rest did not. Of the respondents who did, the majority (60 per cent) of the respondents had an income of more than AUS\$100,000. Of those who did not have an income of more than AUS\$100,000, 17.5 per cent had a family income of more than AUS\$50,000, but less than AUS\$100,000. The rest of the respondents (22.5 per cent) had an income of less than AUS\$50,000. A closer examination of data show that the majority (90 per cent) of those having a family income less than AUS\$50,000 were Swedish and close to half (44 per cent) of them were retirees, perhaps using their savings to make this journey. This partly explains how those with less than AUS\$50,000 family income could undertake an expensive journey such as this one to Antarctica. Only 11 per cent of the passengers who had a family income of less than AUS\$50,000 belonged to the 20-30 age group and they were single. Therefore, the data show that in addition to the level of income other factors such as being able to use up savings, empty nesters and being single influenced the affordability of the journeys.

**Table 14: Your family income level per annum in your home currency? (Pre-visit survey). Distribution of responses**

Family income range (in AUS\$)	Number	Frequency (%)
Below 25,000	1	2.5
25,001-50,000	8	20
50,001-75,000	6	15
75,001-100,000	1	2.5
100,001-125,000	8	20
125,001-150,000	1	2.5
150,001-175,000	2	5
175,001-200,000	3	7.5
200,001-225,000	3	7.5
225,001 and above	7	17.5
<b>Total:</b>	<b>40</b>	<b>100</b>

Note: 12 respondents did not answer this question

Respondents indicated in the pre-visit and post-visit surveys that, on average, they would have been prepared to pay more for their trip than they actually paid. The study tried to determine the expectations of visitors about Antarctica in terms of what they had actually paid for the journey and what they would be willing to pay after the journey. In order to make a comparison, it is necessary to compare those who had stated how much they had actually paid and how much they were willing to pay after the visit. Only 33 respondents answered these pre- and post-visit questions. From the limited data, it seems that the cost of the journey did not leave these travellers with much economic surplus. For example, the pre-visit mean of actual expenditures of these 33 respondents was stated to be AUS\$14,194. The post-visit mean of the maximum amount they felt they would have been justified to spend on the journey is AUS\$14,362 which is only marginally larger. This suggests an average surplus of less than AUS\$200 per traveller. These figures differ from those given in Section 4.2, for example, the mean expenditure of AUS\$15,200 because the former figures are based on 47 responses.

If we suppose that the average expenditure of AUS\$15,200 is typical for tourists visiting Antarctica than conservative estimates can be made of the total expenditure generated by Antarctic Tourism annually. For example, the 13,571 landings by tourists in Antarctica in 2002-03 would have generated more than AUS\$203 million in expenditure. However, if 2003-04 estimates are approximately correct (see Table 10) and cruises involving no landings are included, the expenditure figure for 2003-04 would probably be of the order of AUS\$400 million. Note that the expenditure of AUS\$15,200 includes all cost involved in travelling to join the Antarctic cruise.

## Respondents' Evaluations of Antarctic Wildlife

Prior to their visit, 94.2 per cent of respondents said they were interested in Antarctic wildlife and 5.8 per cent said they were not. Of those interested in Antarctic wildlife, most interest was in penguins, followed by whales and dolphins, and then seals.

The stated interest of respondents in particular Antarctic wildlife species before and after their visit is shown in Table 15. Penguins continued to be of greatest interest, and whales and dolphins of second highest interest after the journey. A major change, however, was the very substantial rise in valuations of sea birds (other than penguins) following the visit of respondents to Antarctica. Most respondents said that they became more interested in Antarctic wildlife following their visit.

**Table 15: If you are interested in Antarctic wildlife, is your interest mainly in which species listed? (you may tick more than one box). Distribution of responses.**

Type of wildlife	Pre-Visit		Post-Visit	
	Frequency	%	Frequency	%
All Wildlife	33	32.7	24	25.8
Penguins	27	26.7	25	26.9
Whales and Dolphins	24	23.8	18	19.4
Seals	14	13.9	10	10.8
Other Polar Seabirds	3	3	16	17.2
<b>Total:</b>	<b>101</b>	<b>100</b>	<b>93</b>	<b>100</b>

The majority of respondents suggested that a special feature of Antarctic wildlife is that most species do not occur elsewhere. The proportion saying this was about the same before and following their visit. Prior to the visit about 40 per cent of respondents said that Antarctic wildlife can be easily seen in large numbers whereas after their visit this rose to 54 per cent. While the majority of respondents stated on the outbound journey that the adaptations of Antarctic wildlife would be a special attraction, only a half said this on the return journey. As for other features and comments, on the outward journey some respondents said they would be able to get close to the wildlife and many thought that it would be a special attraction to see Antarctic wildlife in its natural environment. Getting close was not, however, mentioned in the post-visit survey responses but seeing wildlife in their own environment was. One respondent said that the journey enabled him/her to see several new bird species for the first time.

Following their cruise, 94 per cent of respondents said that they had learnt more about Antarctica and its wildlife as a result of their cruise and 76 per cent said that they had become more aware of conservation issues involving Antarctica wildlife. Nearly all (94 per cent) were in favour of conserving Antarctic wildlife, none expressed opposition to it but 6 per cent did not respond.

The importance placed on seeing Antarctic wildlife increased as a result of the cruise. This is evident from

Table 16. It is also supported by the increase in the weighted average in which ‘no response’ or ‘of no importance’ responses are weighted as zero, ‘not very important’ as 1, ‘important’ as 2, and ‘very important’ as 3. This weighted average increased from 2.48 to 2.66. Although 70 per cent of respondents were satisfied with their wildlife watching experience in Antarctica, 30 per cent said they were not satisfied.

**Table 16: Responses to the questions: (Pre-Visit): How important was the possibility of seeing Antarctic/Sub-Antarctic wildlife in your decision to come on this journey? (Post-Visit): How important was seeing Antarctic/Sub-Antarctic wildlife during this cruise? Distribution of responses.**

Rating	Pre-Visit		Post-Visit	
	Frequency	%	Frequency	%
Very important	32	61.5	37	74
Important	13	25	11	22
Not very important	7	13.5	0	0
Of no importance or n/r	0	0	2	4
Total	52	100	50	100
<b>Index of importance*</b>		<b>2.48</b>		<b>2.66</b>

Note: Index is calculated on the basis that Not important or No response = 0, Not Very Important = 1, Important = 2, Very important = 3

The importance of Antarctic wildlife as an attraction to Antarctic tourists is also evident from responses to a pre-visit question. Respondents were asked: ‘If there was no wildlife to be seen in the South Polar Region, would you have still decided to come on this cruise, given your present costs’. The majority (61.5 per cent) said ‘No’. The reasons given by those who said that they would not have joined the cruise in the absence of Antarctic wildlife ranged from ‘would not be a complete experience’ to ‘wanted to see wildlife’. For a detailed list see Tisdell *et al.* (2004). The reasons of the 34.6 per cent who said ‘Yes’ (would come on the tour any way) ranged from ‘of interest in geology/science’ to ‘interest in photography of scenery and plants’. A few of the respondents (3.8%) did not respond. Furthermore, 53.1 per cent of those who said ‘No’ would not even come on this cruise even if it were much cheaper should there be no Antarctic wildlife.

Following their cruise, however, 50 per cent of respondents stated that they would still have enjoyed their cruise if they had not seen any wildlife, 34 per cent said they would not have, and 16 per cent did not reply. While many respondents still said they would have enjoyed their cruise in the absence of wildlife, it is nonetheless clear that for most, wildlife is a highly significant contributor to their willingness to visit Antarctica and to their enjoyment of it.

While one should be wary about generalising from a small sample, it is apparent that the presence of Antarctic wildlife is a major attraction for most tourists visiting Antarctica. If this group were typical tourists, visits to Antarctica would be more than halved if, other things unchanged, Antarctica wildlife were absent. Given the earlier estimates, this would reduce total expenditure on Antarctica tourism by more than AUS\$100 million annually. Even if the costs of Antarctic cruises were greatly reduced, 30 per cent of respondents said they would still not come on such a cruise in the absence of Antarctic wildlife. If that happened to be a true representative of Antarctic tourists as a whole, it would still result in reduced expenditure on such tourism annually of at least AUS\$60 million dollars. Clearly, the presence of Antarctic wildlife is one of the main tourist assets of Antarctica, if not the major one.

On the outward journey, all respondents expected to see whales and dolphins, penguins, seals, and all (except one) expected to see polar seabirds, other than penguins. Respondents were asked to say how much seeing this wildlife would add to their satisfaction along a scale of ‘not at all’, ‘a little’, ‘much’ and ‘very much’. Whales, dolphins and penguins topped the list in terms of expected added satisfaction, followed by seals and their relatives, and then polar seabirds other than penguins. Nearly all respondents said after their Antarctic visit that they had seen those species. The added satisfaction they claimed to obtain by seeing these, accorded with their original expectations about how much relative extra satisfaction they would obtain if they saw these species. Whales and dolphins were said on average to add most to satisfaction followed by penguins, seals and relatives, and then polar birds (other than penguins). These results are borne out by Table 17.

**Table 17: Index of satisfaction anticipated and obtained from seeing Antarctic wildlife species based on responses to the following question: Pre-Visit (Q9). Please tick in the second column if you expect to see any of the following wildlife in Antarctica or Sub-Antarctica during this cruise. Would it increase your satisfaction (1) a little; (2) much; (3) very much; or (4) not at all to see the following wildlife? Please put the appropriate number in the last column. Post –Visit (Q6). Tick in the second column if you saw any of the following wildlife in Antarctica or Sub-Antarctica during this cruise. Did they increase your satisfaction (1) a little; (2) much; (3) very much; or (4) not at all to see the following wildlife?**

Type of wildlife	Pre-Visit	Post-Visit	Change in value of index	% variation in index
Whales and Dolphins	2.33	2.19	-0.14	-6.01
Penguins	2.31	2.15	-0.16	-6.93
Seals (and relatives)	1.98	1.96	-0.02	-1.01
<i>Polar Seabirds (other than penguins)</i>	<i>1.71</i>	<i>1.66</i>	<i>-0.05</i>	<i>-2.92</i>

Note: Index of added satisfaction is calculated using weights on the basis:  
3 - very much; 2 –much; 1- a little; 0 - not at all/no response.

We also attempted to obtain information from respondents about their willingness to donate funds to support programmes to conserve different species of Antarctic wildlife. However, the response rate was so poor that we could not make use of the data obtained.

Respondents were requested to rank various features of their cruise prior to their visit to Antarctica and to rank the same set of features following their visit using a scale of ‘very important’, ‘important’, ‘not very important’ or ‘of no importance’. Weighting these rankings as 3, 2, 1 and zero respectively and treating a non-response as indicating ‘no importance’, the weighted means before and after visits to Antarctica are as set out in Table 18.

**Table 18: Average weighted indices of importance to respondents of features or attributes of Antarctica/Sub-Antarctica prior to and following their visit. Changes in indices are also shown.**

Features	Pre-Visit Index	Post-Visit Index	Change in value of index	% variation in index
Landscapes and seascapes	2.75	2.74	-0.01	-0.36
Wildlife	2.60	2.56	-0.04	-1.54
Different or unique environment	2.58	2.52	-0.06	-2.33
Unspoilt wilderness	2.58	2.48	-0.1	-3.88
Antarctic summer	2.12	1.94	-0.18	-8.49
The thrill of expedition	1.98	1.90	-0.08	-4.04
Continent without permanent human habitations	1.69	1.82	0.13	+7.69
Few others have visited it	1.50	1.52	0.02	+1.33
Connections with explorers	1.40	1.40	0	0.00
Ship cruise pleasures	0.73	1.20	0.47	+64.38

Note: Index of importance calculated using the following weights:  
3 - very important; 2 – Important; 1- Not very important; 0 - of no importance/no response.

From Table 18, it can be seen that respondents ranked Antarctic landscapes and seascapes as the most important feature (both pre- and post-visit) followed by wildlife. Various Antarctic cruise features are ranked in Table 18 by an index based on the importance given to them by respondents before their Antarctic visit. On average, the rank ordering by respondents remained the same after their visits as before their visits. While most indices of importance showed little change before and after the Antarctic visit by respondents, a few showed substantial variation. Appreciation of ship cruise pleasures increased by a comparatively large amount and the fact that Antarctica is a continent without permanent human habitation also increased as did, to a small extent, the realisation that few others have visited Antarctica. Most other items showed only small declines in their ratings of importance. However, the importance of the Antarctic summer as an attraction showed a decline of around eight per cent, as measured by the index of importance.

There was also a slight increase in the degree of advocacy of respondents of nature conservation following their visit to Antarctica, as can be seen from Table 19.

**Table 19: Attitudes of respondents to nature conservation based on responses to pre-visit and post-visit questions. Pre-Visit (Q8). How would you rate your attitude towards conservation? Post-Visit (Q14). How would you rate your attitude towards nature conservation after your experience of Antarctica? Distribution of responses.**

Attitude to nature conservation	Pre-Visit		Post-Visit	
	Frequency	%	Frequency	%
Extremely strong advocate	6	11.5	3	6
Strong advocate	20	38.5	30	60
Moderate advocate	24	46.2	14	28
Neutral towards this subject	2	3.8	0	0
More oriented towards development than conservation	0	0	0	0
No response	0	0	3	6
<b>Total:</b>	<b>52</b>	<b>100</b>	<b>50</b>	<b>100</b>
Index of environmental advocacy		1.58		1.66

Note: Index of environmental advocacy calculated with the following weights: 3 - extremely strong advocate; 2 - strong advocate; 1 - moderate advocate; 0 - neutral towards this subject/no response; -1 (negative) - more oriented towards development than conservation.

On the whole, the importance placed by respondents on natural environments and wildlife in Antarctica as a part of their cruise expectations and experience appear to be much the same before their visit and following it but are up slightly post-visit. There was, however, a slight increase in respondent's advocacy of nature conservation following their visit to Antarctica. In addition, expectations about seeing different species of Antarctic wildlife and stated realisation of satisfaction from doing so were quite similar in both pre- and post-visit.

The survey also examined the respondents stated knowledge of Antarctica before and after the cruise and it was found that their stated knowledge improved after the visit. This is shown in Table 20.

**Table 20: Do you regard your current knowledge of Antarctica/Sub-Antarctica as excellent, good, average or poor? Distribution of responses.**

Rating	Pre-Visit		Post-Visit	
	Frequency	%	Frequency	%
Excellent	1	1.9	3	6
Good	16	30.8	38	76
Average	29	55.8	7	14
Poor	6	11.5	2	4
<b>Total:</b>	<b>52</b>	<b>100</b>	<b>50</b>	<b>100</b>
Index of knowledge		2.23		2.84

Index of knowledge calculated using the following weights: 4 = excellent knowledge, 3 = Good knowledge, 2 = Average knowledge, 1 = Poor knowledge or no response.

Prior to their visit, just under 40 per cent of respondents said that they had read widely about Antarctica and around 55 per cent said they had watched many TV programmes on Antarctica. Nevertheless, a substantial proportion of the respondents did not have much exposure to such media before their journey.

Consider now the stated opinion of respondents about environmental issues involving Antarctica as revealed by questions put to them. These questions included one about the desirability of increased tourism to Antarctica.

## Opinions of Respondents about Various Environmental Issues Involving Antarctica

Similar environmental questions about Antarctica were asked with respondents, before their visit to Antarctica and following it. This was done to assess the general attitudes of respondents to such issues and to detect any

changes in these as a result of their visit to Antarctica.

Before their visit, 80.8 per cent of respondents said that they believe that global warming is melting icebergs in Antarctica. This fell slightly to 76 per cent in the post-visit survey. However, there was a slight increase post-visit in the percentage of respondents saying that they would like more action to be taken to reduce such melting. Almost 95 per cent of those respondents who were convinced that global warming is melting Antarctic icebergs thought that more action should be taken to reduce such melting.

Around 75 per cent of the respondents were opposed to krill harvesting in Antarctica but 9.6 per cent favoured it in the pre-visit survey. Those in favour rose to 14 per cent in the post-visit survey.

Most respondents (over 90 per cent) were opposed to Antarctica's vast non-living natural resources (eg. petroleum, minerals, water) being commercially exploited for consumptive use. Furthermore, over 90 per cent of respondents wanted Antarctica to be preserved in a pristine state (see Table 21), and a slight rise in this percentage is evident following the visits by respondents to Antarctica. The most frequently given reason for wanting to conserve it in a pristine state was because it was seen as unique (see Table 22). The mere knowledge that Antarctica would remain unspoilt was also frequently mentioned as a reason for preserving it in a pristine state, as well as its influence on the Earth's climate, an indirect use value. The desire to retain the uniqueness and unspoilt character of Antarctica reflects non-use economic values. *Use values* such as tourism potential and conservation of resources for future use were mentioned very infrequently as a reason for wanting to conserve Antarctica in a pristine state. Bequest and altruistic values ('I would like my children and others to enjoy it') were mentioned relatively frequently. No major changes (between responses on the outward journey and the return one) occurred in the relative frequencies with which the reasons were given for wanting to conserve Antarctica in a pristine state. There was very little support for conservation of resources for future (consumptive) use.

