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# HUMAN PERCEPTIONS OF HAULED OUT SEA LIONS (*NEOPHOCA CINEREA*) AND IMPLICATIONS FOR MANAGEMENT: A CASE STUDY FROM CARNAC ISLAND, WESTERN AUSTRALIA

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This study focuses on visitor perceptions of hauled out sea lions on Carnac Island, Western Australia. Carnac Island lies close to the city of Perth and is an important haulout (resting) site for the Australian sea lion, which is recognized as a species in need of special protection. The island is easily accessible by pleasure craft as well as tour boats with many people visiting during the summer (November–April) period. A visitor survey was conducted in order to obtain information on visitor expectations of sea lion viewing, the nature of visitor experience, perceptions of visitor impacts, and views on management. Up to 80% of visitation to the island was by private boat owners and 73% of respondents expected to view sea lions on the beach. Most respondents believed that their presence did not disturb the sea lions, although 78% stated that they observed other people disturbing the sea lions. The survey indicated a high degree of visitor satisfaction. Most respondents were of the opinion that 5 m or less was a safe distance to approach sea lions, in contrast to a recommended approach safe distance of more than 5 m promoted by the state wildlife agency. Visitors supported ranger presence and the provision of more information about sea lions. Management recommendations include the initiation of a visitor monitoring plan, the development of a sea lion interpretation program, increased ranger presence, and a system of training and accreditation for tour guides utilizing Carnac Island.

Key words: Wildlife tourism; Wildlife management; Australian sea lion; *Neophoca cinerea*; Carnac Island; Western Australia; Human–wildlife interactions; Wildlife disturbance; Human impacts; Visitor surveys

## Introduction

Wildlife viewing tourism is expanding rapidly in Australia (Higginbottom, 2004; Higginbottom, Rann, Moscardo, Davis, & Moloin, 2001). With increasing numbers of people seeking to view wildlife, conservation issues have become prominent in terms of protecting species and habitats that are of

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recreation and tourism interest, and ensuring the long-term ecological sustainability of wildlife tourism activities. Marine-based tourism activities are focused on a range of marine species, such as dolphins, whales, whale sharks, manta rays, stingrays, turtles, fur seals, and sea lions (Birtles, Valentine, & Curnock, 2001), but, for many species, little is known on the long-term sustainability of such operations (Green & Higginbottom, 2001; Newsome, Dowling, & Moore, 2005).

Wildlife tourism can have negative impacts on wild species and their habitat (Birtles et al., 2001; Green & Higginbottom, 2001; Newsome et al., 2005; Newsome, Moore, & Dowling, 2002). Potential impacts of wildlife tourism on wild species can involve: disruption to activities such as feeding, mating, social interactions (Marsh et al., 2003); increased predation, aberrations in social behavior, habituation, changes in community structure, reduced reproduction, and local extinction (Reynolds & Braithwaite, 2001). Humans can also be put at risk if interactions with wildlife and visitors are not adequately managed. Feeding wildlife is now generally discouraged, as it can result in aggressive behavior and occasionally attacks on humans (Newsome et al., 2005; Orams, 2001). The value of visitor experience and feedback is being increasingly recognized in the management of wildlife tourism (Lewis & Newsome, 2003; Newsome et al. 2002; Orams, 2000; Worboys, Lockwood, & De Lacy, 2001). The data collected from visitor surveys can provide useful insights into the profile and purpose of visitors engaging in wildlife viewing activities and provide usable information to assist managers in understanding the nature of human–wildlife interaction and manage the situation accordingly.

## The Australian Sea Lion

The Australian sea lion (*Neophoca cinerea*) is a species endemic to Australia that has unique life history characteristics among pinnipeds. Contrary to the New Zealand fur seal, the Australian sea lion has not recovered from past intensive hunting (Ling, 1999; Shaughnessy, 1999), and is vulnerable to local extinction due to the small size of most of its breeding populations. Furthermore, its unusual breeding cycle makes the species sensitive to disturbances in its environment.

The Australian sea lion is the rarest sea lion species of the five known species of sea lions. In the last 15 years, several new Australian sea lion colonies have been found, and the estimated total number of Australian sea lions was revised from a low 2500–3000 (Riedman, 1990) to 11,000–13,000 individuals (Goldsworthy, Bulman, He, Larcome, & Littnan, 2003; Shaughnessy, 1999). Sixty-six breeding colonies are known from comprehensive surveys of potential breeding sites in South Australia and Western Australia (Dennis & Shaughnessy, 1996; Gales, Shaughnessy, & Dennis, 1994; Shaughnessy, 1999; Shaughnessy et al., 1997). About 2700–3400 Australian sea lions are found in Western Australia, while only an estimated 1000 sea lions are found specifically on the west coast (Gales et al., 1994).

Six haulout sites are found on near-shore islands in a radius of 50 km from Perth (Fig. 1). Australian sea lion haulout sites can be defined as shore areas (beaches, rocky shores) that sea lions use throughout the year to come to shore and spend a substantial amount of time. Haulout sites are different from sites where sea lions come to shore only occasionally, such as some mainland beaches. Sea lions frequenting the haulout sites around Perth are exclusively males; female sea lions very rarely visit the Perth region (Gales, Cheal, Pobar, & Williamson, 1992).

The conservation status of the Australian sea lion has been reviewed in the *Action Plan for Australian Seals* (Shaughnessy, 1999). The Australian sea lion is a protected marine species under Australia's Environment Protection and Biodiversity Conservation Act 1999 or EPBC Act (Government of Australia, 1999) and is listed as a "vulnerable species" under the EPBC Act. The species is listed under the State of Western Australia's Wildlife Conservation Act 1950 (Government of Western Australia, 1950) as "In need of special protection."