**Table 21: Do you want Antarctica (including wildlife, plant life and its landscape) to be preserved in its pristine state? Distribution of responses.**

Response	Pre-Visit	Post-Visit
	Relative frequency %	Relative frequency %
Yes	92.3	94
No	1.9	4
n/r	5.8	2
<b>Total:</b>	<b>100</b>	<b>100</b>

**Table 22: The distribution of reasons given by those who said they want Antarctica (including its wildlife, plant life and its landscape) to be preserved in its pristine state. More than one reason could be given.**

Reason	Pre-Visit		Post-Visit	
	Frequency	% of Total responses	Frequency	% of Total responses
It is unique	46	28.9	47	29.2
It has a large influence on the Earth's climate	38	23.9	37	23
I would like to know that it could remain unspoilt	36	22.6	37	23
I would like my children and others to enjoy it	26	16.4	28	17.4
It has tourism potential	7	4.4	7	4.3
It has great resources that could be used in the future	6	3.8	5	3.1
<b>Total</b>	<b>159</b>	<b>100</b>	<b>161</b>	<b>100</b>

Opinions were divided about whether there should be increased tourism activity in Antarctica. Around half of respondents were against it whereas about 40 per cent favoured it. Comments by those respondents who favoured increased tourism to Antarctica ranged from 'to give others the opportunity to experience Antarctica as we have' to 'public awareness' and 'if the environmental impact is managed'. For a list of all the comments see

Tisdell *et al.* (2004). On the other hand, comments by respondents opposed increased tourism to Antarctica included 'increased tourism can only mean increased impact on wildlife and environment and 'would spoil it'. For a list of these comments see Tisdell *et al.* (2004).

A high proportion of respondents (around 90 per cent) favour the Antarctic continent and surrounding seas being declared a world park and for it to be managed under the auspices of the United Nations and/or by the (original) twelve Antarctic Treaty Nations. [These are the original signatory nations and are not all current Antarctic Treaty Nations which exceed 40 in number]. Although there was some increase in opposition to this proposal in the post-visit survey, no major change is apparent.

Respondents were in addition asked 'If an organisation such as the United Nations were to raise money to declare Antarctica and the surrounding seas as a world park and conduct further research into its unique wildlife and landscapes/seascapes, would you be willing to make an annual contribution for the next ten years'? The percentage of respondents' pre-visit who said 'Yes' was 46 per cent and this rose to 54 per cent post-visit. Those who said 'No' declined from 32.7 per cent pre-visit to 26 per cent post-visit whereas the percentage of non-respondents declined slightly. Reasons given by those who said they would not contribute included 'I prefer to make donations to charities that improve the lives of humans' and 'can't make decisions based on a 10 year plan'. See Tisdell *et al.* (2004) for a detailed list for reasons out forward by those not willing to contribute funds.

It maybe worth noting that under The Protocol to the Antarctic Treaty on Environmental Protection (Madrid Protocol) Article 2 declares that 'The Parties commit themselves to the comprehensive protection of the Antarctic environment and dependent and associated ecosystems and hereby designate Antarctica as a natural reserve, devoted to peace and science'. Hence, it is a declared natural reserve. This in itself, however, does not ensure that it is managed as a strict nature reserve and that its pristine nature will necessarily be preserved.

## Discussion and Conclusion

Representatives of virtually all travellers on the 'Akademik Ioffe' completed the questions for this survey during their journeys to and from Antarctica for two of its trips in January 2003. The questionnaire was completed on the return journey to gauge whether values and attitudes of respondents to Antarctic wildlife and to environmental conservation in Antarctica changed following their visit. Little change occurred but on the whole respondents' valuations of Antarctic wildlife rose following their visit to Antarctica.

Most respondents were found, to be relatively well-off economically, to be well educated and typically they were over 50 years of age. Prior to their visit most respondents regarded their knowledge of Antarctica to be 'average', but this rose to 'good' following their visit.

Prior to their visit, most respondents (86.5 per cent) thought that the presence of Antarctic wildlife was a very important or important reason for joining the cruise, although 13.5 per cent thought it was not a very important reason for this. After their visit, 96 per cent of respondents stated that seeing Antarctic wildlife was a very important or important feature of their cruise and no one stated that it was not very important. However, two individuals did not respond. Answers by respondents indicated that (on the whole) their valuation of the importance of Antarctic wildlife as an attraction rose as a result of their cruise. Penguins vied with whales and dolphins as being of particular interest or importance to the responding tourists. Seeing these animals added most to the satisfaction of respondents.

However, most valuations of respondents of the importance of natural attributes or features of Antarctica remained relatively unchanged before and after their visit to Antarctica. Landscapes and seascapes were on average rated as most important in relation to this cruise both before and after visits to Antarctica, followed in importance by wildlife. The attributes of 'different or unique environment' and 'unspoilt wilderness' continued to be highly ranked in importance both pre- and post-visit. The largest comparative increase in importance following the visit was for 'ship cruise pleasures'. Attitudes of respondents in favour of environmental conservation (as scaled by them) strengthened considerably following their visit to Antarctica.

As for environmental policy in Antarctica, nearly all respondents thought that more action should be taken to reduce the melting of icebergs as a result of global warming, nearly all were against the consumptive use of Antarctica's natural resources, and nearly all favoured the conservation of Antarctica in a pristine state. Attitudes in relation to these matters did not change very much after the visit of respondents to Antarctica. While there is some difficulty in interpreting reasons given by respondents for wanting to conserve Antarctica in a pristine state, non-use economic values appear to be of predominant importance.

Respondents were divided about whether there should be increased tourism activity in Antarctica. A half of the respondents were against it prior to their trip to Antarctica and this increased slightly following their visit. On the other hand, 40 per cent of respondents said prior to their visit to Antarctica that they favoured increased tourism activity in Antarctica. This fell slightly following their visit to Antarctica, and many of those who favoured increased tourism in Antarctica qualified their answer, for example, by saying that safeguards should be imposed to ensure that the increased tourism does not jeopardise environmental conservation. So after their



visit, the majority of tourists were opposed to increased tourism to Antarctica and most of these who supported it added qualifications indicating their environmental concerns.

Around 90 per cent of respondents favoured the declaration of the Antarctic and surrounding seas as a world park managed under the auspices of the United Nations and/or by the Antarctic Treaty nations. Initially, however, only a little under a half of respondents said that they would be prepared to donate funds for this enterprise. However, the proportion of respondents who said they were willing to donate once they had visited Antarctica rose to 54 per cent. In addition, although a third of respondents said they would not donate funds to support such a park when asked prior to their visit to Antarctica, this fraction fell to a quarter after their visit. Thus, there is evidence of increased willingness to financially contribute towards an Antarctic world park following the visits of the respondents to Antarctica. However, because the question of the contribution is hypothetical, upward bias could occur in the respondents' expressed willingness to donate funds to support the creation and maintain an Antarctic world park.

Nevertheless, very strong support exists amongst this sample of tourists for the idea that the Antarctic continent and surrounding seas should be a world park managed under the auspices of the United Nations and/or by the Antarctica Treaty nations. About 90 per cent of respondents favoured this proposal. This is consistent with the view that most tourists to Antarctica are likely to be advocates of its environmental conservation.

Antarctic tourists in large numbers can endanger the relatively pristine state of Antarctica, especially in the absence of appropriate environmental management. This is a concern among some scientists (Anon, *Australian Wildlife*, 2004). Furthermore, apart from the volume of visitors to Antarctica, the geographical distribution of their visits could be environmentally very important. Presently, tourism is concentrated on the Antarctic Peninsula, particularly on a few tourist 'hotspots' there, and nearly all such spots are shoreline and coastal (Barrio and Roldan, 1997). The intensity of tourist use of some locations in this peninsula is of particular concern to some environmentalists.

While a voluntary association of Antarctic tourist operators exists, [International Association of Antarctic Tour Operators, (IAATO)] with a code of conduct favourable to environmental conservation, not all Antarctic tourism operators belong to it. Furthermore, it is not known how rigorously members observe the code of conduct of IAATO. In addition, the nature and extent of cumulative-type impacts associated with Antarctic tourism have not been adequately studied (see Kriwoken and Rootes, 2000).

The results of this study suggest that politically and socially tourism can play a positive role in nature conservation in Antarctica (compare also Tisdell and Broadus, 1989). From Table 11, it was seen that over 92 per cent of our survey respondents said prior to their visit to Antarctica that they wanted Antarctica (including wildlife, plant life and its landscape) to be preserved in its pristine state. Support for this proposal increased to 94 per cent after their visit to Antarctica. Only a small minority of respondents opposed such preservation.

While tourists can play, and have played, a significant political, social and economic role in supporting nature conservation (consider, for example, their role in fostering conservation of marine turtles in Australia, (as outlined, for example, in Tisdell and Wilson, 2003b), there is also a need to manage tourism including Antarctic tourism, appropriately so as to control its possible adverse environmental consequences. Ideal mechanisms are not yet in place for managing Antarctic tourism and for conserving Antarctica's natural resources although tourists themselves would be concerned about the destruction of 'its pristine landscape and its wildlife' (Anon, *Australian Wildlife*, 2004, p.31).

Furthermore, the consensus approach to the Antarctic Treaty System seems to be a barrier to effective governance of tourism by the Antarctic Treaty Nations. This is particularly so because at least 43 nations that have signed the Antarctic Treaty. Although the Protocol on Environmental Protection (Madrid Protocol) was added to the Antarctic Treaty in 1991, this protocol did not come into force until 1988. Furthermore, not all Treaty Nations have ratified it and some who have, have not passed enabling national legislation. In addition, several nations that have passed enabling legislation have little or no policing or monitoring of the environmental impacts of tourism in Antarctica (Kriwoken and Rootes, 2000). While self regulation of Antarctic tourism by IAATO members is a step forward, not all Antarctic tour operators are members of IAATO. In addition, although self-organisation can be effective, there is no guarantee that all operators will adhere to an 'agreed' code of conduct. Although evolution of institutional arrangements for better environmental management in Antarctica is occurring, the situation is still far from ideal. Judging from this case study, the demand of Antarctic tourists for keeping Antarctic in a pristine state is very strong and strengthens following their visit. As the number of tourist visits to Antarctica increase, the need to strengthen institutional arrangements governing resource use in Antarctica will become more urgent. The bulk of tourists visiting Antarctica appear to favour greater environmental regulation there.

The main tourism asset of Antarctica is its unique environmental; and Antarctic wildlife is a very important component of that. In fact, this case study indicates that an absence of Antarctic wildlife would cut tourist visits to the Antarctic by up to two-thirds. However, any major degradation of Antarctica's natural environment can be expected to have a very negative impact on its appeal to tourists. The sustainability of Antarctica's tourist industry depends on Antarctica sustaining its natural environment. This is recognised by IAATO and taken into

account in its code of conduct. However, for the reasons mentioned about, this code of conduct may be insufficient on its own to ensure that Antarctica is preserved in a pristine state. Maintaining Antarctica in a pristine state is what the overwhelming majority of Antarctic tourists want.

## CASE STUDY III: GLOW WORMS BASED TOURISM AT NATURAL BRIDGE IN SOUTHEAST QUEENSLAND

### Introduction

This case study focuses on the viewing of glow worms at the Natural Bridge site located within Springbrook National Park in Southeast Queensland. Like Lamington National Park, Springbrook National Park is also situated in the hinterland of the Gold Coast, an important tourist destination in Australia. While the economics of (non-captive) wildlife tourism and associated environmental issues are central to this case study, it differs from the previous ones in several respects.

Ways in which it differs from the previous case studies include the following:

- The Lamington National Park study focused on birds at a tourist attraction and the Antarctic study concentrated on mammals and birds as a tourist asset. This one is centred on insects as a tourist drawcard.
- Only a single wildlife species, the glow worm (*Arachnocampa flava*) constitutes the wildlife attraction in this case study whereas several species interest tourists in the other case studies.
- Nearly all the visits to view glow worms at Natural Bridge are day visits (primarily evening visits). The luminescence of the glow worms there is not visible during the day. Visits to Lamington national park involve many overnight visitors as well as day visitors. Tourist trips to Antarctica (except over flights) almost invariably involve overnight stays.
- While the Natural Bridge site obtains a substantial number of visits for the purpose of glow worm viewing, the number of tourists visiting is much less than at the Green Mountains/O'Reilly's site in Lamington National Park. On the other hand, the number of visits annually to view glow worms at this site is several times the number of annual tourist visits to Antarctica.
- Repeat tourist visits to Lamington National Park are common, are less common for glow worm viewing at Natural Bridge, and are very uncommon for visits to Antarctica.
- Some commercial benefits are obtained by the Queensland Parks and Wildlife Service (QPWS) from tour operators who bring groups of tourists to view glow worms at the Natural Bridge site. QPWS obtains no income, either indirectly or directly, from visitors to Lamington National Park.
- An interesting feature of the glow worm case is that in recent years methods have been devised for breeding glow worms and for maintaining colonies in captivity in 'artificial' (man-made) environments. Two commercial tourist businesses in the region surrounding Natural Bridge developed tourist attractions that include these colonies. Therefore, they provide some potential economic competition to the QPWS natural glow worm attraction at Natural Bridge. No close private tourist substitutes seem to be available in the other two tourism cases. At O'Reilly's, the treetop walk is provided by O'Reilly's but this appears to be complement rather than a substitute for the tourism attractions of LNP.

This case study will concentrate on 'walk-in' or independent visitors who come to the Natural Bridge site to view glow worms. It will outline their socio-economic profile, what motivates them to visit the site to view glow worms, their valuation of their experience, their economic impact, and whether they experience any negative spillovers from other visitors. In addition, information is reported about their knowledge, of glow worms and of 'substitute' glow worm sites in the area. In addition, the economic potential for improving interpretative and other facilities at the site is assessed on the basis of this survey. This case concludes with a general discussion of the issues raised.

We shall now provide some general background on glow worms in Australia and their overall significance as a tourist attraction, outline features of the Natural bridge site and the survey methodology adopted. Then the results of the survey will be reported and interpreted, followed by a concluding discussion of this case.

### General Background on Insect-based Tourism and Glow Worms in Australia

Insect-based tourism is a particular form of wildlife tourism that has remained mostly unnoticed in Australia despite its potential for further development as a tourism drawcard. For instance, there are many Australian

insects such as stick insects, jewel beetles, fireflies that can be potentially used for tourism purposes. Australia is home to 1200 species of jewel beetles (Brunet, 2000) that have hardly been used for tourism purposes. Some form of commercial activity takes place with other insects (e.g. stick insects), but (except in the case of butterflies) it is limited.

Some of the 'established' insect-based tourism activities involve butterflies, dragonflies and glow worms. For example, butterfly and glow worm viewing are popular tourism activities in New Zealand (eg. the Waitomo Caves and at Te Anau) and in Australia. Despite its popularity and its economic importance to the tourism industry no detailed study has been undertaken in Australia to study the socio-economic and related aspects of the glow worm-based industry.

This case study of glow worm viewing in the Springbrook National Park (Natural Bridge section) in southeast Queensland, Australia is a small contribution to rectifying this situation. Like LNP this park is World Heritage listed as part of Central Eastern Rainforest Reserves of Australia (CERRA).

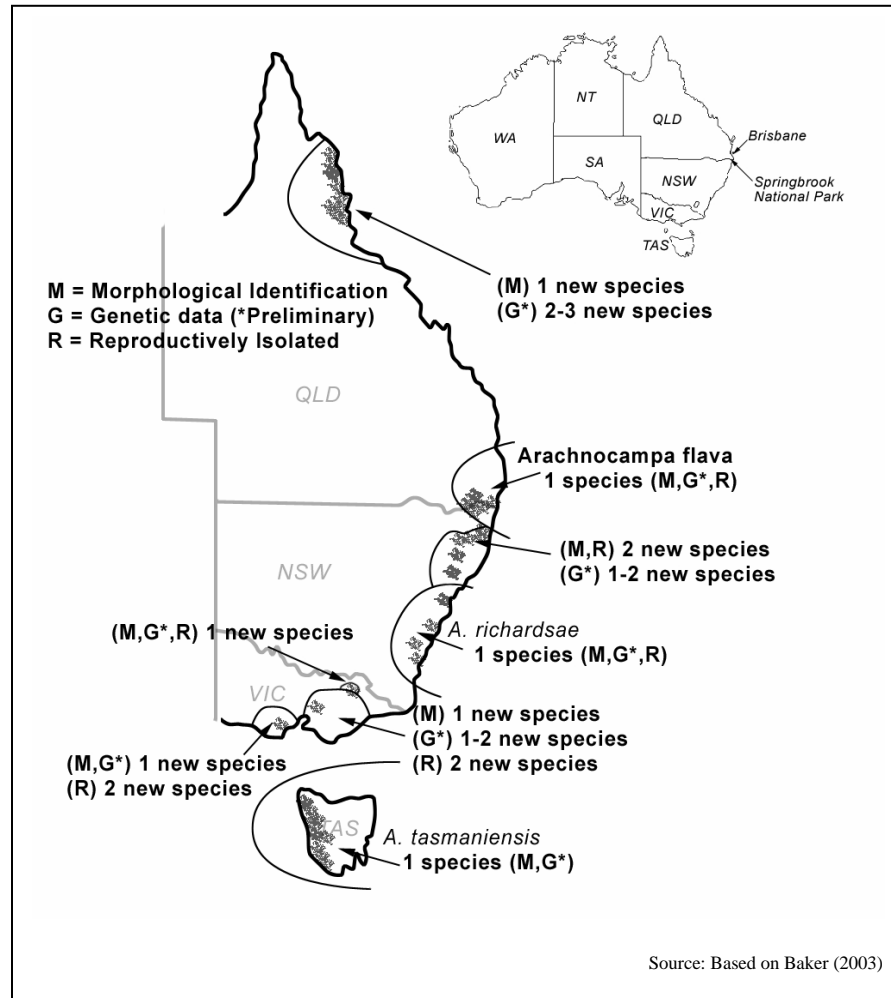
Tourist support (financial and political) for conservation of some insect species can also have an economic value because it maintains their future use options. A good example of a possible future value for glow worms is the potential to discover the chemical and genetic basis their bioluminescence. However, in situations where there is no immediate commercial economic value obtained from insect species no money or little money is likely to be allocated for their conservation. For instance, the Mt Buffalo glow worm is restricted in distribution to a sub-alpine cave in Mt Buffalo, Victoria and has been recommended for listing as threatened species (Baker, 2003). Tourism may have the potential to raise money for its conservation and could provide a commercial incentive to breed this species for tourism purposes, as is done privately with *Arachnocampa flava* in Springbrook, Queensland. Prospects are promising since the breeding of glow worms has been achieved in several places (Baker and Merritt, 2003; Takaie, 1989). Many species of potentially valuable insects are endangered in Australia (*Reader's Digest*, 1997) and need assistance for their survival. However, let us concentrate specifically on glow worms as a tourist attraction.

Glow worms *Arachnocampa* genus are found only in Australia and New Zealand and have been a tourist attraction for several decades, especially in the Waitomo Caves in New Zealand. Each year thousands of tourists visit glow worm colony sites to see them and watching glow worms has become a valuable commercial activity at some sites. In essence these insects have created a niche market in tourism and are an important economic activity for those involved in such tourism. Commercial stakeholders and tour operators who utilise glow worm colonies include those who have private property rights in glow worm colonies.

The glow worms of the southern hemisphere are immature flies (order Diptera) and are not to be confused with the bioluminescent beetle larvae and adults (order Coleoptera) that go by the same common name. There is one species of glow worm in New Zealand and three in Australia (Pugsley, 1983), with several new species awaiting formal identification and naming (Baker, 2003; Baker, 2002). Glow worms in Australia occur in areas of high humidity from the rainforests/caves of far north Queensland to Tasmania in the south but are only present in eastern Australia. A literature search conducted by Baker (2003) shows many identified localities (see Map 4) in which they occur. Tourism (small to large scale) utilises some of these sites in all of the four states concerned namely, Queensland, New South Wales, Victoria and Tasmania. Tourism usually occurs in sites where the glow worm colonies are large.

In Springbrook National Park (Natural Bridge section), where this survey on glow worm tourism was conducted, the greatest abundance of these insects is found in wetter months of the year between October to March and these local climatic variations are believed to affect the display of their glow (Baker, 2002). The species of glow worm found in Natural Bridge is *Arachnocampa flava*, but all species of glow worms have the potential to be tourist attractions.

**Map 4: Map showing identified glow worm sites in Australia and the recorded Species**



As shown in Map 4, many glow worm species recorded in Australia have a very restricted geographical range and are mostly endemic to the area where they are found. The restricted range may partly be explained by the inability of the adult mosquito-like flies to travel long distances and to colonise new areas (Baker and Merritt, 2003; Richards, 1960).

Like butterflies and dragonflies and many other species of insects, glow worms, have four distinct stages. For tourism purposes, it is the glow worm stage that is attractive. Glow worms unlike larva of butterflies and moths are predatory and lure their prey by glowing in the dark. Hence, unsuspecting prey (insects) get entangled in their web. Their larval stage is the longest one and can last up to one year depending on the availability of prey and environmental conditions (Baker, 2003). However, once the larva pupate and become adults, their life span is very brief, lasting as little as two days for a female and up to six days for a male (Baker, 2003).

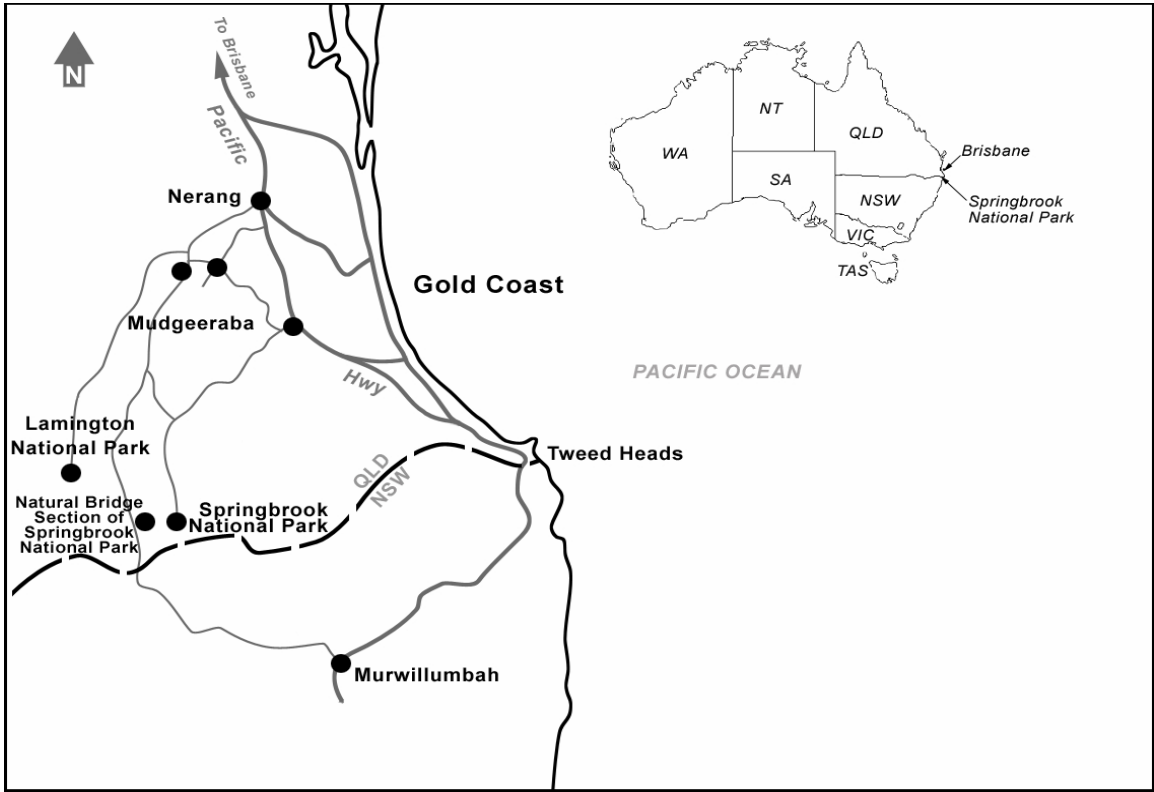
Glow worm viewing in its natural habitat is a night-time activity that occurs in a cave or in a rainforest. However, because of the potential that glow worms have to attract visitors during the day and in order to make glow worms more easily accessible, some entrepreneurs have created artificial habitats for glow worms to attract day-time (fee-paying) visitors. Artificial habitats for glow worm tourism have been created at Springbrook (Forest of Dreams) and are being developed at Mt Tamborine (Cedar Creek Vineyard and Winery). Such activity highlights the demand that exists among daytime visitors for such viewing.

### **The Natural Bridge Glow worm Site and General Data on its Visitors**

Springbrook National Park (Natural Bridge section) in Queensland (see Map 5) bordering NSW is well known for its colony of glow worms and attracts a diverse group of visitors. Entry to watch glow worms in the Natural Bridge cave and the surrounding national park is free for independent visitors as is the case for visitors to almost all national parks in Queensland. Although there is no direct entry fee for visitors, Queensland Parks and Wildlife Service (QPWS) has a system of charging commercial (bus) tour operators and for access to the site for tour groups viewing glow worms. To some extent, these charges are likely to be passed on to tourists joining

these commercial tours but the exact degree to which this is so is not known. This scheme has, amongst other things, provided funds to QPWS to maintain rangers close to the glow worm viewing area in the evening/night when commercial tourists visit the site. The presence of rangers also gives some protection to the glow worms and provides an opportunity for independent visitors to interact with the rangers.

**Map 5: Map showing Springbrook National Park (Natural Bridge section) colony of glow worms (*Arachnocampa flava*) and its environs**



Source: Based on QPWS (1999) information brochure on Springbrook national park (Natural bridge section)

Statistics collected by QPWS show as many as 300 such visitors are brought on some nights by commercial tour operators, although this number fluctuates according to the arrival of the above mentioned tourists to Australia. Table 23 shows the number of tourists brought by commercial tour operators to Natural Bridge since 2001. Commercial tour operators bring in large numbers of Asian tourists (e.g. from Japan, South Korea, Taiwan) in addition to other visitors (both foreign and Australian) to Natural Bridge. Glow worm tours in Australia, like in New Zealand, are well advertised on the internet by most commercial tour operators.

**Table 23: Estimated number of visitors brought by commercial tour operators and ‘independent visitors’ during the period 2001-2003 to view glow worms at Natural Bridge**

Month/ Year	2001		2002		2003		Total	
	Tours	Ind	Tours	Ind	Tours	Ind	Tours	Ind
January	6029	1981	4133	1374	5006	1642	15168	4997
February	5995	1580	5730	1210	4035	831	15760	3621
March	6279	1403	4767	856	3548	1192	14594	3451
April	6306	1948	3870	694	3814	1322	13990	3964
May	6199	1139	4553	951	2141	595	12893	2685
June	5762	1330	3682	421	3176	1083	12620	2834
July	6848	1412	3149	655	3191	1349	13188	3416
August	5893	1038	3153	492	4030	1090	13076	2620
September	4286	1020	2837	764	5512	1435	12635	3219
October	4671	951	4020	580	3192	729	11883	2260
November	4990	1040	3960	681	5863	1022	14813	2743
December	4186	1136	4058	874	5728	1549	13972	3559
<b>Total</b>	<b>67,444</b>	<b>15,978</b>	<b>47,912</b>	<b>9,552</b>	<b>49,236</b>	<b>13,839</b>	<b>164,592</b>	<b>39,369</b>

Source: QPWS (2001-2003) unpublished data

Note that the figures in Table 23 are probably underestimates of visitor numbers. This is because QPWS rangers record data only when they are stationed at the park entrance and often do not record numbers from independent visitors who enter the park while the rangers are on patrol. Furthermore, on certain evenings rangers are not present in the park. They work only five nights per week.

Table 23 indicates that commercial tour operators brought on more than 50,000 visitors a year during the period 2001-2003 to view glow worms at Natural Bridge. However, numbers have fluctuated from year to year and numbers have dropped. This is partly due to events of September 11, 2001, SARS and drop in Japanese tourism to Australia during the last few years. However, the large numbers of tourists brought in by commercial tour operators demonstrate that the importance of this attraction to them. In addition to the mostly Asian visitors brought by commercial tour operators, many independent visitors, both Australian and foreign, travel to Natural Bridge to view glow worms on their own. Some school groups and groups of elders are also included in the non-commercial (independent) visitor category. On average, the number of independent visitors has been around 13,000 for the last three years as shown in Table 23. However, they account for less than 20 percent of visitors coming to Natural Bridge to view glow worms. The majority of these visitors are from Australia and the rest are mainly from Europe, New Zealand and North America.

## Survey Methodology

Table 23 indicated that glow worm viewing is a popular night-time activity in Natural Bridge. If it were not for the presence of glowing worms there, it can be assumed that most of these visitors would not have travelled to Natural Bridge. Glow worms are an economic asset and bring economic benefits to the southeast Queensland region and help create employment there. The economic importance of glow worms is highlighted by the presence of private operators who provide glow worm viewing facilities during the day and at night for fee-paying visitors in Springbrook itself. There are two such sites, namely the ‘Forest of Dreams’ and the ‘Springbrook Research Centre’.

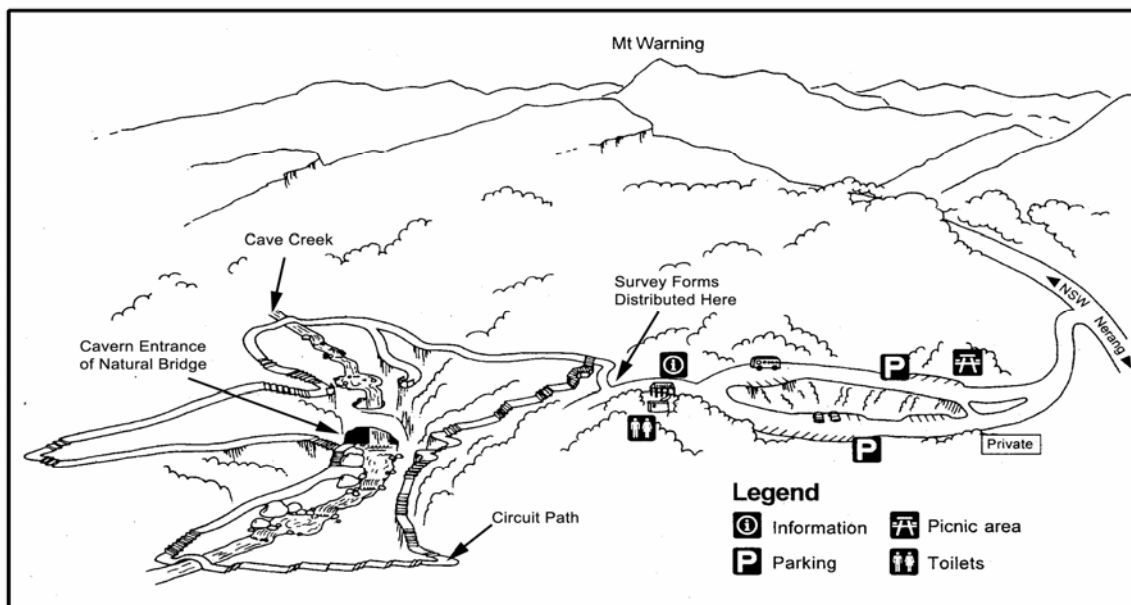
Despite the popularity of glow worms as a tourist attraction in Australia and their potential to attract significant numbers of tourists, generate economic benefits, and create local employment, no detailed study has been undertaken to date to determine the profile of visitors, their expenditures in the local area, satisfaction levels, knowledge gained from the visit, the demand for improved interpretative facilities, views about overcrowding, the possible introduction of a user-fee charges, visitors’ knowledge about other glow worm sites and to determine visitors’ background attributes such as gender, age, educational and income levels. Such information can be useful for tourism planning purposes and site management.

In this study only independent visitors were surveyed (see Appendix C for questionnaire). The tourists brought in by commercial tour operators were not surveyed. One reason was the language barrier in the case of visitors on commercial tours because most were from Asia. Another reason was that many of these tourists

(especially the Asian tourists) have already pre-paid for their whole visit and hence, it was thought that they would be unable to answer many of the questions in the survey independently. Furthermore, many of these visitors travel to Natural Bridge as part of an evening tourist package that often involves other attractions and dinner. Because of the differences between these two distinct types of visitors, it was decided to concentrate the study only on independent visitors only. That was also necessary given our limited time and budgetary constraints (only AUS\$10,000 was allowed for all the case studies in this report).

Conducting direct interviews was not practical mainly because glow worm watching at this site is a night-time activity and visitors come only for a brief period of time. We decided to adopt the following approach. One member of each independent group or party was to be handed a survey form together with a postage pre-paid self addressed envelope and requested the completed survey form in the next few days and post it. The QPWS gave its permission for the conduct of the survey inside the Springbrook National Park (Natural Bridge section). QPWS rangers could hand out the survey forms to independent visitors. This they did on those evenings which they were present to monitor bus tours and other visits. They were handed out by QPWS staff at the commencement of the circuit track to the Natural Bridge. (see Map 6).

**Map 6: Rough map of Natural Bridge walking track which leads to Cave Creek and the cavern in which the colony of glow worms at Natural Bridge is located. As indicated, survey forms were handed out at the beginning of this circuit track.**



Source: Modification of map in QPWS (1999) brochure on Springbrook National Park (Natural Bridge section)

Survey forms were intended to be handed to each individual person (if travelling alone) or party who visited Natural Bridge for the purpose of watching glow worms from January, 2003 to February, 2004 on a voluntary basis. However, the distribution of survey forms was halted for several months because of the transfer of rangers and new rangers having to be made aware of the project. The survey resulted in 177 usable responses. After allowing for a party size of 4.4, this gave a coverage of approximately seven percent of the independent visitors in the period covered.

### **The Socio-Economic Profile of Independent Visitors Viewing Glow worms at Natural Bridge**

The majority (84%) of surveyed visitors were from Australia. Of the foreigners most were from Europe, North America and New Zealand. Asians were poorly represented, but there were visitors from Hong Kong, Singapore and from other countries in South East Asia. One of the reasons why Asians are not well represented is because the survey excluded Asian tourists brought by commercial tour operators. Also most Asian visitors to Australia are not independent visitors. Furthermore, language barriers might reduce the response rate of Asian walk-in groups. In all, visitors from 13 different countries visited Natural Bridge and answered our questionnaire.

Of the Australians who visited Natural Bridge, 59% were born in Australia. The rest were migrants, some of



whom having lived in Australia for as long as 51 years. As might be expected, most of the Australian visitors were from Queensland, followed by those from NSW and Victoria. NSW is only a few kilometres from Natural Bridge and it might be expected that are to proximity the second largest group of visitors would be from NSW. The composition of Australian visitors to Natural Bridge by states is shown in Table 24.

**Table 24: Distribution of responding Australian walk-in visitors coming to Natural Bridge to view glow worms by State**

State	Frequency	Rel. Frequency
QLD	113	76.4
NSW	26	17.6
VIC	6	4.1
NT	1	0.7
ACT	1	0.7
WA	1	0.7
TAS	0	0
SA	0	0
<b>Total:</b>	<b>148</b>	<b>100*</b>

Table 24 indicates that that distance individuals are located away from the site is a factor influencing the number of independent visits to Natural Bridge. Travel costs influenced the frequency of visits. Most of the visitors (58%) said that their visit involved a day excursion which and not part of a journey involving an overnight stay away from home. This is supported by the large number of visitors from QLD and NSW visiting Natural Bridge who had postcodes within three hours travelling distance to Natural Bridge. However, 41% of the respondents said that they were on holiday, that is, a trip involving a stay at least one night away from home. This group included foreigners.