Pinniped tourism in the Southern Hemisphere has recently been reviewed by Kirkwood et al. (2003). Their findings show that tourism focusing on wild pinnipeds is a growing industry in all of the 10 Southern Hemisphere countries that have pinniped populations (Peru, Chile, Ecuador, Argentina, Uruguay, Brazil, Namibia, South Africa, Australia, New Zealand), plus Antarctica. These authors recorded 80 sites where pinniped-focused tourism is taking place, with over 161 registered tourist operators and

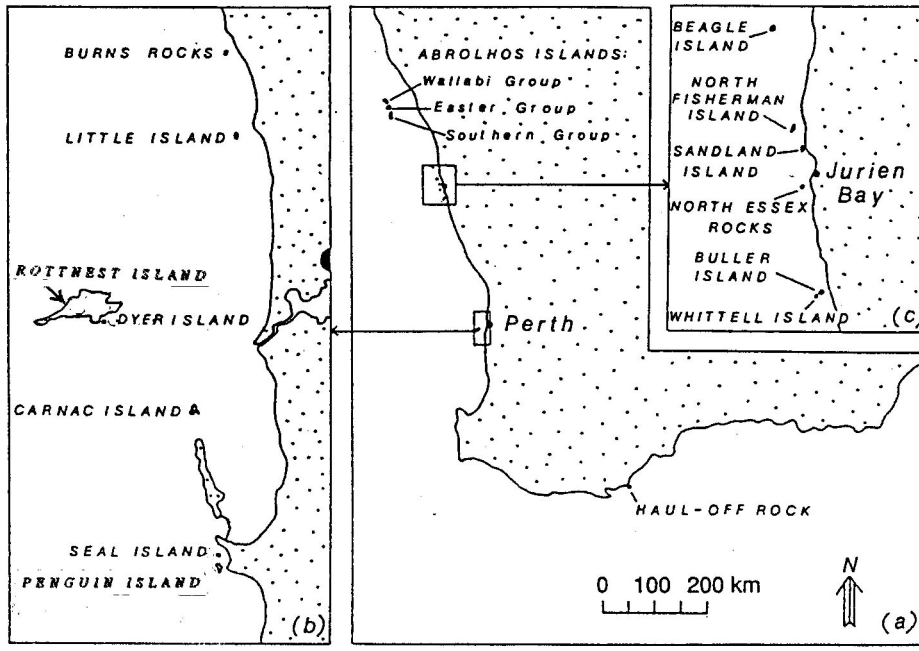


*Figure 1.* Distribution of the Australian sea lion on the west coast of Western Australia: (a) situation map, (b) location of the six haulout sites near Perth, and (c) breeding sites around Jurien (adapted from Gales et al., 1992).

more than 1.3 million tourists annually. The most visited sites, attracting up to 100,000 tourists annually, are, in Australia, Seal Bay on Kangaroo Island (South Australia) and Seal Rocks (Victoria), and, in New Zealand, Kaikoura Peninsula and Tonga Island.

In a review of the effect of tourism on pinnipeds worldwide, Orsini (2004) found adverse impact of tourism in 6 out of 12 species (Australian sea lion, New Zealand fur seal, Australian fur seal, South American fur seal, harp seal, Hawaiian monk seal). Recommendations to mitigate human impacts ranged from increasing approach distances and restricting access to the site to amending legislation to increase the level of protection for pinnipeds. Wright (1998) noted that a resident group of Hooker's sea lions in New Zealand was tolerant (habituated) to human activity, but recommended long-term monitoring to document any long-term impacts from ecotourism.

So far there has been very little information published on the impact of tourism and recreation on the Australian sea lion (CALM, 1992; Higgins, 1993; Martinez, 2003; Orsini, 2004). A study investigating the behavior of hauled out sea lions at Carnac Island in the presence of visitors was done in parallel with the visitor survey described here (Orsini, 2004). A summary of the findings is that sea lions responded to people's presence through four main types of behavior: looking repeatedly at the visitors, called "Look" (almost 50% of responses), lifting their head off the sand ("Lift head"), sitting up on their foreflippers ("Sit up"), or no reaction at all. The frequencies of these different types of behavior differed from the frequencies observed in the absence of humans. The frequencies also varied depending on the time of the day and the age of the animals. More acute responses involved either running towards humans or retreating in the water and occasionally leaving the beach. Human behavior resulting in these sea lion responses included approaching sea lions at various distances, or more direct disturbance of the sea lions by visitors, such as throwing sand, sea weed, or other objects or splashing water at the sea lions, or deliberately approaching sea lions at distances of less than 2.5 m for the purpose of taking photographs.

## Study Site

Carnac Island is a small (19 ha), uninhabited A-class nature reserve managed by the Western Australian Department of Conservation and Land Management (CALM) (Fig. 2). The island is the main of three sites (with Penguin Island, Little Island) where interactions on land between recreational visitors and sea lions frequently occur in the Perth region and where land-based sea lion viewing activities by commercial tour operators are permitted.

Carnac Island is located approximately 10 km from the coastal city of Fremantle and thus easily accessible by pleasure craft as well as by tour boats. It is most attractive to visitors for its scenic values, its birdlife and hauled-out sea lions, its sheltered beach and safe swimming, and its anchorage protected from the fresh southwesterly sea breezes. Carnac Island is one of the three most important sea lion haulout sites in the Perth region and one of the most important on the west coast of Western Australia (CCWA & CALM, 2003).