Once the 16% of the foreigners are excluded, only 20% of the visitors said they were on holiday. Approximately 1% did not answer this question. Most of the holiday visitors, although they did not stay close to Natural Bridge travelled from places such as Brisbane, Gold Coast and the Sunshine Coast which are popular holiday destinations. Most of these visitors went back on the same night to the place where they started their trip. The data show that most visitors make a day-trip to view the glow worms at Natural Bridge. Those on holiday usually travel to see glow worms and return to their original base. The most popular (91%) form of transport was by either a car or a van. A small number (3%) travelled by motor cycle and a few (2%) living close by walked to Natural Bridge. The average party size was 4.4 persons, including children.

Most of the surveyed respondents were female (54%) and the number of male respondents was 45%. However, it may have been that females were more likely to respond than males or to do so on behalf of their travel party. Approximately 1% did not indicate their gender. Interestingly, the majority (30%) of the survey respondents belonged to the 20-30 age group followed by the 30s and 40s age groups. The visitor numbers begin to diminish quite steeply for the 50s group and the number in their 60s and those above is small (3%). From Table 25, it is clear that it is largely those under 50 who are most likely to visit. However, rangers at Natural Bridge suggest that the age distribution is wider than indicated in Table 25 (Tanya Sweeney, personal communication, 12/6/2004). The viewing of glow worms at Natural Bridge may be less attractive to older visitors than younger persons because it is a night time activity and involves a walk along an unlit pathway with steps in places. A torch is needed for this walk. Nevertheless, this does not mean that glow worms are less attractive to older visitors. It is necessary to study other sites that offer day time glow worm viewing to examine these aspects.

**Table 25: Distribution of age of respondents**

	<b>Frequency</b>	<b>Rel. Frequency</b>
School going	2	1.1
<20 left school	6	3.4
20-30	53	29.9
31-40	40	22.6
41-50	41	23.2
51-60	28	15.8
61+	6	3.4
No Response	1	0.6
<b>Total:</b>	<b>177</b>	<b>100</b>

As observed in other surveys involving ecotourists (Tisdell and Wilson, 2003a, Tisdell and Wilson, 2002a), the level of education of the responding visitors is relatively high. The majority (37%) had a degree followed by those who had completed year 12 (16%), diplomas (15%), trade certificate (11%), postgraduate qualifications (9%), grade 10 (8%) and secondary education (3%). Close to 2% of the respondents did not answer this question.

Although the largest group (30%) of the responding visitors had a family income of more than AUS\$60,000, most of the respondents had a family income between AUS\$30,001-\$40,000 (17%) and AUS\$40,001-\$50,000 (14%). A small group of visitors (8.5%) had a family income of between AUS\$50,001-\$60,000 while the rest had an income below AUS\$30,000. The annual family income of visitors is shown in Table 26.

**Table 26: Distribution of income of surveyed visitors coming to Natural Bridge to view glow worms**

<b>Income Range</b>	<b>Frequency</b>	<b>Rel. Frequency</b>
Below \$20,000	19	10.7
\$20,001-\$30,000	20	11.3
\$30,001-\$40,000	30	16.9
\$40,001-\$50,000	25	14.1
\$50,001-\$60,000	15	8.5
\$60,001 and above	53	29.9
No Response	15	8.5
<b>Total:</b>	<b>177</b>	<b>100</b>

A breakdown of family incomes between Australian's and foreigners show that foreigners (37%) had family incomes higher than AUS\$60,000 compared to 32% Australians. Higher family incomes among foreigners can be partly explained by the presence of Europeans and North Americans in the sample. There were also relatively more foreigners with family incomes of less than AUS\$20,000 and with incomes between AUS\$40,000–AUS\$50,000. This may be because of the presence of overseas backpackers. However, in rest of the income groups, there were relatively more Australians than foreigners.

### **The Importance of Glow Worms at this Site as a Tourist Attraction and the Economic Value and Economic Impact of Visits**

For the vast majority (84%) of the respondents, the main purpose of their excursion was to see glow worms at Natural Bridge. Most of the visitors were either day trippers (those travelling from home) and those on holiday who also decided to make it a diversionary day trip. In order to visit Natural Bridge, visitors travelled a minimum of about 1 km to a maximum of 900 km. The average distance travelled was 114 km per person or party. Despite the distance travelled, a large percentage of the visitors (96%) said that it was worthwhile travelling this distance to see the glow worms at Natural Bridge.

We asked the respondents what was the main reason for visiting to see glow worms. The main reasons cited by the visitors are listed in Table 27.

**Table 27: Frequency of responses to the question ‘What was the main purpose of your visit to see the glow worms?’ (Semi structured question)**

	<b>Frequency</b>	<b>Rel. Frequency</b>
Entertain visitors	63	25.5
Curiosity	62	25.1
Attracted by star like event	55	22.3
Amazed insects produce light	28	11.3
Other	18	7.3
Fill in spare evening	17	6.9
No response	4	1.6
<b>Total:</b>	<b>247<sup>+</sup></b>	<b>100</b>

Note: Respondents could indicate more than one reason

As Table 27 shows for the largest percentage of the responding visitors, the main purpose of the visit was to entertain visitors. The importance of this factor has been observed in other surveys as well (Tisdell and Wilson, 2002a). This partly explains some repeat visits to sites such as Natural Bridge. Curiosity was ranked second as the main reason for the visit followed by the star-like features of the glow worm display. The vast majority (98%) of respondents were satisfied with their visit, and said that they would recommend Natural Bridge to a friend. Only 2% said that they would not.

Despite the satisfaction derived by the visitors and the distance travelled by some visitors, the amount of money spent per visitor for their travel to Natural Bridge was small. It was estimated, on the basis of costs reported by the respondents that the average expenditure per person was AUS\$7 per trip.<sup>8</sup> A few visitors said that they did not incur any costs in travelling to Natural Bridge to watch glow worms although they had travelled a considerable distance to reach Natural Bridge. No reasons were cited, but it is likely that when some parties travelled together no costs were incurred to one party. Only a few visitors travelled from the neighbourhood (within a kilometre) where the costs incurred would have been minimal.

Most of the respondents (95%) stated that their visit to see glow worms at Natural Bridge was worth their cost and effort. Only around 2% said that the cost was not worth the visit and 3% did not answer this question.

Of those who said that they felt that the visit to see glow worms at Natural Bridge was worth the effort and cost, 73% said that their experience was worth more than the cost and only 29% said that the experience was not worth more than the cost. Approximately 3% of the respondents did not answer this question. The high satisfaction experienced by the visitors shows the existence of a consumer surplus or an economic surplus. In order to measure this we asked the respondents:

If yes, how much more would you personally have been prepared to pay for this experience?

The average additional amount a respondent was personally prepared to pay for this experience was AUS\$19.90<sup>9</sup>. As mentioned above the average expenditure per person in travelling to Natural Bridge was AUS\$7. Since there is no entry fee at present for ‘independent’ visitors who come to view glow worms at Natural Bridge the average extra amount (AUS\$19.90) that the respondents were prepared to pay for the glow worm experience provides a measure of the consumer surplus for the average respondent.

This estimate of the economic surplus on consumer surplus may be used to provide a measure of the economic value that independent visitors obtain annually from viewing glow worms at Natural Bridge. A lower bound estimate of this can be obtained as follows: Suppose that the sample of respondents and the average party size of 4.4 is representative of the population of independent visits. Then  $13,839/4.4 = 3145$  independent parties would have visited the site to view glow worms in 2003. Of these one would expect a potential respondent in 73 per cent of each of these parties (2,296) to be prepared to spend an average AUS\$19.90 more than was actually spent to see the glow worms at Natural Bridge. This would amount to AUS\$46,690 for the year based on the number of independent visitors to the site in 2003. This can be regarded as a lower bound estimate of the total consumers’ surplus obtained by walk-in visitors coming to Natural Bridge to view glow worms. This is

<sup>8</sup> For the calculation seven large groups (some groups had more than 50 adults) were removed and some of them are possibly school groups.

<sup>9</sup> The figure was estimated by taking into account only those who said that their glow worm experience was worth more than the cost. There were 123 respondents who said yes out of which 41 did not say how much more they would personally have been prepared to pay for this experience. Furthermore an outlier of \$550 was removed together with seven respondents who said they were willing to pay ‘nothing’.

because it is only based on the actual response of one person in a party averaging 4.4. The actual figure may be over AUS\$100,000 p.a.

The actual sum of this economic surplus of independent visitors could be higher than \$46,690 because some non-respondents in the parties surveyed may have been prepared to pay extra to visit Natural Bridge to see glow worms. Furthermore, some of those respondents who said they would not have been prepared to spend more to visit Natural Bridge could have said so for strategic reasons.

What these results indicate, however, is that although independent visitors pay no entrance fee to see glow worms at Natural Bridge they are obtaining a net economic benefit from it of at least AUS\$46,000 a year. It is an economic benefit even though independent visitors do not pay for it.

The economic impact in terms of total expenditure incurred by visitors travelling to Natural Bridge to watch glow worms is relatively small. An average party in the sample spend AUS\$30.80 = \$7 x 4.4 on a visit. If the sample was on average representative of all independent visitors in 2003, the total expenditure associated with their journey to view glow worms at Natural Bridge would have been \$13,839 x 7 = \$96,873.

The survey results indicate that there is very little local economic impact from glow worm viewing at this site in the Natural Bridge village nearby the glow worm site or within 25km of it. Of the surveyed visitors, only 18.6% spent money in the local village or nearby. The majority (79.9%) did not and another 1.7% did not answer this question<sup>10</sup>. Of the 18.6% who spent money in the village or within 25 kilometres of the site, the maximum amount spent per person was AUS\$40 and the minimum amount was AUS\$1.70. The average amount was AUS\$12.20. The low level spending within a 25 kilometres radius of the site could be attributed to several factors for example: (a) many tourists do not spend the night in the nearby vicinity and (b) there are no other nearby major attractions where tourists can spend their money.

### **Visitors' Knowledge of the Presence of the Glow Worm Site at Natural Bridge and of Substitute Sites in the Area**

For the majority of the responding visitors (56%), it was their first visit to watch glow worms while for 43% it was not. Only 1% did not answer this question. Of those who had visited Natural Bridge before to see glow worms, many of them had come only once or twice previously. However, there were some visitors who had come more than thrice and less than ten times. There were a few visitors who had visited Natural Bridge more than 10 times. Most respondents learnt about the glow worms as an attraction by word of mouth either from friends or family. Independent visitors did not learn about the site very much from travel books or agents. However, Natural Bridge, like most other glow worm sites is given publicity on the internet.

Of those who were on holiday, 50% said that they knew of the existence of glow worms at Natural Bridge before they left home while 47% said they learnt about the glow worms while they were on holiday. The majority (85%) of the visitors thought that they would visit Natural Bridge again to watch glow worms while only 12% said that they would not. Approximately 3% did not answer this question. The large number of visitors saying that they were willing to return further demonstrates the overall satisfaction of visitors to Natural Bridge with their experience. This also confirms the large number of repeat visitors to Natural Bridge. In addition to visitors watching glow worms, a large number of visitors (72%) had also visited the National Park (Natural Bridge section) during the day while 28% did not. An average visitor had visited Natural Bridge National Park during the daytime around 4.6 times with some visiting as many as 20 times. These are mostly visitors who live close to the National Park. Of those who said 'no', more than half (55%) said they plan to visit it by day and 24% said 'no', while the rest did not answer this question.

In the survey, we wanted to determine whether or not the visitors were aware of the existence of other glow worm sites in the area, including the 'Forest of Dreams' at Springbrook. Only a small percentage of visitors knew about their existence. For instance, only about 10% of the respondents to Natural Bridge knew about the existence of the 'Forest of Dreams' and only two had actually visited the place. Most of the visitors who knew about the existence of the 'Forest of Dreams' were repeat visitors and were Australians. Of those who said 'no' (82%), more than half (53%) said that they would have liked a chance to visit the 'Forest of Dreams'. Around 40% said 'no' and 6% did not answer this question. In addition to the questions relating to the 'Forest of Dreams', we asked the visitors whether they knew 'that glow worms also occur naturally at Mount Tamborine National Park in the hinterland of the Gold Coast' north of Natural Bridge. Only 23% knew about the presence of glow worms occurring at Mount Tamborine National Park. The majority of the visitors (75%) did not know of the existence of glow worms there and 2% did not answer this question.

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<sup>10</sup> Only the responses of 170 visitors were taken into account. Seven 'large parties', e.g. school parties, were removed for this analysis<sup>10</sup>. One outlier was removed to estimate how much money was spent in the local area.

## Visitors' Knowledge of Glow Worms

A section of the survey was designed to determine the visitors' knowledge of glow worms since it has many policy implications.

A significant number of visitors (67%) said that they obtained knowledge about the biology and ecology of glow worms during their visit to Natural Bridge. However, 32% said 'no' and 1% did not answer this question. Of those who said 'yes' (119), 52% were 'first time' visitors and the rest were 'repeat' visitors. Of those who said 'no' (55), 64% were 'first time' visitors and the rest were 'repeat' visitors. The information was mainly obtained from notice boards, rangers and leaflets. In addition to asking whether they had obtained information about glow worms, the survey asked several specific questions to determine the extent of their knowledge. First, the survey asked the visitors whether they knew what glow worms were? The majority (79%) of the visitors said 'yes', while 16% said 'no' and 5% did not answer this question. Of those who said 'yes', (139), 54% were 'first time' visitors and the rest were 'repeat' visitors. Of those who said 'no', (28), 64% were 'first time' visitors and the rest were 'repeat' visitors. In order to determine how much the visitors knew about glow worms, we asked the following question:

'What is the reason for glow worms lighting up'? The answers to this question are shown in Table 28.

**Table 28: Distribution of responses to the structured question 'What is the reason for glow worms lighting up?'**

	<b>Frequency</b>	<b>Rel. Frequency</b>
To attract insects only	114	64.4
To attract mates	22	12.5
Don't know	23	13
To attract mates and to attract insects	8	4.5
No Response	6	3.2
Other	3	1.6
To enable them to see	1	0.6
<b>Total:</b>	<b>177</b>	<b>100</b>

Table 28 indicates that the majority of the respondents (64.4%) knew that the reason for glow worm lighting is to attract insects for food. However, the rest did not know the reason for their lighting up, and they included repeat visitors. Of those who knew the answer to this question, 53% were 'first time' visitors and the rest were 'repeat' visitors. Of those who did not know the reason for glow worms lighting up, 62.5% were 'first time' visitors and the rest were 'repeat' visitors. Furthermore, we asked the visitors what spiders and glow worms have in common? The responses are shown in Table 29.

**Table 29: Distribution of responses to the structured question 'What do spiders and glow worms have in common?'**

	<b>Frequency</b>	<b>Rel. Frequency</b>
Both have sticky threads	123	69.5
Don't know	34	19.2
Both insects	13	7.3
No Response	6	3.4
Both Poisonous	1	0.6
<b>Total:</b>	<b>177</b>	<b>100</b>

Close to 70% of the visitors knew that both species have sticky threads. About approximately 7% of the visitors also said that both spiders and glow worms were insects which is technically incorrect because spiders belong to the class *Arachnida* and insects to the class *Insecta*. The rest did know the answer to this question. Of those who knew these facts, 54% were 'first time' visitors and the rest were 'repeat' visitors.

Of those who did not know what spiders and glow worms have in common, 62.5% were 'first time' visitors

and the rest were 'repeat' visitors. With regard to the question 'Is the glow worm only one stage of the life of an insect?' 59% said 'yes' and 11% said 'no'. However, 26% said they 'don't know' and 3% did not answer this question. Of those who said 'yes' many mentioned the names of insects and 17% said 'don't know'. Of those who knew that the glow worm was only one stage of the life of an insect, 54% of them were 'first time' visitors and 46% were 'repeat visitors'. Of those who did not know this fact, 58% were 'first time' visitors and 42% were repeat visitors. The replies of those saying 'yes' are shown in Table 30.

**Table 30: Distribution of responses to the structured question 'What do the adults look like?'**

	Frequency	Rel. Frequency
Moth	23	21.9
Fruit flies	29	27.6
Other	23	21.9
Don't Know	18	17.1
Beetles	7	6.7
Blowflies	5	4.8
<b>Total:</b>	<b>105</b>	<b>100</b>

Table 30 shows that despite 59% of the visitors saying that the glow worm is only one part of the life of an insect, many were unsure what the adult looked like. Only 27.6% were of the view that the adult glow worm looked like fruit flies which is a correct answer. However, in the other category, 13.3% of respondents mentioned that the adults resembled a mosquito which might be allowable. Interestingly, 21.9% of the respondents said that the adults look like moths and 6.7% said they look like beetles.

### **Economic Scope for Value Adding Activities at the Natural Bridge Site**

It was decided to ask independent visitors a couple of questions to determine how much demand might exist for a couple of services that might add value to their glow worm viewing experience at Natural Bridge. They were asked about the desirability of a small booklet being available on glow worms and the value of an interpretative centre about glow worms.

We can conclude that there is some demand amongst independent visitors for a booklet. However, it would have to be relatively inexpensive. Sales to about 70 per cent of the independent parties visiting would result in about 1,750 booklets being sold per year. There might also be some sales to a few individuals in bus tour groups.

Respondents were asked:

*'Do you think that it would be useful to be able to purchase a small booklet at Natural Bridge explaining the biology/ecology of glow worms?'*

The majority of surveyed visitors (81%) answered 'yes' to this question while only 18% did not like the idea. Another 1% did not answer this question. However, only 68.4% of the visitors said that they would have been inclined to purchase such a booklet during the visit, while 29.4% answered 'no' and there was no response from 2.2% of the participants. Of those who said 'yes', the average amount the respondents were prepared to spend for an information booklet of around 12 pages was AUS\$3.80. The maximum amount stated was AUS\$10.

Surveyed respondents were also asked:

*'Would you like to see a display centre at Natural Bridge containing exhibits that fully explain the life history of glow worms and the reason for their presence at Natural Bridge?'*

The majority (88%) of the visitors said they would like to see a display centre at Natural Bridge containing exhibits that fully explained the life history of glow worms and the reasons for their presence at Natural Bridge. Only 11% did not like the idea and around 1% did not answer this question. Of those who said 'yes', 98% said that assuming that the exhibit was of good quality, that they would have made use of it. None of the respondents said 'no' and around 2% did not answer this question. The survey results show that a display centre would be used by most visitors if it were free.

However providing such a facility free of charge could be impractical. Respondents were therefore, asked *'If an entry fee had to be charged to cover the cost of this facility, what entry charges would be reasonable in your view?'* Space was left to indicate charges for adults, children and pensioners.

On average respondents stated that it was reasonable to charge an entry fee of AUS\$3.70 for an adult. However, approximately 9% of those who answered this question said that visitors should not pay an entrance fee to cover the cost of an interpretive centre. For children the average rate was AUS\$1.60 and 23% said

children should not pay. The average amount suggested for pensioners was slightly higher (AUS\$1.90) with 18% of respondents saying that pensioners should not pay an entrance fee.

At these suggested rates, an interpretative centre would not appear to be likely to be economic. For example, if adults pay an entry fee of AUS \$4.00 per person and about 6,000 adult independent visitors were to visit it annually, its gross revenue would be \$24,000 annually; entry for children and pensioners being assumed to be free. This would, however, be boosted if say 30 per cent of bus group visitors were to use it and pay. That would add about an extra \$40,000 in gross revenue. Overall the economic viability of the possible interpretative centre would depend on its degree of use by bus tour groups. It could be quite economic if there is sufficient interest from this quarter. However, in that case the exhibit would need to take into account the language requirements and other needs of this group.

If tour group operators believe that they and their clients would have demand for such a facility, the idea may be worth exploring. There would also be a case for having local community voluntary involvement in the operation of such a facility, as is the case at Mon Repos Conservation Park in relation to turtle-watching. At Mon Repos local volunteers assist rangers and manage the gift and refreshment side of commercial activities. Another possibility may be to allow the facility to be provided and/or managed privately subject to particular conditions. The concession could generate income for QPWS. However, we were not in a position to explore adequately the commercial feasibility of these options.

### **Negative Spillovers from Other Visitors and the Question of Whether Independent Visitors Should Pay Fees to View Glow Worms at Natural Bridge**

The cave at Natural Bridge for viewing glow worms does not have unlimited capacity to hold visitors and many visitors in the cave at any one time may distract from the enjoyment of other visitors due to noise, competition for the best viewing points, excess light from torches etc. The path to and from the site may also become congested at times. We therefore, asked respondents the following question: *'Did you feel inconvenienced by other visitors while viewing glow worms?'*

A considerable percentage of respondents (40%) said that they did experience such inconvenience. However, the remainder said they did not. Nevertheless, it is clear that negative spillovers from other visitors is a significant problem at the site. It has the potential to magnify if visitor numbers increase.

There are several ways to deal with such 'congestion' problems. A method favoured by many economists is to introduce a fee or price to use a congested facility. However, if demand to use the facility is highly inelastic, a high charge may be needed to reduce use of the facility and significant redistribution of income also occurs. In any case, there is strong opposition amongst Australians, particularly Queenslanders, for charging fees for using national parks and protected areas as is evident from the LNP case study reported earlier.

Such opposition is also apparent in this case. The sampled visitors were asked: *'Do you believe that walk-in visitors (those not on group visits organised by bus companies) should pay an entrance fee to see the glow worms at Natural Bridge?'* The majority of the respondents (73%) said 'No'; 24% said 'they should', and 3% of the sample did not respond. We can observe that although 40% of respondents reported some negative externalities from other visitors only 24% were in favour of introducing an entrance fee for independent visitors.

In relation to bus tours, some scheduling of arrivals of different groups is adopted so as to avoid major overlaps in arrivals. Major overlaps in arrivals and visits to the cave at Natural Bridge can be a source of major negative spillovers on individual visitors.

### **Discussion of Case III**

The glow worm colony in Springbrook National Park (Natural Bridge section) is one of the largest in Australia and attracts close to 60,000 visitors a year, both independent visitors and those brought in by commercial tour operators. However, as shown in Table 23 the majority of tourists (mainly Asian) are brought by commercial operators often as part of a pre-paid Australian tour although commercial tour operators cater for several other groups as well. Although this form of tourism has remained largely understudied and its contribution to tourism unnoticed, glow worms at Springbrook National Park attract more visitors annually than turtle viewing at Mon Repos and a few thousand less than whale-watching at Hervey Bay (Wilson and Tisdell, 2003). However, the latter ecotourism activities occur only for a part of the year whereas glow worm viewing does not. While the bulk of tourists brought by commercial tour operators are Asian, the composition of independent visitors are not. In this group, the majority of the visitors (83.6%) are Australians and most of the foreigners are from the UK, US and New Zealand.

The study found that most of the independent visitors are day-trippers, including those on holidays. The

number of visitors who stayed in Springbrook because of the presence of glow worms was negligible and no extra days were spent in this immediate area because of the presence of glow worms. Furthermore, the amount of money spent by the tourists in the area (within a 25 km radius) is relatively little and hence the economic impacts from this form of tourism are not significant for the immediate local economy. However, within the Southeast Queensland region, independent visitors spend approximately AUS\$100,000 annually for visits to view glow worms at Natural Bridge. Commercial tour operators' fees for the excursion that involves glow worm viewing is high and judging by the number of visitors (Table 23) the revenue generated by their activity in the Gold Coast region/southeast Queensland region must be considerable. Furthermore, there are two private properties in Springbrook that offer glow worm viewing facilities during the day and at night they charge a fee and maintain a restaurant and conduct other activities (e.g. pottery displays, etc) to 'add value' to their business operations. Although annual visitation figures are not available, these sites are popular among tourists.

Glow worm viewing at Natural Bridge has a much smaller regional economic impact than visits to LNP. Nevertheless, its glow worm colony has economic value. For example, although independent visitors pay no entry fee, the colony's economic value to them (as measured by their consumers' surplus) was estimated to be at least AUS\$46,000 annually. Most of this economic benefit is obtained by Australians since they account for the bulk of independent visitors coming to view glow worms. Local (Australian) economic benefits are also obtained from tourists coming in bus tours. These are, however, mostly foreigners so Australian economic gains from their visits to the colony on the extra income received by Australians as a result of their visits. This is not estimated here.

Of course, the economic value of Natural Bridge section of Springbrook National Park and this park as a whole exceeds the economic value of glow worm viewing at Natural Bridge. For example, Natural Bridge also interests daytime visitors who do not see glow worms as do other parts of Springbrook National Park. Furthermore, as pointed out in the early discussion of the economics of conserving natural areas, the total economic value obtained from a national park depends not only on its economic value for tourism and recreation but on off site economic values as well.

The knowledge of glow worms of the majority of visitors was high (although there was uncertainty regarding more specific questions such as 'what do the adult glow worms look like') indicating that they had read about glow worms before their visit. Furthermore the majority of the visitors were willing to purchase a booklet that explained the biology and ecology of glow worms. The majority of the visitors indicated that most visitors were satisfied with their glow worm experience and were of the view that the visit was worth the cost and effort. The average cost per visitor of travelling to Natural Bridge was AUS\$7 and the average respondent was prepared to personally pay AUS\$19.90 more for the experience. However, the majority (73%) of the visitors believed that walk-in visitors should not pay an entrance fee to see the glow worms at Natural Bridge.

Overall, glow worm viewing remains a popular tourist activity and the majority of the visitors have high satisfaction rates visiting the colony of glow worms at Springbrook National Park (Natural Bridge section). There is also a large number of repeat visitors travelling on their own or accompanying others and stating that they would talk to friends and relatives about their experience at this site. The popularity of glow worms is also confirmed by the existence of two privately run commercial glow worm sites in the Springbrook area.



# CONCLUDING COMMENTS

## Overall Coverage in Retrospect

Three very different case studies have been used to illustrate the economic value and economic impact of tourism utilising non-captive wildlife in natural environments. Case study I involving Lamington National Park, focused on the importance of birds as a tourist attraction; the Antarctic study (Case Study II) concentrated on mammals and birds eg. penguins, as a tourist attraction, and insects were the centre of attention in case study III of tourism utilising the glow worm colony at the Natural Bridge site.

In both Cases Studies I and II, it was possible to assess the relative value of wildlife as tourist attraction compared to other attributes of the tourist destination that might appeal to tourists. In both cases, concrete measures of its relative importance were presented.

The importance placed by tourists on conserving wildlife and natural environments at the relevant tourist destinations were given particular attention. This is because wildlife tourism often fosters support for nature conservation and because the sustainability of economic benefits from this type of tourism depends on the conservation of its natural assets.

Socio-economic differences are evident in the tourists involved in tourism in these three cases. On average, the age, income levels and educational levels of respondents are higher in the Antarctic case than for the LNP case, and in turn, levels of these variables for the LNP sample are higher than for the sample of independent visitors visiting the glow worm colony at Natural Bridge. Although wildlife tourism is likely to be of particular interest to the well educated and those on higher income, this study suggests that it can satisfy individuals from a wide range of socioeconomic backgrounds when the full range of types of wildlife-based tourism are taken into account.

Furthermore, the case studies differ in the duration of associated journeys because visits to Antarctica usually involve several days, visits to LNP consist both of day and overnight visits, whereas visits to view glow worms at Natural Bridge rarely involve overnight stays in the neighbourhood of the site – most are merely evening visits.

Primary economic impact (level of initial expenditure generated) by the tourism involved in three cases, is largest for Antarctic tourism, less (but still quite high) for tourism in LNP, including at the O'Reilly's/Green Mountains site; and least for glow worm viewing by independent visitors at Natural Bridge. Within the southeast region of Queensland, large economic impact appears to be generated by tourism to LNP. Although economic impact is much less from the glow worm colony at Natural Bridge, its economic impact would be appreciable when account is taken of visitors on bus tours who constitute the bulk of visitors to this site. In the case of Antarctic tourism, while it no doubt has a significant economic impact on Ushuaia in southern Argentina, much of the expenditure by Antarctic tourists occurs elsewhere. Economic leakages from Ushuaia would be high in view of its remoteness. It was found that in the absence of birds, expenditure generated by the O'Reilly's/Green Mountain site would be cut by at least 40 per cent and in the absence of Antarctic wildlife, the number on Antarctic tourists would drop by at least 30 per cent and similarly expenditure on such tourism. In the absence of glow worms virtually no night-time visitors would go to Natural Bridge in Springbrook National Park.

As explained in Section 2, measures of economic impact of tourism do not measure the net economic value of tourism. One measure of this net economic value is the economic surplus or consumers' surplus that individuals obtain as a result of visiting a tourist site or area. In practice, however, this is very difficult to measure. In these studies, we relied on the stated maximum willingness of respondents to pay for their tourism experience to measure this surplus. It seems likely that due to strategic bias it was understated by respondents in the LNP study (Case I) it was probably understated in case II for Antarctica, but results seem believable in case III, the glow worm case. As discussed below, significant response bias could be present in Cases I and II. In Case I, in particular, strategic bias may be present because respondents were aware that their responses might be used to suggest an entry fee for LNP. Possibly hypothetical bias could be present in Case II.

Both case studies I and III highlight the high level of opposition by Australians to charging fees for entry of visitors to state-owned protected sites to see or enjoy natural phenomenon there. However, foreigners are less opposed to such fees. Australians are more inclined to accept them if they can be assured that the money will be spent on improvements or conservation in the area visited, or at least on nature conservation. The question of a fee being imposed on visitors, to Antarctica was not put to the respondents. Nevertheless, the majority of Antarctic respondents were concerned about the possible environmental impacts should the number of tourists visiting Antarctica continue to increase.

In each of the case studies, the respondents had a chance to provide information about environmental matters

pertinent to their tourism experience and to raise their concerns about relevant environmental issues.

## **Limitations**

The major portion of this research was based on primary data collected by means of surveys. While this is a relatively costly and time-consuming method, it is sometimes the only available means to collect relevant data on wildlife tourism. Nevertheless, one must be aware that such methods have potential pitfalls. Two of the most important pitfalls are:

- sample bias; and
- response bias.

Sample bias occurs when the sample of tourists surveyed is different from the population of tourist under consideration. Such bias may be serious or minor. While procedures to reduce the seriousness of such bias are available, they can be very costly to apply. They include increasing sample size and adopting various randomisation procedures. In our surveys, we tried within our funding constraints for the surveys to guard against sample bias. For example, at the O'Reilly's/Green Mountains site some forms were distributed by the guest house. Others were distributed at the rear of the car park on different days of the week. Coverage of tourist parties on the two voyages at the 'Akademik Ioffe' by the surveys was relatively complete but the sample is not drawn from the whole population of tourists visiting Antarctica. Therefore, there is room for debate about how representative it is of all tourists visiting Antarctica. Nevertheless, the socio-economic characteristics of this sample are relatively similar to those found by other researchers to be typical of Antarctic tourists. In the case of independent visitors coming to see glow worms at Natural Bridge, we had less control over distribution of survey forms and it as intermittent due to circumstances beyond our control. However, there is no particular reason to believe that this sample is markedly different on average to the population of independent visitors coming to this site to view glow worms. However, there may be some under representation of foreign visitors due to language barriers.

Response bias of those surveyed can be a major problem. It seems to be a greater problem when trying to obtain information about tourists' maximum willingness to pay for a tourist experience (a basis for estimating economic value) than for gathering information about their actual expenditure. Two important sources of bias in this case are strategic bias and hypothetical bias. Strategic bias may occur for example because respondents believe that they may be charged a fee to use a tourist facility based on their stated willingness to pay (WTP). They may, therefore, understate the WTP. Secondly, although respondents might want to give an honest answer, they may have difficulty in accurately envisaging the actual situation that calls for their response. As in most market surveys, some caution is called for in interpreting the results of our surveys. This, however does not mean that no implications can be drawn.

## **Some Possible Implications for Those in the Tourism Industry**

After providing background on the nature of tourism economics, this study explored its application to three different wildlife tourism cases. In each case, important economic impacts were shown to be generated by such tourism. These varied in size and degree of regional impact depending on the nature of the case. Overall indications are also that the net economic value obtained by tourists from such tourism is high but strategic and hypothetical bias makes it difficult to measure this accurately.

The two Australian-based case studies show that there is strong opposition amongst Australians to charging fees for entry to national parks or state protected areas but less so amongst foreigners. This opposition is maintained even when most of the Australians observe environmental problems at a site as a LNP and Natural Bridge. However, Case Study I indicates that there will be less opposition to the charging of fees if entrants can be assured that the funds collected are spent on improving amenities and conservation effort in the protected area where they are collected. If fees were to be introduced, it would be important politically to link them to such expenditure.

On the other hand, there is little opposition to charging for 'optional extras' at tourist sites within state protected areas. Such extras can include information booklets, interpretative centres and so on. The commercial provision of optional extras in national parks is a potential source of extra revenue for QPWS, can enhance benefits recovered by visitors and increase their support for nature conservation. Such extras need not be supplied by QPWS itself.

The economics of such value adding activities at Natural Bridge were explored. Except for the sale of an

informative booklet providing information on glow worms, the commercial viability of an interpretative centre seemed doubtful if it were to depend just on demand from independent visitors but could be quite viable, if it had reasonable patronage from visitors on bus tours. Such a facility might be operated as a private concession and/or with community involvement. However, a full and specific feasibility study would be required before developing such a facility.

The presence of birds was found to be a major factor enticing individuals to visit the O'Reilly's/Green Mountains site. It was shown that their absence would greatly reduce demand for visiting this site and have a large adverse economic impact. It was also noted that different groups of visitors seek different attributes of birds, and that conflict exists between groups concerning the desirability of those attributes. In turn, this results in social conflicts about how visitors should interact with birds. One group of visitors objects to the feeding of birds at this site. Another group enjoys feeding birds at this site because it enables them to have close contact with the birds and to see brightly coloured birds easily. This creates several managerial issues that are discussed to some extent in Tisdell and Wilson (forthcoming, b). It seems likely that the economic value of this site would be significantly reduced if feeding of birds were to be completely prevented. This specific issue needs more investigation.

There was widespread support among our sample of Antarctic tourists for keeping Antarctica in a pristine state. Most respondents favoured capping the number of tourist visits to Antarctica for environmental reasons and many of those who did not said that numbers should only be allowed to increase if appropriate environmental safeguards are put in place. How the number of tourist visits might be limited was not canvassed. For example, the possibility of a fee for visits to Antarctica was not explored.

Antarctica's unique environment, including its wildlife, is its main attraction. The survey indicated that in the absence of Antarctic wildlife Antarctic tourism would diminish greatly. Maintaining the pristine state of Antarctica and its stock of wildlife is vital for sustaining its tourism industry.