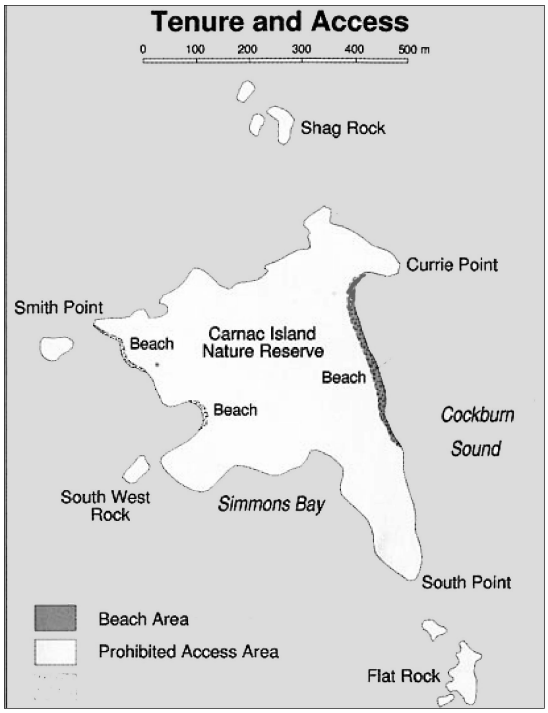


*Figure 2.* Map of Carnac Island and location of the main sea lion haulout area on the island's main beach (shaded area) (map adapted from the Carnac Island Management Plan; CCWA & CALM, 2003).

The management purpose of Carnac Island Nature Reserve is the "conservation of flora and fauna and recreation," while the specific management goals relative to recreation on the island include: "To ensure that the passive recreation activities that are permitted on the island do not compromise the island's conservation purpose," and to maintain an emphasis on "passive recreation (for example, nature appreciation) and visitor education to assist with the management of visitor behaviour" (CCWA & CALM, 2003).

The estimated numbers of visitors per year are 13,000 on land and 20,000–30,000 in the Eastern Bay (where most sea lions haul out), including private boats and tours (Ingram, 2001). However, the number of recreational visitors is likely to have been underestimated.

There are three main categories of visitors on Carnac Island, which can be described as follows:

1. People on sea lion viewing tours (wildlife tourism). The main focus of these tours is on sea lions, as it is the only wildlife that can be reliably seen during the tours. Tours often include a guided visit on the beach.
2. People on charter boats (general tourism). These operators cater for tourist groups or social functions, and are generally not focused on wildlife. Visitors are sometimes ferried to the beach by dinghy and can view sea lions on their own (guide not provided).
3. People engaged in recreational boating. Visitors arrive on private boats and anchor in the Eastern Bay in shallow water or drag their boat on the beach. People can view hauled out sea lions from their boats, or while walking along the beach, or during swimming/snorkeling activities. Recreational activities on the beach that have the potential to interfere with hauled sea lions, such as playing beach games, frequently occurs, although such activities are deemed incompatible with the goals of the Carnac Island Nature Reserve Management Plan (CCWA & CALM, 2003).

## Methods

The survey, based on guidelines developed by Horneman, Beeton, and Hockings (2002), took place

from January 16 to February 28, 2003, during the summer period, a time of high visitation at Carnac Island. Approval was obtained from the Murdoch University's Animal and Human Ethics Committees and from the Western Australian Department of Conservation and Land Management prior to the start of the study. A total of 207 visitors filled out the questionnaire. The questions were based on management issues identified at the start with the wildlife management agency (CALM), which was concerned about the increase of the number of visitors to Carnac Island and their potential impact on the sea lions as well as potential human safety issues when humans are in close proximity with the sea lions. This study focused on visitor perceptions of issues such as human impacts on wildlife and visitor safety, resulting in important implications for management. Results derived from the survey provide an insight on visitor profiles, attitudes, expectations, and perceptions towards sea lion viewing.

The questionnaire was designed to gather information on the following points:

- Profile of visitors to Carnac Island.
- Visitor expectations of sea lion viewing, as well as sea lion viewing outcomes.
- Description of sea lion viewing activities.
- Interactions between humans and sea lions (on land, from boats, and in the water).
- Visitor perceptions of sea lion disturbance by humans.
- Visitor perceptions of sea lion viewing and quality of visitor experience.
- Visitor perceptions of whether sea lions are attracted to people.
- Visitor perceptions of safety issues.
- Visitor support for guidelines and regulations on human/sea lion interactions.
- How visitors would improve their sea lion viewing experience in the future.
- Some open-ended questions that gave respondents the opportunity to provide comments and suggestions.

Visitors were approached on the beach (see Fig. 2) and, after a brief presentation of the study and its goals, were asked if they wished to participate in the survey. The questionnaire was presented to visitors after they had been on the beach for a while, to allow them time to view the sea lions if they wished, so that they could answer questions (Appendix) about the quality of their experience. The response to the request to fill out the questionnaire was generally positive once respondents were made aware that the results of the study would assist in the conservation of the sea lions. There was generally a high level of interest for the sea lions and some respondents were keen to provide feedback on their experience and often asked questions on the life history of the species.

Respondents were given a questionnaire to fill out with limited guidance: little background was provided to potential respondents on the sea lions unless specific questions were asked. It took an average of 5–10 minutes for people to fill out the form. Assistance was readily available if respondents sought clarifications on some of the questions. As the survey was not designed to provide a random sample of human visitors on Carnac Island, its results do not strictly apply to the whole visitor population. However, the survey provides valuable information on how to improve the future management of the island.

## Results

Please note that percentages in the following section do not always add up to 100%, as multiple responses were possible for some questions, and not all respondents answered all the questions (see Appendix).