This has been recognised by IAATO which has drawn up a relevant code of conduct for its members. However, as pointed out in this report, there are gaps in environmental regulation in Antarctica. Some of these arise from the type of governance arrangements that have evolved for Antarctica.

There are environmental concerns about the concentration of Antarctic tourism on the Antarctic Peninsula. Very little use of the Australian Antarctic Territory for tourism purposes has occurred probably mainly because of its long distance from settled areas in the Southern Hemisphere. The scope for the development of such tourism (including tourism that might utilise Macquarie Island and Heard Island which are World Heritage listed) needs specific in depth research. Australia has a special interest in Antarctica and in relation to population, Australians are well represented amongst tourists to Antarctica.

In fact, in all the three cases a significant number of respondents raised environmental issues of concern to them. Crowding, congestion and negative spillovers from other visitors were prominent amongst such concerns. These environmental issues can be expected to magnify in the long run as visitor numbers increase. Alternative means of dealing with them will require, careful assessment. This assessment will need to be done bearing in mind that the charging of entry fees to national parks is not a popular political option. This is likely to limit its use as a possible economic control option.

This study finds that the economic value of Australian birds and of insects have been under estimated as tourist attractions. Australian mammals (especially koalas and kangaroos) have been given much emphasis in overseas promotion of wildlife in Australia as a tourist attraction. Australian birds, however, have a large potential for attracting overseas tourists (both generalists and specialists) whereas seeing Australian mammals is more difficult. Most Australian birds can be seen by day, are often colourful, their sounds can be interesting and they are often unique to Australia, or its immediate region. Specialist bird watchers spend large amounts of money on their hobby and can have significant economic impacts in regions where they engage in bird watching. Case study III provide a useful example of how insects can become a significant tourist asset. Apart from glow worms, butterflies, bees and to a limited extent some other insects are used for tourism purposes in Australia. There seems to be scope for increasing the range of insects used for tourism purposes in Australia and promoting this dimension of wildlife tourism. Given the growing interest in ecologically based tourism, a very wide range of living wild organisms can be utilised as tourist attractions. In many cases, this will provide an economic incentive for their conservation and make individuals more aware of and supportive of their conservation.

Tourist expenditure in the local regions, employment created, and numbers of tourists visiting wildlife viewing sites act as a political pressures. Governments are more likely to take action in relation to conservation when there are economic benefits from tourist expenditures to the local or national economy and if large numbers of tourists visit wildlife viewing sites. The political economy aspect arising from wildlife-based tourism can be important in improving conservation outcomes.

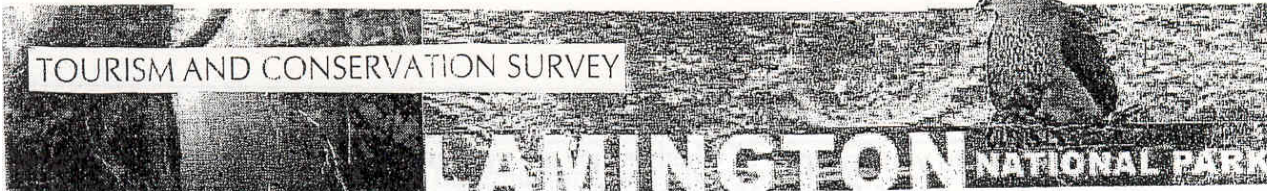
As discussed, economics can play an important role in several areas involving wildlife-based tourism activities and can also assist in meeting conservation objectives. Well conducted wildlife-based tourism ventures can result in positive conservation outcomes and enhance the frequency of wildlife sightings and hence visitor satisfaction. Therefore, it is imperative that wildlife-based tourism is conducted with conservation in mind.

These objectives are inseparable and should complement each other. This will not only ensure the future sustainability of wildlife-based tourism operations, but can increase visitor satisfaction levels from guaranteed sightings and from conservation of wildlife itself. In such circumstances, visitors are more likely to support wildlife-based tourism operations and are likely to donate money for conservation purposes.

Case studies, such as those completed above demonstrate that non-captive wildlife in varied locations generates many millions of dollars of tourist expenditure each year and is a valuable economic asset, even if visitors do not pay to watch or appreciate that wildlife. The sizes of the economic expenditures involved are much larger than appears to be commonly recognised, judging by our estimates of the economic contribution of birds to tourism in LNP and Antarctic wildlife to Antarctic tourism. While expenditure for viewing glow worms at Natural Bridge is smaller, it is not insignificant, particularly if visitors on bus tours are taken into account. Furthermore, given the existence of Springbrook National Park, the opportunity cost of such tourism is relatively low. By making the economic benefits obtained from tourism based on non-captive wildlife better known and providing measures of it, political support for conserving wildlife and protected areas should be enhanced. This will benefit tourist enterprises that depend on such wildlife and protected areas for their business.

## APPENDIX A: O'REILLY'S /GREEN MOUNTAINS SURVEY FORM

### O'REILLY'S/GREEN MOUNTAINS SITE



This study is being conducted by Clem Tisdell and Clevo Wilson, researchers from The University of Queensland and we would like your help. We need information about nature conservation at this site. Could you spare a little while to answer some of our questions? Your answers will be confidential and used only for scientific purposes. **Please post the completed survey forms without delay in the self addressed envelope provided (postage prepaid). Thank you for your anticipated help.**

Please fill out in relation to day of receipt

1. Is this your first visit to this site? Yes  No

If No, how many times have you visited previously? Approximate number

What is your main reason for visiting this site this time?

4. How many persons are travelling with you? Number of adults      Number of children

5. Does your visit here involve an overnight stay at this site or nearby? Yes  No

If No go to 7.

6. If Yes, where are you staying?

O'Reilly's Rainforest Guesthouse       QPWS Camping Ground

Elsewhere (please specify) .....

7. Is visiting O'Reilly's the main purpose for you being here? Yes  No

If No, what is your main purpose? (1) .....

8. We are trying to assess the importance of a number of features at this site and we would like your input. It would help us if you could say whether the following features of this site were very important, important or unimportant reasons for your decision to visit it.

Reason	Very Important	Important	Unimportant
The presence of the rainforest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The presence of birds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good picnic spot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cool green spot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bring visitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Getting close to nature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good starting point for walks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Considerable biodiversity present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rare ecosystem	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
World Heritage listed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A place to get away from routine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. We would like to assess the value of birdlife at this site. Please help us by indicating the importance to you (in terms of whether they are very important, important or unimportant) of the following attributes of birdlife at this site.

Attributes	Very Important	Important	Unimportant
Seeing lots of birds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hearing birds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large variety or diversity of birds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presence of rare birds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Close physical contact with birds e.g. Crimson Rosellas/King Parrots	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brightly coloured birds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others (specify).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. If you had to choose between  
 (a) seeing lots of birds at this site, and  
 (b) seeing half as many birds but more varied species,  
 what do you think you would prefer? (a)  or (b)

11. Please list the species of birds (or types of birds) that you most appreciate at this site.  
 (a) ..... (b) ..... (c) .....  
 (d) ..... (e) ..... (f) .....

12. From your point of view do you consider the protection of birds at this site  
 Very important       Important       Unimportant

13. If there were no birds at this site, would you still visit?      Yes  No   
 If Yes, would you reduce the frequency of your visits?      Yes  No   
 If Yes, by 25%, 50% or 75%?

14. (a) Do you think that visitors should pay to visit Lamington National Park? Yes  No

Why (1) ..... (2) .....

(b) Would you be more willing to pay if money collected is spent to improve park facilities and conservation at this site?      Yes  No

(c) How much do you think a visiting adult should be charged per visit? AUS\$ .....

(d) What is the maximum amount that you would pay per visit?      AUS\$ .....

15. Did you obtain any information about birdlife here and its role in the ecosystem?

Yes  No

16. Would you have liked more information to have been provided?      Yes  No

If Yes, what type of information?

(1) ..... (2) ..... (3) .....

17. Are you a member of any nature conservation organizations? Yes  No

If Yes, please state names of organizations

(1)..... (2) ..... (3) .....

18. How would you rate your attitudes towards nature conservation?

- Extremely strong advocate  Strong advocate
- Moderate advocate  Neutral towards this subject
- More oriented towards development than conservation

19. Will you engage in any of the following activities today in connection with your visit to this site?

If possible, indicate how many hours or fractions thereof will be spent today in these activities

Activity	Yes/No	Hours
Travelling to and from Lamington NP by motor vehicle	Yes <input type="checkbox"/> No <input type="checkbox"/>	.....
Travelling in and around Lamington NP by motor vehicle	Yes <input type="checkbox"/> No <input type="checkbox"/>	.....
Picnicking and enjoying the picnic facilities	Yes <input type="checkbox"/> No <input type="checkbox"/>	.....
Photography generally	Yes <input type="checkbox"/> No <input type="checkbox"/>	.....
Board Walk	Yes <input type="checkbox"/> No <input type="checkbox"/>	.....
Botanic Gardens	Yes <input type="checkbox"/> No <input type="checkbox"/>	.....
Bushwalking in National Park	Yes <input type="checkbox"/> No <input type="checkbox"/>	.....
Birdwatching using specialist equipment such as binoculars, field guides, special camera(s)	Yes <input type="checkbox"/> No <input type="checkbox"/>	.....
Other important activities at site (please specify) .....	Yes <input type="checkbox"/> No <input type="checkbox"/>	.....

20. Do you consider your knowledge of birds to be  
 Below the general average  Average  Above average?

If not above average, go to 23]

21. If above average, do you consider yourself to be a birdwatching specialist or hobbyist?  
Yes  No

22. If Yes,

(a) Do you have specialist birdwatching gear with you on this trip such as

- Bird field guide  Specialist binoculars
- Special camera  Telescope
- Other special equipment (please specify latter).....

(b) What most attracts you to visit this site? (i)..... (ii) .....

23. Do you think the environment could be improved at this site? Yes  No

If Yes, what are your suggested improvements?

(a) ..... (b) ..... (c) .....

24. How much did you or (if accompanied) your party spend on the date of receipt of this form at this site or within 60 kilometres of it (e.g. at Canungra or Tamborine? [Please include food, refreshments, souvenirs, petrol, accommodation costs and so on. Do not include money spent outside this area e.g. petrol purchased before leaving home if you live more than 60 kilometres away].

Australian dollars (approx) ..... on day of receipt of form





## APPENDIX B: ANTARCTICA – PRE-VISIT SURVEY FORM



This study is being conducted with support from the *CRC for Sustainable Tourism* by the *University of Queensland* and the *University of Tasmania* (Australia) and we would like your help. We need information about Antarctic/Sub Antarctic-based tourism. Could you please spare a little time to answer some of our questions? Your answers will be confidential and will be used only for scientific purposes. It is not necessary to divulge your name or address for this study. Please hand over the completed survey form in the next few days in the envelope provided to a crew member or the person who handed over this form to you. Thank you very much for your Co-operation.

Your assigned survey number .....

Important: The assigned number will be used to match your replies with a brief return survey.

### Preliminary Information

1. Your name or, if you wish to remain anonymous, a pseudonym that you should also use to complete a second form on your return journey .....
2. Date of completion of this form: Day ..... Month ..... Year .....
3. Name of cruise ship ..... Port of departure .....
4. Date of departure of cruise .....
5. Proposed date of return of cruise .....
6. Brief indication of route of cruise (main places visited)  
.....  
.....
7. In which country do you normally reside? .....
8. What is the main unit of currency of the country in which you permanently reside? (For example, for the US it is US dollars, for Canada it is Canadian dollars, for many European countries it is Euros, for Australia, it is Australian dollars)  
.....

Please state all answers to questions below involving money in your home currency.

9. Is this your first visit to the South Polar Region?       Yes     No
10. If **No**, how many times have you visited it before? .....
11. Have you visited the North Pole?     Yes     No

12. Are you travelling alone or are you accompanied on this journey?

Alone       Accompanied

13. If accompanied, by how many persons? Adults .....Children (under 15) .....

14. In terms of your home currency, **how much do you expect that you/ your accompanying partner/family will have spent per person (approximately) specifically for this journey by the time it ends?** [Include what you have spent to date **plus** extra purchases such as special clothing, books, etc and what you expect to spend before the end of the journey.]

Amount in home currency ..... for entire journey for ..... person(s)

15. How **much more** would you have been prepared to spend for this journey before deciding **not to go** on it and to do something else instead?

Amount in home currency .....**per person**

Any comments?.....

### **Knowledge about Antarctica**

1. Do you regard your current knowledge of Antarctica/sub-Antarctica as

Excellent       Good       Average       Poor

2. Have you read widely about Antarctica? **Yes**  **No**

3. Have you watched **many** TV programmes on Antarctica? **Yes**  **No**

4. Are you interested in Antarctic wildlife? **Yes**  **No**

5. If **Yes**, is your interest of Antarctic wildlife mainly in:  
(you may tick more than one box)

Penguins                       Other sea birds                       Seals and sea lions  
 Whales and dolphins       All wildlife                               Any other .....

6. What is special about Antarctic wildlife? (you may tick more than one box)

Most of Antarctic wildlife are not found elsewhere  
 They can be seen easily in large numbers  
 The special adaptations of Antarctic wildlife

Any other (1) ..... (2) .....

7. Were you aware that commercial hunting of seals and penguins has taken place during the 19<sup>th</sup> and 20<sup>th</sup> century in the Sub-Antarctic islands? **Yes**  **No**

### **Wildlife and Tourism**

1. How important was the possibility of seeing Antarctic/Sub-Antarctic wildlife in your decision to come on this journey?

Very important  
 Important  
 Not very important  
 Of no importance

2. If there was **no wildlife** to be seen in the South Polar Region, would you have still decided to come on this cruise, given your present costs? **Yes**  **No**

3. If **No**, and the cruise costs were much less, would you change your mind and go on this cruise, **despite not being able to see wildlife?**

**Yes**  **No**

Why? .....



10. List up to eight species of wildlife that you would especially like to see and hope to see on this cruise. List the species that you most want to see first and the remainder in descending order [Please see note at end of table to fill out hypothetical donation amount].

Species (Name)	Hypothetical Donation* (in your home currency) (Please read note)	Species (Name)	Hypothetical Donation* (in your home currency) (Please read note)
1		5	
2		6	
3		7	
4		8	

\*Note: It is possible that the continuing existence of each of these species may be threatened by environmental changes such as global warming, the harvesting of krill or, in some cases, unknown factors. If you were asked for a one-off payment to support measures (such as research or policy changes) that would prevent the extinction of the individual species mentioned by you, what is the donation you would make? List this in your home currency against the species mentioned in the corresponding column. When you consider each, assume that no donation is required to save the others. Although this question is hypothetical, please assume that it is real and that it has to come from your budget. Please consider your daily expenses before deciding on the donation.

11. If these species were **not** in your previous list, and you were asked for a **similar one-off donation**, how much would you **donate in terms of your home currency**.

Species (Tick if you expect to see them)	Donation in your home currency
1. Emperor Penguins <input type="checkbox"/>	
2. Rockhopper Penguins <input type="checkbox"/>	
3. Southern Elephant Seals <input type="checkbox"/>	
4. Blue Whales <input type="checkbox"/>	
5. Humpback Whales <input type="checkbox"/>	
6. Minke Whales <input type="checkbox"/>	
7. Orca (Killer Whales) <input type="checkbox"/>	
8. Snow Petrels <input type="checkbox"/>	
9. Antarctic Skuas <input type="checkbox"/>	
10. Wilson's Storm Petrels <input type="checkbox"/>	

### Opinions on Antarctica

- Do you believe that global warming is melting icebergs in Antarctica? Yes  No
- If **Yes**, would you like action to be taken to reduce such melting? Yes  No   
 If **Yes**, why (1) ..... (2) .....  
 If **No**, why (1) ..... (2) .....
- Do you think that **krill** harvesting should continue in Antarctica? Yes  No
- If **No**, are you in favour of limited krill harvesting? Yes  No
- Are you in favour of Antarctica's vast resources (e.g. petroleum, minerals, water) being exploited?  
 Yes  No
- Are you in favour of the Antarctic continent and surrounding seas being declared a world park and managed under the auspices of the United Nations and/or by the twelve Antarctic Treaty nations?  
 Yes  No

7. Are you in favour of **increased** tourism activity in Antarctica?

Yes  No

If **Yes**, why (1) .....

If **No**, why (1) .....

8. Do you want Antarctica (including the wildlife, plant life and its landscape) to be preserved in its pristine state? **Yes**  **No**

9. If **Yes**, is it because (you may tick more than one box)

- It is unique
- It has tourism potential
- I would like my children and others to enjoy it
- I would like to know that it remains unspoilt
- It has great resources that could be used in the future
- It has a large influence on the Earth's climate

10. If an organization such as the *United Nations* were to raise money to declare **Antarctica** and its surrounding seas as a **world park** and conduct further research into its unique wildlife and landscapes/seascapes, would you be willing to make an **annual contribution** for the next ten years?

Yes  No

11. If **Yes**, what is the maximum amount you would like to contribute **per year** in your currency for the next 10 years?

.....

If **No**, what are your reasons? .....

**Background Information (only to be used for general processing of responses)**

1. Gender of person filling out the form? Male  Female

2. To what age group do you belong?

20 – 30  31 – 40  41 – 50  51 – 60   
61 - 70  71 - 80  81 +

3. Indicate your highest educational qualification

Primary only  Some junior schooling  Completed year 10 secondary or equivalent   
Completed year 12 or equivalent  Trade certificate or equivalent  Diploma or equivalent   
Degree or equivalent  Post-graduate degree or equivalent  Any other .....

4. Your family income level per annum in your home currency?

Note: **This is confidential and for** scientific research only  
Below 25,000  25,001 - 50,000  50,001 - 75,000  75,001 - 100,000   
100,001 - 125,000  125,001 - 150,000  150,001 – 175,000   
175,001 - 200,000  200,001 - 225,000  225,001 and above

Any other amount .....

5. Would you want to visit Antarctica again if it costs the same as now? **Yes**  **No**

**THANK YOU FOR YOUR CO-OPERATION**

Contact details of researchers:

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## APPENDIX B (cont'd): POST-VISIT SURVEY FORM



This is the Second Evaluation Form (post-visit survey) of the study you participated in during your outbound journey (First Evaluation) to Antarctic/Sub Antarctic islands which is being conducted with support from the *CRC for Sustainable Tourism* by the *University of Queensland* and the *University of Tasmania* (Australia). Could you please spare a little time to answer a few more questions? Your answers, as always, will be confidential and will be used only for scientific purposes. Please hand over the completed survey form in the next few days (before the ship reaches the port of departure) in the envelope provided to a crew member or the person who handed over this form to you. Thank you very much for your Co-operation.

**Important:** Please use the same survey number you used during the filling out of the **outbound survey form (First Evaluation)**.

Your assigned survey number .....

**Please state all answers to questions below involving money in your home currency.**

### PRELIMINARY INFORMATION

1. Your name or pseudonym that you used to complete the first survey form on your outbound journey.....

2. Date of completion of this form: Day ..... Month ..... Year .....

3. Name of cruise ship .....

4. Date of departure of cruise from Antarctica .....

5. Brief indication of route of cruise (main places visited)

.....  
 .....  
 .....

6. Was your Antarctic experience

- less impressive than you expected
- more impressive than you expected
- about the same as you expected

7. How much do you **now feel (after your experience of Antarctica)** you would have been justified in spending on this journey? Please indicate the maximum amount. **The value can be less, equal or more than the amount you/partner/family actually spent.**

Amount in home currency ..... for entire journey for ..... person(s)

Any comments?.....  
 .....

## **Knowledge about Antarctica**

1. Do you consider your knowledge of Antarctica/sub-Antarctica after your visit to be  
Excellent       Good       Average       Poor
2. Have you become **more** interested in Antarctic wildlife following your visit?  Yes  No
3. If **Yes**, is your increase in interest of Antarctic wildlife mainly in relation to:  
(you may tick more than one box)  
 Penguins                       Other sea birds                       Seals and their relatives  
 Whales and dolphins       All wildlife                       Any other .....
4. What is special about Antarctic wildlife?  
(you may tick more than one box)  
 Most of Antarctic wildlife are not found elsewhere  
 They can be seen easily in large numbers  
 The special adaptations of Antarctic wildlife  
  
Any other (1) ..... (2) .....
5. Did you become aware of commercial hunting of seals and penguins in the 19<sup>th</sup> and 20<sup>th</sup> century in the Sub-Antarctic islands during the visit to Antarctica?  
 Yes                       No                       Knew about it before the cruise
6. Do you think you have **learnt more** about Antarctica and its wildlife as a result of this cruise?  
 Yes  No
7. Did you become **more aware** of conservation issues of Antarctic wildlife as a result of your cruise?  
 Yes  No
8. Do you think that Antarctic wildlife should be conserved?  
 Yes  No

## **Wildlife and Tourism**

1. How important was seeing Antarctic/Sub-Antarctic wildlife during this cruise?  
 Very important       Important       Not very important       Not of any importance
2. If you are a specialist bird-watcher did you see  
 all the birds you wanted to see  
 more than half of the birds you wanted to see  
 less than half of the birds you wanted to see
3. With your bird-watching experience in Antarctica were you  
 Very satisfied       Satisfied       Not satisfied
4. If you did not see **any wildlife**, would you have still enjoyed your cruise?  
 Yes       No

5. Please tick (✓) the appropriate column to indicate how important the following features or attributes of **Antarctica/Sub-Antarctica** were **during** this cruise

	<b>Very Important</b>	<b>Important</b>	<b>Limited in importance</b>	<b>Of no importance</b>
Wildlife				
Landscapes and seascapes				
Connections with explorers				
Different or unique environment				
Few others have visited it				
Unspoilt wilderness				
The thrill of expedition				
Ship cruise pleasures				
Continent without permanent human habitations				
Antarctic Summer				
Other (please specify)				

6. Tick the second column if you **saw any of the following wildlife in Antarctica or Sub-Antarctica** during the cruise. Did they increase your satisfaction **(1) a little (2) much (3) very much or (4) not at all** to see the following wildlife? **Please put the appropriate number in the last column.**

<b>Species</b>	<b>Saw the species? If Yes, please tick (✓)</b>	<b>Added satisfaction if seen (Please put the appropriate numbers below)</b>
Whales and dolphins		
Penguins		
Seals (and relatives)		
Polar seabirds (other than penguins)		



7. List up to **eight species** of wildlife that you wanted to see and which you encountered on this cruise. List **first** the species that you **liked most** and the remainder in descending order of your preference for these. [**Please see note at end of table to fill out hypothetical donation amount**].

Species Name	Hypothetical Donation*	Species Name	Hypothetical Donation*
	<b>Please read note</b>		<b>Please read note</b>
1		5	
2		6	
3		7	
4		8	

\* **Note:** It is possible that the continuing existence of each of these species may be threatened by environmental changes such as global warming, the harvesting of **krill** or, in some cases, unknown factors. If you were asked for a **one-off payment** to support measures (such as research or policy changes) that would prevent the extinction of the individual species mentioned by you, what is the donation you would make? List this in your home currency against the species mentioned in the corresponding column. When you consider each, assume that no donation is required to save the others. **Although this question is hypothetical, please assume that it is real and that it has to come from your budget. Please consider your daily expenses before deciding on the donation**

8. If the following species **were not** in your previous list, and you were asked for a **similar one-off donation**, how much would you donate in terms of your home currency **after your experience with these species**.

Species (Tick if you expect to see them)	Donation in your home currency
1. Emperor Penguins <input type="checkbox"/>	
2. Rockhopper Penguins <input type="checkbox"/>	
3. Southern Elephant Seals <input type="checkbox"/>	
4. Blue Whales <input type="checkbox"/>	
5. Humpback Whales <input type="checkbox"/>	
6. Minke Whales <input type="checkbox"/>	
7. Orca (Killer Whales) <input type="checkbox"/>	
8. Snow Petrels <input type="checkbox"/>	
9. Antarctic Skuas <input type="checkbox"/>	
10. Wilson's Storm Petrels <input type="checkbox"/>	

### Opinions on Antarctica

1. Do you believe that global warming is melting icebergs in Antarctica? **Yes**  **No**
2. If **Yes**, would you like action to be taken to reduce such melting? **Yes**  **No**

If **Yes**, why (1) ..... (2) .....

If **No**, why (1) ..... (2) .....

3. Do you think that **krill** harvesting should continue in Antarctica? Yes  No

4. If **No**, are you in favour of limited **krill** harvesting? Yes  No

5. Are you in favour of Antarctica's vast resources (e.g. petroleum, minerals, water) being exploited?  
Yes  No

6. Are you in favour of the Antarctic continent and surrounding seas being declared a world park and managed under the auspices of the United Nations and/or by the twelve Antarctic Treaty nations?  
Yes  No

7. Are you in favour of **increased** tourism activity in Antarctica?  
Yes  No

If **Yes**, why (1) ..... (2) .....

If **No**, why (1) ..... (2) .....

8. Do you want Antarctica (including the wildlife, plant life and its landscape) to be preserved in its pristine state? Yes  No

9. If **Yes**, is it because (you may tick more than one box)

- It is unique
- It has tourism potential
- I would like my children and others to enjoy it
- I would like to know that it remains unspoilt
- It has great resources that could be used in the future
- It has a large influence on the earth's climate

10. If an organization such as the *United Nations* were to raise money to declare Antarctica and its surrounding seas as a **world park** and conduct further research into its unique wildlife and landscapes, would you be willing to make an annual contribution for the next ten years?

Yes  No

11. If **Yes**, what is the maximum amount you would like to contribute **per year** in your currency for the next 10 years

.....

If **No**, what are your reasons? .....

12. If you are not already a member of a nature conservation organization do you wish to join one after your Antarctic experience?

Yes  No

If No, why? .....

13. If Yes, please state organizations that you would consider joining

(1)..... (2) .....

14 How would you rate your attitudes towards nature conservation after your experience of Antarctica?

- Extremely strong advocate
- Strong advocate
- Moderate advocate
- Neutral towards this subject
- More oriented towards development than conservation

15. Would you want to visit Antarctica again if costs are the same as now? Yes  No

Any comments are welcome.....  
.....

**THANK YOU FOR YOUR CO-OPERATION**

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## APPENDIX C: NATURAL BRIDGE SURVEY FORM

# GLOW WORMS



### TOURISM SURVEY OF 'WALK-IN' VISITORS\* TO SEE GLOW WORMS AT NATURAL BRIDGE NATIONAL PARK

This research study is being conducted by Clem Tisdell and Clevo Wilson, researchers from The University of Queensland. It is supported by the Australian Co-operative Research Centre for Sustainable Tourism. We would like your help. We need information about your visit to this site. Could you spare a little while to answer some of our questions? Your answers will be confidential and used only for scientific purposes. Please post the completed survey forms without delay in the self addressed envelope (postage prepaid). Thank you for your anticipated help.

1. Date and time of commencing visit at Natural Bridge to see glow worms.  
Day of week ..... Approx time ..... Date (d/m/y) .....
2. In what country do you permanently reside? .....
3. If Australian, in what State do you permanently reside? .....
4. Please give your postcode in Australia .....
5. Did you visit Natural Bridge while on holiday, that is, a trip involving a stay of at least one night away from home or as a day excursion, that is as part of a journey not involving an overnight stay away from home  Yes  No
6. On the day of your travel to Natural Bridge to see glow worms, in what place, town or city did you start your journey? .....
7. After you went to Natural Bridge to see glow worms, did you spend the night at the place where you started your trip?  Yes  No  
If No, in what town or locality did you stay that night? .....
8. By what form of transport did you travel to Natural Bridge?  
 Car/van  Motor bike  Other (please specify) .....
9. How many were in your party (e.g. an individual, couple or family) including yourself?  
Number of adults ..... Number of children .....
10. Did you stop at any other attractions on your way to Natural Bridge?  Yes  No  
If Yes, please list these.  
  
(a) ..... (b) .....
11. Do you consider that your visit to Natural Bridge was the main purpose for the excursion that included it?  Yes  No
12. Approximately how many kilometres in total did you travel by road to include Natural Bridge glow worms specifically in your travel itinerary?  
..... km (approximately) .....
13. Did you feel that it was worthwhile travelling this distance to see the glow worms at Natural Bridge?  
 Yes  No
14. How much do you estimate that you (or, if accompanied, your whole party) spent specifically for the purpose of visiting Natural Bridge to see glow worms?  
  
Total AUS\$ (approx) ..... for ..... person(s)
15. Do you feel that your visit to see glow worms at Natural Bridge was worth the cost and effort?  
 Yes  No

\* This survey is intended for visitors who are not part of a commercially arranged tour group arriving by bus to see the glow worms at Natural Bridge National Park.

If Yes, do you feel this experience was worth more than the cost?  Yes  No

If Yes, how much more would you personally have been prepared to pay for this experience? AUSS\$.....

16. On the day of your visit to Natural Bridge National Park to see glow worms, did you or your travel party spend any money at the village nearby or within 25 km (approx) of it?

Yes  No

If Yes, how much did you (or, if accompanied, your party) spend?

Total AUSS\$ (approx) ..... for ..... person(s)

17. Was this your first visit to Natural Bridge to see glow worms?  Yes  No

If No, how many times have you visited before to see glow worms? .....

18. Have you seen glow worms before?  Yes  No

If Yes, where did you see them previously? .....

19. How did you learn about the glow worms as an attraction at Natural Bridge? Please state source or sources of information.

Friend  Travel agent  Travel book  Other (please specify) .....

20. If you are on holiday (not a day tripper), did you know of the glow worms at Natural Bridge before you left home?  Yes  No

21. What was the main purpose(s) of your visit to see the glow worms?

Entertain visitors  Fill in spare evening while holidaying  Curiosity

Attracted by this spectacular star-like event  Amazed that insects can produce light

Other (please specify) .....

22. Would you recommend a visit to friends?  Yes  No

23. Do you expect to visit Natural Bridge National Park again, at a future time, to look at the glow worms again?  Yes  No

24. Have you visited Natural Bridge National Park during the daytime?  Yes  No

25. If Yes to 24, how many times have you visited it by day? .....

If No to 24, do you plan to visit it by day?  Yes  No

### **Knowledge of Glow Worms**

26. Did you obtain any knowledge about the biology and ecology of glow worms during your visit?

Yes  No

If Yes, what was the source of that knowledge? .....

27. Do you know what glow worms are?  Yes  No

28. What is the reason for glow worms lighting up?

To attract mates  To attract flying insects  To enable them to see at night

Other (please specify) .....  Don't know

29. What do many spiders and glow worms have in common?

Both are poisonous  Both are insects

Both have sticky threads to catch insects which they eat  Don't know

30. Is the glow worm only one stage in the life of an insect?  Yes  No  Don't know

31. If Yes, what do the adults look like?

Moths  Fruit flies  Beetles  Blowflies

Other (please specify) .....  Don't know

### **Other Questions**

32. Do you think that it would be useful to be able to purchase a small booklet at Natural Bridge explaining the biology/ecology of glow worms?  Yes  No

33. Would you have been inclined or bothered to purchase such a booklet on your visit?

Yes  No

If Yes, How much would you be prepared to spend, say for an informative booklet of around 12 pages?

AUSS\$.....

34. Do you believe that walk-in visitors (those not on group visits organised by bus companies) should pay an entrance fee to see the glow worms at Natural Bridge?

Yes  No

Why? .....

35. Did you feel inconvenienced by other visitors while viewing glow worms?

Yes  No

Yes, please explain.....

36. Would you like a close-up view of living glow worms even if they were in an artificial habitat?  
 Yes  No
37. Would you like to see a display centre at Natural Bridge containing exhibits that fully explain the life history of glow worms and the reason for their presence at Natural Bridge?  Yes  No
38. If Yes to 37, assuming that the exhibit was of a good standard, would you have made use of it on your visit?  
 Yes  No
39. If an entry fee had to be charged to cover the cost of the type of interpretative centre mentioned in 37, what entry charges to this facility would be reasonable in your view?

Adults \$..... Children \$..... Pensioners \$.....

40. Do you have any suggestions for improving the facilities at the Natural Bridge site?  
 .....
41. Do you know of the 'Forest of Dreams' at Springbrook?  Yes  No
42. If Yes to 41, have you visited it?  Yes  No
43. If Yes to 42, when did you visit it? .....
- If No to 42, why have you not visited it? .....
- If No to 41, the 'Forest of Dreams' is a privately owned tourist attraction that has established an 'artificial' colony of glow worms, and is unique in this regard. The glow worms can be seen during the day at the 'Forest of Dreams' and the site is not too distant from Natural Bridge. Would you like to have had a chance to visit the 'Forest of Dreams'?  Yes  No
44. Do you know that glow worms also occur naturally at the Mount Tamborine National Park in the hinterland of the Gold Coast?  Yes  No
- If Yes, and you have visited this Park to see glow worms, how does the display at Natural Bridge compare with that at Mount Tamborine?  
 Much more spectacular  Much the same  Not as spectacular

**Background Attributes**

45. Gender of person filling out the form? Male  Female
46. To what age group do you belong?  
 School going  <20 left school  20 – 30   
 31 – 40  41 – 50  51 – 60   
 61 +
47. Indicate your highest educational qualification  
 Primary only  Some secondary schooling  Completed year 10 secondary   
 Completed year 12  Trade certificate  Diploma   
 Degree  Post-graduate degree  Any other .....
48. Your family income level per annum in Australian dollars?  
 Note: This is confidential and for scientific research only  
 Below AUS\$20,000  AUS\$20,001 - 30,000  AUS\$30,001 - 40,000   
 AUS\$40,001 - 50,000  AUS\$50,001 - 60,000  AUS\$60,001 and above
49. In what country were you born? .....
50. If born outside Australia, and live in Australia, how many years have you lived here?  
 ..... years
51. Would you describe yourself as  
 a strong advocate of nature conservation  
 a moderate advocate of nature conservation  
 and advocate of the view that nature conservation should not be allowed to stand in the way of economic growth