### *Profile of Visitors to Carnac Island*

A total of 86% of respondents were recreational visitors (they came on private boats), while 14% of respondents came on commercial tours or charter boats (Fig. 3). The main point of departure to Carnac Island was Fremantle (55%), followed by Woodman Point (30%), both located south of Perth. Most of the respondents (71%) visited Carnac Island on weekends and public holidays, but 20% also visited the island on weekdays. The purpose of the visit was mainly boating, swimming/snorkeling, socializing (around 50–55% each), as well as wildlife viewing (44%), indicating a recreational focus for most visitors. A total of 35% of the respondents were at Carnac Island on their first visit, another 15% on their second visit, while 31% were regular visitors (≥5 visits).

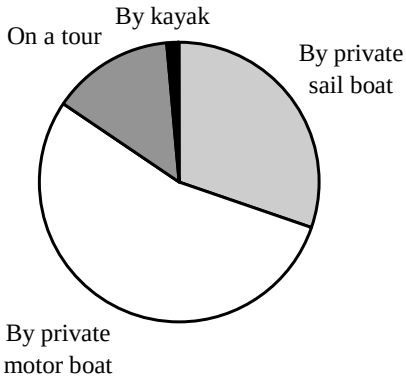


*Figure 3.* How respondents reached Carnac Island.

### *Visitor Expectations of Sea Lion Viewing and Viewing Outcomes*

A high percentage of respondents (78%) knew about sea lions at Carnac Island prior to their visit. The goal of 66% of the respondents who knew about sea lions was to view sea lions during their visit. These figures indicate a specific intention to view sea lions before going to the island. While 73% of respondents expected to view sea lions on the beach, 38% expected to view them from a boat, and 38% to encounter them in the water (Fig. 4). All 207 respondents saw sea lions during their visit, and almost all of them saw them on the beach, while 30–35% saw a sea lion from a boat or encountered one in the water.

### *Interactions Between Humans and Sea Lions*

The most common sea lion behavior observed by respondents on the beach was overwhelmingly "Sleeping/resting" (98%), followed by "Sitting upright" (31%) and "Moving" (25%) (answers not mutually exclusive). This indicates that the most common type of sea lion viewing experience by visitors at Carnac Island was viewing a sea lion when it is inactive.

Of the 38% of respondents who expected an encounter with a sea lion in the water, most (90%) did encounter one there. Of these respondents, 64% said that a sea lion swam past them while they were in the water, and 36% said that a sea lion swam towards or around them. This indicates that sea lions frequently swim near or around people. Of the 86 respondents who had interactions with sea lions in the water, 10 respondents mentioned being touched

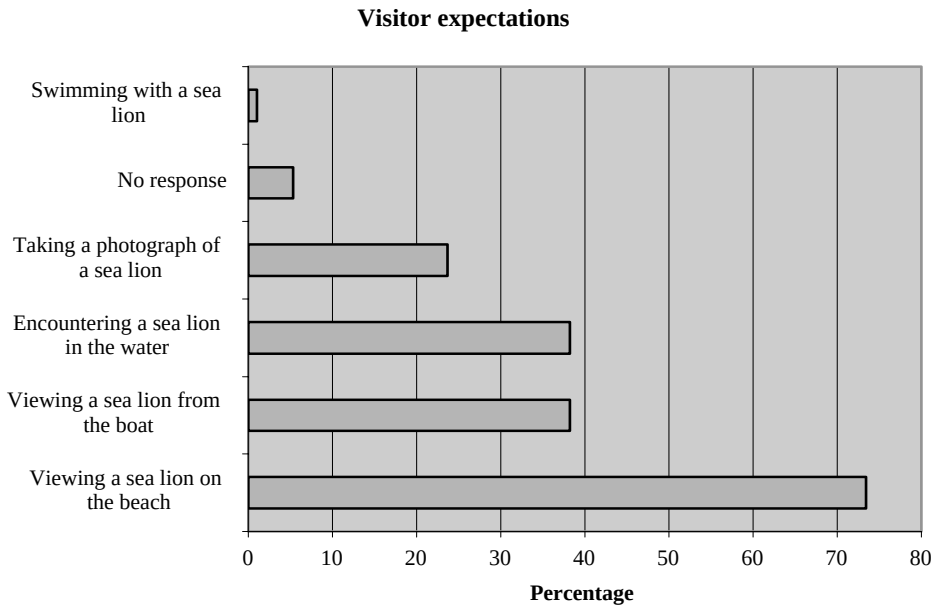


*Figure 4.* Visitor expectations of their encounter with a sea lion.

or nudged by a sea lion. No report of biting or aggressive behavior was made and no occurrence of adverse interactions between sea lions and swimmers came to our attention during the field period.

Anecdotal observations during this study show that young sea lions frequently interact with people in the water, while this is not usually the case with adult sea lions. Inquisitive juveniles often leave the beach to join one or several swimmers/snorkelers and can remain with them for extended periods of time. This appears to be an extension of behavior where juveniles interact among themselves in the water.

### *Visitor Perceptions of Sea Lion Disturbance by Humans*

When asked "Did you feel that sea lions were disrupted by: (1) Yourself, (2) Other people, (3) Not disrupted," the answer was (1) 10%, (2) 20%, and (3) 76%. The overall perception that visitors themselves did not disrupt the sea lions most likely relates to a lack of awareness that the apparently benign behavior exhibited by sea lions actually constitutes a disturbance. Orsini (2004) notes that sea lion responses to human disturbance are not conspicuous (mostly "Look" or "Lift head") and most visitors are not aware that this may constitute a significant disturbance through its ongoing, repetitive nature. Another contributing factor is that most respondents were interviewed after 10:30 am, at a time when sea lions were less likely to respond to human presence.

The larger percentage of respondents that observed other people disrupting sea lions is most likely indicative of signs of more obvious disturbance, such as distinct observable reactions to human approach (e.g., a sea lion being perceived to sit up in response to human presence). This is confirmed by responses to the question: "Did you see something that may adversely affect sea lions?" In this case 78% of respondents answered "Yes." This question related to incidents of direct disturbance of sea lions by humans such as people deliberately causing the animals to move. Of the 64 (out of 161) respondents who commented on the source of the disturbance, 50% mentioned people, 31% boats, and 11% commercial tourism. The lack of patrol boats was also mentioned.

### *Visitor Perceptions of Sea Lion Viewing and Quality of Experience*

Respondents generally enjoyed their sea lion viewing experience, 86% rating their experience between 7 and 10 (out of 10), and only 7% giving it a rating of between 3 and 5 (Fig. 5).

When asked the open-ended question: "What did you enjoy/dislike the most while viewing the sea lions at Carnac Island?" 169 respondents provided a total of 192 comments. Of these comments, the majority (89%) were positive, while only 11% were negative. Twenty-two percent of comments mentioned the scenic qualities, peacefulness, and naturalness of Carnac Island. Among the 76% of comments referring to the enjoyment of viewing sea lions, 22% mentioned the opportunity to view wild sea lions "in their natural habitat," and 20% mentioned the enjoyment of viewing them "being themselves" (including sleeping, resting, or just "being lazy") without "human interference," while 19% emphasized the "interactions" with the sea lions, including "being close to them" (6%) and/or "swimming with them" (6%). Four percent of comments referred to the opportunity to view sea lions "freely," in an uncontrolled manner and without many other people being there. The value of information provided by the research volunteers was mentioned in 2% of the comments.

Among the 19 comments on what people disliked about sea lion viewing, respondents indicated "other people," particularly when they were getting too close to sea lions and interfering with them (3% of the total). In 2% of the comments, respondents indicated that they disliked the pontoon near the island set up by the "ecotourism" operator, as well as the large "Ecotour" ferry and "mass tourism." A similar number of comments mentioned the sea lions not being entertaining enough (2%) and two respondents (1%) did not agree with the guidelines about interactions between sea lions and humans in the water.

### *Visitor Perceptions of Whether Sea Lions Are Attracted to People*

Although a majority of respondents (58%) thought that sea lions were not particularly attracted to humans, a significant proportion (39%) indicated that they perceived that sea lions sought or enjoyed the presence of people. From the comments provided,

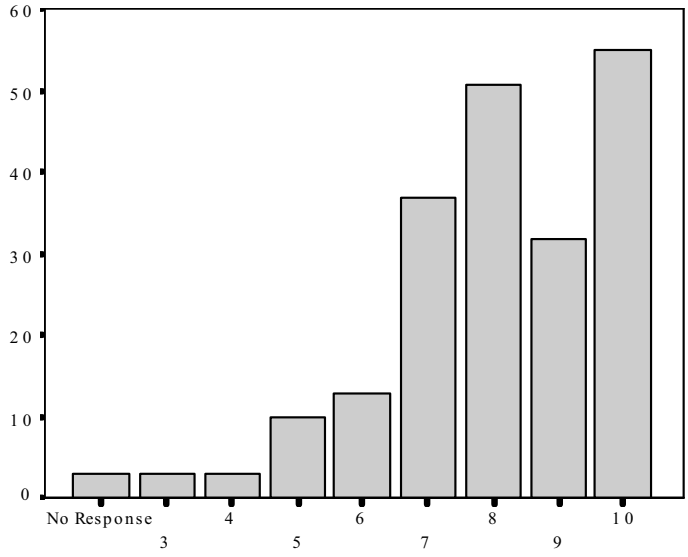


*Figure 5.* Enjoyment levels of visitors viewing sea lions at Carnac Island.

it appears that this perception came from the "friendliness" of sea lions towards people.

The reasons why respondents enjoyed viewing sea lions in this context included: a) interacting with sea lions in the water (30% of respondents), and b) sea lions being playful, intrigued by humans (14% of respondents).

One response indicates that a respondent believed that sea lions enjoyed being fed fish. One direct observation by the author of people feeding fish to a large adult sea lion confirms that some people unfortunately continue feeding sea lions. The fact that sea lions appear very tolerant to human presence tends to give people a false sense of security, even though the chance of attack by a sea lion is small.

### *Visitor Perceptions of Safety Issues*

Most respondents (71%) considered that 5 m or less was a safe distance to approach sea lions (including 35% who thought that a distance of less than 3 m was safe), despite guidelines recommending staying at least 5–10 m away from sea lions, and more if the animals show any response to human presence. Furthermore, although 92% of respondents were aware that sea lions can inflict a painful bite, 42% of respondents said that they were not aware that sea lions are capable of outrunning a person on the beach.

### *Visitor Attitudes Towards Guidelines and Regulations on Human/Sea Lion Interactions*

There is a large support (80% of respondents) for the current guidelines dealing with interactions between humans and sea lions. Even though these guidelines were summarized in the questionnaire, it is possible that respondents may not have been aware of them prior to filling out the question, and may have had a limited understanding of what they are. However, the answers can be interpreted as a strong support for protecting sea lions from undue interference from humans and suggest that support would be likely for further measures to protect sea lions, provided visitors receive appropriate supporting information.