**THANK YOU FOR YOUR CO-OPERATION**

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## REFERENCES

- Anon 2004, 'Antarctica', *Australian Wildlife*, No. 1, p.31.
- Australian and New Zealand Environment and Conservation Council 2000, Benchmarking and Best Practice Program. User-Pays revenue, Draft Report, prepared by ANZECC Working Group on National Parks and Protected Areas Management, Canberra.
- Baker, C 2002, 'A biological basis for management of glow worm populations of ecotourism significance', University of Queensland Honours Thesis, CRC for Sustainable Tourism, Common Ground Publications, Australia, 62 pp.
- Baker, C & Merritt, D 2003, 'Life cycle of an Australian glow worm *Arachnocampa flava* Harrison (Diptera: Keroplatidae: Arachnocampinae)', *Australian Entomologist*, vol. 30 (2), pp. 45-55.
- Baker, C 2003, 'Australian glow worms – managing an important biological resource', Australasian Cave and Karst Management Association, *INC Journal*, vol. 53, December.
- Bandara, R & Tisdell, CA 2004, 'Use and non-use values of wild Asian elephants: a total valuation approach', *Sri Lanka Economic Journal*, (in press).
- Barker, J, Grigg, GC & Tyler, MJ, 1995, *A Field Guide to Australian Frogs*, Surrey Beatty and Sons, Chipping Norton, NSW.
- Barrio, AM & Roldan, MG 1997, 'Report on Antarctic Tourism Numbers through the Port of Ushuaia, 1996-97', <http://www.tierradelfuego.org.ar/antartida/tur9697eng.htm> Antarctic Unit, Ushuaia, Argentina.
- Benson, DE 2001, 'Wildlife and recreation management on private lands in the United States', *Wildlife Society Bulletin*, vol. 29, pp. 359-371.
- Birding Tours Worldwide 2003, *News - Field Guides*, Field Guides Incorporated, Texas, USA.
- Bishop, RC 1987, 'Economic values defined', *Valuing Wildlife: Economic and Social Perspectives*, Decker, D. J and Goff, G. R. (eds.), Westview Press, Boulder, Colorado, pp. 24-33.
- Brunet, B 2000, *Australian Insects – A Natural History*, Reed New Holland, Frenchs Forest, NSW.
- Buchanan, R 1987, *The Bushwalk Book of South-East Queensland*, Bushpeople Publications, Cairns, Qld, Australia.
- Ceballos-Lascrain, H 1996, *Tourism, Ecotourism and Protected Areas*, IUCN Publication Services Unit. Gland, Switzerland.
- Cordell, HK & Herbert, NG 2002, 'The popularity of birding is still growing', *Birding* vol. 34: 54-59.
- Cullen, R 1985, 'Rationing recreation use of public land' *Journal of Environmental Management*. vol. 21(1), pp. 213-224.
- Davis, D & Tisdell, C 1999, 'Tourist levies and willingness to pay for a whale shark Experience', *Tourism Economics*, vol. 5, pp. 161-174. Reprinted in Tisdell (2001).
- Davis, D, Tisdell, C & Hardy, M 2001, 'The Role of Economics in Managing Wildlife Economics', *Wildlife Tourism Research Report Series*, vol. 3, CRC for Sustainable Tourism Pty Ltd, Gold Coast, Qld, Australia.
- Field, BC 2001, 'Natural Resource Economics – An Introduction', Chapter 17, McGraw-Hill International Edition.
- Figgis, P 2000, 'The double-edged sword: tourism and national parks', *Habitat Australia*, vol. 28, pp. 24- 32.
- Filion, FL, Foley, JP & Jacqemot, AJ 1994, 'The economics of global ecotourism', pp. 235-252, in *Protected Area Economics and Policy: Linking Conservation and Sustainable Development*, Munasinghe, M. and McNealy, J. (eds), The World Bank, Washington, DC.
- Fredline, L & Faulkner, B 2001 'International Market Analysis of Wildlife Tourism', *Wildlife Tourism Research Report*, vol. 22, CRC for Sustainable Tourism, Griffith University, Gold Coast campus, Qld.
- Gowdy, J 2000, 'Terms and concepts in ecological economics', *Wildlife Society Bulletin*, vol. 28, pp. 26-33.
- Hanley, N, Shogren, JF & White, B 1997, *Environmental Economics in Theory and Practice*, Macmillan Press, London.
- Herath, G 2000, 'Issues surrounding entrance fees as a suitable mechanism for financing natural areas in Australia', *International Journal of Wilderness*, vol. 6(2), pp. 35-39.
- Higginbottom, K 2004, 'Wildlife Tourism: Impacts, Management and Planning', *CRC for Sustainable Tourism*, Gold Coast, and Common Ground Publishing, Altona, Vic.
- Hohl, AE & Tisdell, CA 1995, 'Peripheral tourism: development and management', *Annals of Tourism Research*, vol. 22, pp. 517-534. Reprinted in Tisdell (2001).
- Howarth Tourism and Leisure Consulting 1981, *Tourism Multipliers Explained*, Published in conjunction with the World Tourism Organisation, [http://www.horwath.co.za/tourism/pdf/tourism\\_multipliers.pdf](http://www.horwath.co.za/tourism/pdf/tourism_multipliers.pdf) (Accessed in September 2003).
- International Association of Antarctica Tour Operators 2003, 'IAATO Overview of Antarctic Tourism' submitted by the International Association of Antarctica Tour Operators (IAATO) 2002-2003, Antarctic Season to the Antarctic Treaty Conference, ATCM XXVI/IP, Agenda Item 10.
- Isaacs, JC 2000, 'The limited potential of ecotourism to contribute to wildlife conservation', *Wildlife Society Bulletin*, vol. 28, pp. 61-69.
- Jakobsson KM & Dragun, AK 1996, *Contingent Valuation and Endangered Species: Methodological Issues and Appreciation*, Edward Elgar, Cheltenham, UK.
- Jarrott, JK 1990, *History of Lamington National Park*, J. K. Jarrott and The National Parks Association of Queensland Inc, Brisbane, Australia.

- Joint Tourism Committee 2000, 'Regional map of Southeast Queensland', *The Guide*, vol. 31, p. 24.
- Kerlinger, P & Brett, J 1995, 'Hawk mountain sanctuary: a case study of birder visitation and birding economics'. In: *Wildlife and Recreationists: Coexistence Through Management and Research*, ed. R. L. Knight and K. J. Gutzwiller, pp. 271-280, Washington DC, USA: Island Press.
- Kriwoken, LK & Rootes, D 2000, 'Tourism on ice: environmental impact assessment of Antarctic tourism', *Impact Assessment and Project Appraisal*, vol. 18(2), pp. 138-150.
- McNeely, JA, Thorsell, JW & Ceballos-Lascurain, H 1992, *Guidelines of National Parks and Protected Areas for Tourism*, World Tourism Organisation, Madrid and United Nations Development Programme, Paris.
- Martin, RD 1991, *Life in a Rainforest: A Tree Top Walk*, Published by Era Publications in Association with Martin International, Flinders Park, South Australia.
- Moon, R & Moon, V 2000, *Discover Australia – National Parks*, Global Book Publishing Pty Ltd, NSW, Australia.
- Nielson, L 1991, *Birds of Lamington National Park and Environs – A Guide's Guide*, Published by Lloyd Nielson, Canungra, Qld.
- O'Reilly, B 1983, *Green Mountains*, reprinted by Lloyd O'Neil, South Yarra, Victoria.
- Pearce, DR, Turner K & Bateman, I 1994, *Environmental Economics*. Harvester Wheatsheaf, Hemel Hempstead, UK.
- Prasad, B & Tisdell, CA 1998, 'Tourism in Fiji, its economic development and property rights', pp. 165-191 in *Tourism and Development* Tisdell, C. A. and Roy, K. C. (eds). Nova Science Publishers, Commack, New York.
- Pugsley, C. W. (1983), Literature review of the New Zealand glow worm *Arachnocampa luminosa* (Diptera: Keroplatidae) and related cave-dwelling Diptera, *New Zealand Entomologist*, 7: 419-424.
- Queensland National Parks & Wildlife 1999, *Visitor Information – Springbrook National Park*, Brisbane, Queensland, Australia.
- Queensland National Parks & Wildlife 2001 *Visitor Information – Lamington National Park*, Brisbane, Queensland, Australia.
- Rankin, RL & Sinden, JA 1971, 'Causal factors in the demand for outdoor recreation', *The Economic Record*, vol. 47, pp. 418-426.
- Reader's Digest 1997, *Encyclopedia of Australian Wildlife*, Reader's Digest (Australia) Pty Ltd, First Edition, Sydney, NSW.
- Richards, AM 1960, Observations on the New Zealand glow worm *Arachnocampa luminosa* (Skuse) 1890, *Transactions of the Royal Society of New Zealand* 88, pp. 433-436. Takaie, H. (1989). Breeding and display of the glow worm, *Arachnocampa spp. Insectarium* 26(7), 214-219.
- Sekercioglu, CH 2002, 'Impacts of birdwatching on human and avian communities', *Environmental Conservation*, vol. 29, pp. 282-289.
- Sinden, JA 1977, 'Provision and use of national parks in Victoria: empirical tests of the Tisdell propositions', *Australian Economic Papers*, vol. 16, pp. 175-193.
- Takaie, H 1989, 'Breeding and display of the glow worm, *Arachnocampa Spp*', *Insectarium*, vol. 26(7), pp. 214-219.
- The US Fish and Wildlife Service 2001, The 2001 National Survey of Fishing, Hunting and Wildlife Associated Research, <http://federalaid.fws.gov/> (Accessed in September 2003).
- The International Ecotourism Society 2000, Ecotourism Statistical Fact Sheet. <http://www.ecotourism.org/textfiles/statsfaq.pdf> (Accessed in September 2003).
- Tisdell, CA 1974, *The value of demand for and supply of national parks – economic issues raised by recreational use*, *Research Paper*, No. 4, Board of Environmental Studies, University of Newcastle, NSW. Reprinted in Tisdell (2001).
- Tisdell, CA 1996, 'Ecotourism, economics and the environment: observations from China', *Journal of Travel Research*, vol. 34(4), pp. 11-19.
- Tisdell, CA 1998, 'Ecotourism: aspects of its sustainability and compatibility with conservation, social and other objectives', *Australian Journal of Hospitality Management*, vol. 5(2), pp. 11-23. Reprinted in Tisdell (2001).
- Tisdell, CA 1999a, *Biodiversity, Conservation and Sustainable Development: Principles and Practices with Asian Examples*, Edward Elgar, Cheltenham, UK.
- Tisdell, CA 2001, *Tourism Economics, the Environment and Development*, Edward Elgar, Cheltenham, UK.
- Tisdell, CA 2002, *The Economics of Conserving Wildlife and Natural Areas*, Edward Elgar, Cheltenham, UK.
- Tisdell, C & Bandara, R 1993, 'Wildlife-based recreation and local economic development: The case of the Pinnawala elephant orphanage in Sri Lanka', *Economics, Ecology and the Environment Series*, Working Paper No. 84, School of Economics, The University of Queensland, Brisbane, Australia.
- Tisdell, CA & Broadus, J 1989, 'Policy issues related to the establishment and management of marine reserves', *Coastal Management*, vol. 17, pp. 37-53. Reprinted in C. Tisdell (2002) *The Economics of Conserving Wildlife and Natural Areas*, Edward Elgar, Cheltenham, UK.
- Tisdell, CA and Wen, J 1997a, 'Why care is needed in applying indicators of the sustainability of tourism', *Australian Journal of Hospitality Management*, vol. 4(1), pp. 1-6. Reprinted in Tisdell (2001).
- Tisdell, C & Wilson, C 2002a, 'Economic, Educational and Conservation Benefits of Sea Turtle Based Ecotourism – A Study Focused on Mon Repos', *Wildlife Tourism Research Report Series*, vol. 20, CRC for Sustainable Tourism Pty Ltd, Gold Coast, Qld, Australia



- Tisdell, C & Wilson, C 2002b, 'World heritage listing of Australian natural sites: tourism stimulus and its economic value' *Economic Analysis and Policy*, vol.32, 27-49.
- Tisdell, CA & Wilson, C 2002c, 'Ecotourism for the survival of sea turtles and other wildlife', *Biodiversity and Conservation*, vol. 11, pp. 1521-1538.
- Tisdell, C & Wilson, C 2003a, 'Visitor profiles and environmental attributes, especially of birds, attracting visitors to Lamington National Park: Tourist attitudes and economic issues', *Economics, Ecology and the Environment Series*, Working Paper No. 76, School of Economics, The University of Queensland, Brisbane, Australia.
- Tisdell, CA & Wilson, C 2003b, 'Does Ecotourism Contribute to Sea Turtle Conservation? Is the Flagship Status of Turtles Advantageous?', *Economics, Ecology and the Environment*, Working Paper No. 90, School of Economics, The University of Queensland, Brisbane, Australia.
- Tisdell, CA & Wilson, C 2004a, 'Birds in an Australian rainforest: Their attraction for visitors and visitors' ecological impacts', *Economics, Ecology and the Environment Series*, Working Paper No. 103, School of Economics, The University of Queensland, Brisbane, Australia.
- Tisdell, C & Wilson, C 2004b, 'Economics of Wildlife Tourism', *Wildlife Tourism: Impacts, Management and Planning*, ed. K. Higginbottom, (2004). CRC for Sustainable Tourism, Gold Coast, and Common Ground Publishing, Altona, Vic.
- Tisdell, CA & Wilson, C forthcoming a, 'The public's knowledge of and support for conservation of Australia's tree-kangaroos and other animals', *Biodiversity and Conservation*.
- Tisdell, C & Wilson, C forthcoming b, 'Birds in an Australian rainforest: their attraction for visitors and visitors' ecological impacts', *Ecology Research*, Columbus, C. (ed.), Nova Science Publishers, New York.
- Tisdell, C, Wilson, C & Kriwoken, L 2004, 'Antarctic tourists: a case study of their evaluation of Antarctic wildlife and environmental issues', *Economics, Ecology and the Environment*, Working Paper No. 99, School of Economics, The University of Queensland, Brisbane, Australia.
- Turner, RK, Pearce, D & Bateman, I 1994, *Environmental Economics – An Elementary Introduction*, Harvester Wheatsheaf, London.
- United States Department of the Interior, Fish and Wildlife Service and US Department of Commerce, Bureau of the Census 1996, *National Survey of Fishing, Hunting and Wildlife associated Recreation* [www document]. URL <http://www.census.gov/prod/3/97pubs/fhw96nat.pdf>.
- Upeneja, A, Shafer-E L, Seo, W & Yoon, J 2001, 'Economic benefits of sport fishing and angler wildlife watching in Pennsylvania', *Journal of Travel Research*, vol. 40(1), pp. 68-78.
- Weaver, D & Lawton, L 2001, *Attributes and Behaviour of Ecotourists in LNP*, CRC for Sustainable Tourism, Griffith University, Gold Coast Campus, Brisbane, Australia.
- Wen, JJ & Tisdell CA 2001, *Tourism and China's Development: Policies, Regional Economic Growth and Ecotourism*, World Scientific, Singapore.
- Wilkie, DS & Carpenter, JF 1999, 'Can nature tourism help finance protected areas in the Congo basin?', *Oryx*, vol. 33, pp. 332-338.
- Wilson, C & Tisdell, C 2001, 'Sea turtles as a non-consumptive tourism resources especially in Australia', *Tourism Management*, vol. 22, pp. 279-288.
- Wilson, C & Tisdell, C 2003a, 'Conservation and economic benefits of wildlife-based marine tourism: sea turtles and whales as case studies', *Human Dimensions of Wildlife*, vol. 8, pp. 49-58.
- World Tourism Organisation 1999, *Tourism and Economic Development*, Contribution of the World Tourism Organisation to the SG report on tourism and sustainable development for the CSD 7 meeting, <http://www.world-tourism.org/sustainable/doc/CSD7-99-WTOcontribution.pdf> (Accessed in September 2003).
- Zawacki, WT, Marsinko, A & Bowker, JK 2000, 'A travel cost analysis of non- consumptive wildlife associated recreation in the United States', *Forest Science*, vol. 46, pp. 496-506.

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# LISTS

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Table 15 If you are interested in Antarctic wildlife, is your interest mainly in which species listed? (you may tick more than one box). Distribution of responses.  
Table 16 Responses to the questions (Pre-Visit): How important was the possibility of seeing Antarctic/Sub-Antarctic wildlife in your decision to come on this journey? (Post-Visit): How important was seeing Antarctic/Sub-Antarctic wildlife during this cruise? Distribution of responses  
Table 17 Index of satisfaction anticipated and obtained from seeing Antarctic wildlife species based on responses to the following question: Pre-Visit (Q9). Please tick in the second column if you expect to see any of the following wildlife in Antarctica or Sub-Antarctica during this cruise. Would it increase your satisfaction (1) a little; (2) much; (3) very much; or (4) not at all to see the following wildlife? Please put the appropriate number in the last column. Post –Visit (Q6). Tick in the second column if you saw any of the following wildlife in Antarctica or Sub-Antarctica during this cruise. Did they increase your satisfaction (1) a little; (2) much; (3) very much; or (4) not at all to see the following wildlife?  
Table 18 Average weighted indices of importance to respondents of features or attributes of Antarctica/Sub-Antarctica prior to and following their visit. Changes in indices are also shown.

Table 19	Attitudes of respondents to nature conservation based on responses to pre-visit and post-visit questions. Pre-Visit (Q8). How would you rate your attitude towards conservation? Post-Visit (Q14). How would you rate your attitude towards nature conservation after your experience of Antarctica? Distribution of responses.
Table 20	Do you regard your current knowledge of Antarctica/Sub-Antarctica as excellent, good, average or poor? Distribution of responses.
Table 21	Do you want Antarctica (including wildlife, plant life and its landscape) to be preserved in its pristine state? Distribution of responses.
Table 22	The distribution of reasons given by those who said they want Antarctica (including its wildlife, plant life and its landscape) to be preserved in its pristine state. More than one reason could be given.
Table 23	Estimated number of visitors brought by commercial tour operators and 'independent visitors' during the period 2001-2003 to view glow worms at Natural Bridge
Table 24	Distribution of responding Australian walk-in visitors coming to Natural Bridge to view glow worms by State
Table 25	Distribution of age of respondents
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Table 28	Distribution of responses to the structured question 'What is the reason for glow worms lighting up?'
Table 29	Distribution of responses to the structured question 'What do spiders and glow worms have in common?'
Table 30	Distribution of responses to the structured question 'What do the adults look like?'

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