### *How Visitors Would Improve Their Sea Lion Viewing Experience*

A volunteer ranger on the beach was the preferred choice (77%), presumably as a way to reduce the incidence of undesirable human behavior and to as-

sist and inform people on the beach. The lower score for a CALM ranger (20%) indicated that respondents were less in favor of the presence of an official ranger on the beach. Several respondents indicated that they would not favor a "Monkey Mia" type experience where highly controlled, closely supervised wildlife viewing takes place (Monkey Mia in Shark Bay, Western Australia, is well-known worldwide as a site where wild dolphins come to the beach to be fed by wildlife rangers in the presence of hundreds of visitors).

Many respondents (59%) requested more information that included an information display. The current information display on the wooden platform was difficult to access from the beach in the 2002/2003 tourist season because wave erosion exposed sharp limestone rocks between the beach and the platform, so that few people would have been able to view the display. The low score of the "No change" option (21%) suggests that most respondents saw a change as desirable. Guided tours were the least preferred option (9%).

## Discussion

### *Visitor Appreciation of Sea Lion Viewing*

The variety of reasons given by respondents for why they enjoyed their sea lion viewing experience showed that the majority of respondents not only enjoyed their experience, but also had a significant appreciation of that experience. Two different groups of respondents emerged from the survey. Some people enjoyed the opportunity of seeing sea lions in their natural habitat, "being themselves" without interference ("passive" appreciation), while others preferred the "interaction" aspect of the experience, including being close to the sea lions and/or being in the water with them ("active" experience). Many visitors are likely to want to photograph sea lions, which is likely to result in close approach or even result in people trying to get the sea lion to "do something." These findings are relevant in terms of visitor management. In order to be able to fully enjoy their sea lion viewing experience, people would need detailed interpretation of why sea lions are hauled out on the beach and spend most of their time resting. Otherwise, there is a risk, as observed in this study several times, that visitors may attempt to elicit a reaction from the sea lions if they perceive that this resting behavior is uninteresting. This may result in inappropriate behavior from the part of the visitors, leading to harassment of the animals. Accordingly, these are important results to take into account when developing guidelines for visitor management and designing interpretation and education material.

### *The Impact of Recreational Visitors on Sea Lions: The "Incidental Ecotourist"*

The results show that although many visitors witnessed incidental disturbance caused by humans to sea lions, they did not seem to recognize that they themselves could disturb sea lions. Low-level, repetitive human disturbances of wildlife are indeed difficult to recognize, even by experienced scientists or managers (Duffus & Dearden, 1990). A broad-reaching education program, supported by a sea lion interpretation plan, would assist in developing this awareness, so that visitors can recognize telltale signs of human disturbance to sea lions and adjust their own behavior accordingly.

This survey indicated that many visitors to Carnac Island have a recreational focus, including visitors who arrive on charter boats (general tourism). It is likely that the attraction of Carnac Island to recreational and general tourism visitors will increase in the future, as the island is only a short boat trip (5 nautical miles) from Fremantle and other popular boat ramps, is sheltered from the sea breeze in summer and provides easy and free-of-charge anchorage for boats without the need for a permit, contrary to Rottnest Island, where mooring and access fees are charged and moorings are generally overcrowded. The proportion of "incidental ecotourists" (i.e., tourists who are attracted by something other than wildlife and may or may not have an appreciation of wildlife viewing; Grossberg, Treves, & Naughton-Treves, 2003) is likely to increase in the future. The introduction of an "ecocruise" ferry to Carnac Island that can accommodate over 100 passengers with a purpose-built pontoon moored less than 50 m from the island has introduced larger scale "ecotourism" to the island and is likely to involve a large proportion of "incidental ecotourists."

With regards to visitors that are attracted to wildlife viewing, Duffus and Dearden (1990) note that, as usage increases, visitors coming to ecotourism

sites tend to have a more "generalist" profile. Wildlife "specialists" (those who are primarily attracted to wildlife viewing) gradually lose out in their competition with the generalists. This is likely to be the case for both recreational and "ecotour" commercial visitors. Management tends to become then increasingly directed towards the "generalists," and the conservation of wildlife becomes more and more secondary to the main management goals. This scenario has been observed at the Northern Royal Albatross Colony in New Zealand in particular (Higham, 1998).

Carnac Island Nature Reserve is unusual compared to other nature reserves in Western Australia, in that its management purpose includes recreation in addition to nature conservation. The recently published Carnac Island Nature Reserve Management Plan specifies that "passive" recreation is the main type of recreational activity compatible with wildlife conservation on the island (CCWA & CALM, 2003).

*Management Recommendations*

The development of a specific tourism/recreation management framework will provide for a definition of optimal conditions, management actions, and a monitoring program (Higginbottom, Green, & Northrope, 2003). Key Performance Indicators (KPIs) can be set that aim to measure specified acceptable conditions (Moore, Smith, & Newsome, 2004). Adaptive management needs to be a key element of the management framework to account for uncertainty and any negative change that may emerge from long-term monitoring (Newsome et al., 2005). In accordance with this and the results of this visitor survey, the following management strategy for sea lion viewing on Carnac Island is recommended.

1. **Monitor visitor activity, expectations, and behavior.** a) Monitoring visitor numbers against set visitor number targets (KPI), b) monitoring visitor activity on the beach for compliance with the "passive recreation" goal of the Management Plan (KPI), and c) monitoring visitor attitudes and expectations towards sea lions and sea lion viewing (KPI).
2. **Develop an interpretation program to raise visitor awareness and improve the sea lion viewing experience.** A large amount of literature is available on the meaning, purpose, and role of interpretation programs; design principles are reviewed by Newsome et al. (2002). A sea lion interpretation program available to all visitors (recreation, tourism) can turn passive sea lion viewing into a high quality experience by providing meaning to that experience (Worboys et al., 2001). From a tourism and recreation point of view, watching sea lions sleeping or resting may not provide a rewarding experience for many tourists without the provision of context to the experience. Issues that need to be addressed are the level and amount of interpretation material required on the island (location and nature of the permanent information display board, presence of a volunteer or Department of Conservation and Land Management ranger on the beach, signage, use of pamphlets, use of a mobile information shelter on the beach at peak visitation times), and their accessibility to the various categories of visitors (recreational visitors, visitors on charter boats, on tours).
3. **Management of close approach and public safety.**
   *Prepare an education and awareness program about sea lions.* Target audiences should not only include Carnac Island visitors, but also stakeholder groups (e.g., motorboat and yachting clubs), charter boat and tour operators, and the wider public. An overhaul of the existing permanent display on the island is needed, and its location should be reviewed to ensure that it can be easily and safely accessed by visitors at all times. Other education tools can be used (e.g., mobile education display at boat ramps, yacht clubs, and schools). It is important for managers to engage stakeholders and the wider public into a new phase of education and consultation to gain public and industry support for any significant change in the management of Carnac Island, building on the positive interest and appreciation of sea lion viewing that most Carnac Island visitors are showing.
   *Increase ranger presence on the beach.* The presence of rangers on the beach would contribute significantly to public education and the reduction of instances of direct disturbances to

sea lions. The introduction of a volunteer ranger on the beach received strong support from visitors during the survey. These rangers could assist the Department of Conservation and Land Management staff rangers in day-to-day public education and monitoring activities.

4. **Development of a quality wildlife viewing experience through the accreditation of tour guides and tourism operators.** A system of training and accreditation of tour guides on Carnac Island certified by CALM would add value to the visitor experience provided in the wildlife tours and be of commercial benefit to the industry (Dowling, 1996). Under CALM license conditions, tourism operators seeking access to the island may be required to be accredited under the Australian National Ecotourism Accreditation Program (NEAP).

## Conclusion

Given the wide range of tourism situations, behavioral ecology, and relative sensitivity of different target species, it is important to understand human attitudes towards wildlife. Moreover, there has been an explosive growth in wildlife tourism in recent years and this coupled with the strong desire within humans to have close contact with animals makes the study of human–wildlife interaction an important precursor to designing management strategies (Newsome et al., 2005). Studies of human perception and interest in target species thus form an important focus of wildlife tourism research and can provide information on the use of sites, visitor characteristics and the outcomes of visitor activity (Newsome et al., 2002).

The results of this visitor survey showed that visitors greatly valued their sea lion viewing experience, and indicated a strong interest and support for sea lions and their management. This is supported by recent work on stakeholder interests in stingrays at a stingray-feeding site at Hamelin Bay, Western Australia (Lewis & Newsome, 2003). Few visitors to Carnac Island were aware that human presence by itself could be a source of disturbance to sea lions. However, visitors did notice various incidents of direct sea lion disturbance. Newsome, Lewis, and Moncrieff (2004) reported on human disturbance of stingrays at Hamelin Bay. Visitors were observed giving rays inappropriate food, throwing various items at rays, and fishing for rays. Patrons also noticed other visitors engaging in inappropriate activities such as adults placing children on the back of stingrays for photographs. The work carried out by Newsome et al. (2004) confirms the issues that may arise where large numbers of unsupervised people come into contact with wildlife. Even though there has been only one documented instance of sea lion attack at Carnac Island in 30 years, the fact that young children and adults carry out recreational activities in the midst of sea lions represents a public safety risk. Despite few incidences of inappropriate behavior and close contact, most visitors support the presence of a ranger on the beach at peak visitation times and an education and awareness program would assist in reducing risk of injury to visitors. Results from the survey carried out by Lewis and Newsome (2003) show ranger presence and education to be the most preferred management strategies that could be put in place if uncontrolled stingray feeding were to increase at Hamelin Bay. This survey also shows support for increased management presence and thus assists in planning for sustainable human–sea lion interaction on Carnac Island.

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## Biographical Notes

Jean-Paul Orsini (provide a short paragraph).
David Newsone (provide a short paragraph).

Appendix: Summary of Visitor Responses to the Survey Questionnaire

| Question No. | Question | Response | Percent of Respondents | Implications for Sea Lion Interpretation, Visitor Education/Awareness, and Carnac Island Management |
|---|---|---|---|---|
| 1 | How did respondents reach Carnac? | Private boats<br>Tour boats | 86<br>14 | Recreation represents a major portion of respondents. |
| 2 | Point of departure on mainland | Fremantle<br>Woodman Point<br>Other | 55<br>30<br>15 | Education program to focus around the Fremantle and Woodman Point boating communities (e.g., boat clubs, boat ramps). |
| 3[a] | Purpose of visit | Swimming/snorkeling<br>Boating<br>Socializing<br>Wildlife viewing<br>Fishing | 56<br>55<br>53<br>44<br>20 | Wildlife viewing ranks fourth after three recreational pursuits. Multiple selections for many respondents. |
| 4 | Number of previous visits | 0<br>1<br>2–5<br>>5 | 35<br>16<br>18<br>31 | Direct visitor education should be directed towards first time visitors as much as repeat visitors. |
| 5[a] | Day of visit | Weekend<br>Public holiday<br>Weekday | 49<br>22<br>19 | A substantial proportion of respondents visit Carnac on weekdays. |
| 6a | Did respondents know about sea lions prior to visit? | Yes ($N$ = 164)<br>No | 78<br>21 | The great majority of respondents were aware of sea lions before their visit. Further research is needed on how they knew about sea lions and what they knew. |
| 6b[b] | Was viewing sea lions a goal of your visit? ($N$ = 164) | Yes<br>No | 66/52<br>34/26 | Two thirds of the respondents who knew about sea lions had sea lion viewing as the goal of their visit. |
| 7[a] | Respondents' expectations regarding sea lion viewing | Viewing a sea lion on the beach<br>Viewing a sea lion from the boat<br>Encountering a sea lion in the water<br>Taking a photograph<br>Swimming with sea lion | 73<br>38<br>38<br>24<br>1 | Expectations were mainly sea lion viewing on the beach, but expectations of sea lion viewing from a boat and in the water were high. |
| 8a | Did you view sea lions during your visit? | Yes<br>No | 100<br>0 | Sea lion tour operators can almost provide a guarantee that sea lions will be viewed at Carnac Island. |
| 8b | Where did your sea lion viewing/encounter take place (beach, boat, water)? | On the beach<br>From a boat<br>In the water ($N$ = 86) | 95<br>32<br>34 | A third of respondents encountered a sea lion in the water. |
| 9a[a] | What was the sea lion doing while you were watching it? | Sleeping/resting<br>In an upright position<br>Moving | 98<br>31<br>25 | The viewing experience of most respondents consisted of a sleeping sea lion. It is important to present other aspects of the sea lions' life cycle when designing interpretation/ education material. |
| 9b[b] | Sea lion behavior during encounter with human in the water ($N$ = 86) | Swimming past you<br>Swimming towards/around you | 64/26<br>36/15 | Much interaction occurred in the water between sea lions and people. Sea lions approached 15% of respondents during interactions in the water. |
| 9c[b] | In the water, did sea lion touch or nudge you? ($N$ = 86) | Yes<br>No<br>No response | 15/5<br>77/25<br>8/2 | No instance of a sea lion biting a human in the water was reported to the survey team. |

| | | | | |
|---|---|---|---|---|
| 10[a] | Did you feel that sea lions were disrupted by: | Your presence<br>Other people's presence<br>Not disrupted | 10<br>19<br>76 | Few respondents perceived that they disturbed sea lions, while most believed that sea lions were not disrupted. Need for more education/awareness. |
| 11a | Did you see something that may adversely affect sea lions? | Yes ($N$ = 161)<br>No | 78<br>21 | Responses to this question complement results of Question 10. Respondents witnessed various cases of incidental disturbance to sea lions. |
| 11b[b] | If yes, what was the source of the disturbance? ($N$ = 64) | People<br>Boats<br>Commercial tourism<br>Indirect impacts<br>No perceived impact | 50/16<br>31/10<br>11/3<br>5/1<br>3/1 | Most respondents believed that people and boats were the two main sources of disturbance to sea lions. |
| 12 | Level of enjoyment of sea lion viewing (from 1 low to 10 high) | Score 7–10<br>Score 3–6 | 86<br>12 | High enjoyment level with an average score of 8.0. |
| 13a | Did you perceive that sea lions enjoyed or sought the presence of humans? | Yes ($N$ = 80)<br>No<br>Unsure | 39<br>58<br>2 | Charismatic nature of sea lions, look directly into people's eyes. Inquisitive juveniles, often seek human interaction (on land or in the water). |
| 13b[b] | If yes, how? ($N$ = 80) | "Interactions sea lions/people in water"<br>"Sea lions enjoy people"<br>"Sea lions content/indifferent to people"<br>Miscellaneous<br>No response | 30/12<br>14/5<br>11/3<br>6/2<br>35/14 | Interactions between sea lions and people in the water appear to be an important part of the respondents' sea lion viewing experience (see also Question 9b). |
| 14 | How close can a person approach a sea lion safely? | 1–3 m<br>3–5 m<br>5–10 m<br>>10 m | 35<br>36<br>22<br>5 | The great majority of respondents believed that an approach distance of ≤5 m is adequate, despite being aware that sea lions can bite (Question 15). This presents a safety and sea lion disturbance issue. |
| 15 | Are you aware that: | A sea lion can inflict a painful bite<br>A sea lion can outrun a person on the beach | 92<br>42 | There is a knowledge that sea lions can bite, but a limited awareness that they can outrun a person on the beach. Safety issue (see also Question 14). |
| 16 | Do you believe current guidelines/rules to interact with sea lions should be: | The same<br>Stricter<br>Less strict | 80<br>10<br>8 | Although there appears to be strong support for guidelines/rules for interactions between sea lions and people, many respondents are not aware of the recommended approach distance (Question 14). |
| 17 | What did you enjoy/dislike while viewing sea lions? | Positive comments<br>Negative comments | 173<br>22 | See comments below |
| 18a[a] | How could your experience of viewing the sea lions be improved in the future? | Volunteer ranger providing guidance<br>CALM ranger on site<br>Information display on the beach<br>Guided tours<br>No change | 77<br>20<br>59<br>9<br>21 | Volunteer ranger was the preferred choice and there was a request for an information display easily accessible on the beach. |
| 18b[b] | Respondents' comments on how to improve their sea lion viewing experience ($N$ = 30) | Signage, information display<br>More regulation, protection<br>Less tourism<br>More/better amenities<br>Less regulation | 30/4<br>27/4<br>20/3<br>17/2<br>6/1 | General support for more sea lion protection, even if that involves more regulation. Request for more on-site information. |

[a]Multiple responses.
[b]Percentages of all respondents ($N$ = 207) first number and of respondents that answered the question ($N$ supplied in column 2).

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