



## Research Note

# Effects of the Presence of Official-Looking Volunteers on Harassment of New Zealand Fur Seals

ALEJANDRO ACEVEDO-GUTIÉRREZ,\* LISA ACEVEDO,† AND LAURA BOREN‡

\*Department of Biology, Western Washington University, Bellingham, WA 98225-9160, U.S.A., email [acevedo@biol.wvu.edu](mailto:acevedo@biol.wvu.edu)  
†3805 Taylor Avenue, Bellingham, WA 98229, U.S.A.

‡Marine Mammal Consultants, 44 Crescent Street, Richmond 7020, New Zealand

**Abstract:** *An increased number of tourists viewing animals in the wild have increased stress on these animals (hereafter wildlife). Many wildlife-viewing locations rely on voluntary compliance with posted regulations to protect animals from tourists because of the expense of employing on-site enforcement personnel. Voluntary compliance, however, is ineffective. The presence of official-looking volunteers may decrease the incidence of wildlife harassment by tourists. To test this possibility, we observed tourists interacting with 5- to 12-month-old New Zealand fur seals (*Arctocephalus forsteri*) at the popular Obau Stream waterfall while in the absence or presence of a young woman in plain sight wearing a neon vest (i.e., observer) and when an observer was not present. We observed 254 tourist groups at the waterfall when young seals were present. The percentage of groups in which at least one person harassed (approached, touched, or threw objects) a young seal was two-thirds lower when the official-looking observer was present. Frequency of harassment was inversely related to observer presence. Programs in which volunteers work at tourist sites are popular in countries with high tourism rates, such as New Zealand. Our results show that a relatively inexpensive and effective tourism-management strategy may be to post such volunteers as observers at sites where tourists view wildlife.*

**Keywords:** marine mammals, tourism management, tourist experiment, volunteers, wildlife harassment

Efectos de la Presencia de Voluntarios en el Hostigamiento a Focas Finas de Nueva Zelanda

**Resumen:** *Un mayor número de turistas observando animales silvestres ha incrementado el estrés sobre estos animales (en adelante fauna silvestre). Debido al costo de emplear personal de vigilancia muchas localidades de avistamiento de fauna silvestre dependen del cumplimiento de regulaciones publicadas para proteger a los animales de los turistas. Sin embargo, el cumplimiento voluntario no es efectivo. La presencia de oficiales voluntarios puede disminuir la incidencia de hostigamiento de los turistas hacia la vida silvestre. Para examinar esta posibilidad observamos a turistas interactuando con focas finas de Nueva Zelanda (*Arctocephalus forsteri*) de 5 a 12 meses de edad en la popular cascada Oabu Stream en presencia de una joven vestida con un chaleco fosforescente (i.e., observadora) y cuando dicha observadora no estaba presente. Observamos a 254 grupos de turistas en la cascada cuando las focas jóvenes estaban presentes. El porcentaje de grupos en los que por lo menos una persona hostigó (se aproximó, tocó o arrojó objetos) a una foca joven fue dos tercios menor cuando la observadora estaba presente. La frecuencia de hostigamiento estuvo inversamente relacionada con la presencia de observadores. Los programas con voluntarios que trabajan en sitios turísticos son populares en países con altas tasas de turismo, como Nueva Zelanda. Nuestros resultados demuestran que la ubicación de voluntarios como observadores en sitios donde los turistas observan la fauna silvestre puede ser una estrategia de manejo de turismo relativamente poco costosa y efectiva.*

**Palabras Clave:** experimento turístico, hostigamiento a fauna silvestre, mamíferos marinos, manejo de turismo, voluntarios

Paper submitted April 15, 2010; revised manuscript accepted August 5, 2010.

## Introduction

Wildlife tourism (i.e., tourism focused on observation of free-living vertebrates) has generated resources for conservation and furthered economic development in regions near protected areas worldwide, except the United States and Japan (Boo 1990; Giannecchini 1993; Balmford et al. 2009). Simultaneously, increased wildlife tourism has elicited concerns over its potential negative effects on wildlife and the environment (Newsome et al. 2005; Tapper 2006). Most wildlife tourism centers on the observation of predators, which often are the focus of conservation efforts (Sergio et al. 2008).

The effects of tourism on wildlife are well documented (Beale & Monaghan 2004; Bejder et al. 2009) and range from changes in distribution and behavior (Constantine et al. 2004; Bejder et al. 2006; Hayward & Hayward 2009) to reduction in body condition and survival (Müllner et al. 2004; Rode et al. 2007). The New Zealand fur seal (*Arctocephalus forsteri*) is a predator that has become popular with tourists (Boren et al. 2009). The interaction of tourists with these seals may affect maternal separation, body condition, and foraging (Boren 2001).

Because tourism has the potential to negatively affect animals, wildlife tourism is managed through regulations. In New Zealand, the viewing of marine mammals is regulated by the Marine Mammals Protection Regulations of 1992. The demand for encounters with fur seals and sea lions has increased, and additional regulations have been developed to minimize effects of tourists on these species (DOC 2007a, 2007b). Nevertheless, humans do not always respect unenforced regulations, regardless of the context (e.g., Pagh 1999; Rowcliffe et al. 2004; Goslinga & Denkers 2009). For instance, posted signs have no effect on tourist compliance with viewing regulations for New Zealand fur seals (Acevedo-Gutiérrez et al. 2010). Unfortunately, enforcement is expensive and thus usually absent at viewing sites. One potential solution to this problem is the stationing of official-looking volunteers at viewing sites to encourage compliance with regulations. To determine whether this approach might work we stationed an observer in plain sight of tourists and recorded frequency of harassment of young New Zealand fur seals in the presence and absence of the observer.

## Methods

### Study Site

Ohau Stream waterfall is approximately 25 km north of Kaikoura on the South Island of New Zealand. It is reached by an easy 3- to 5-min walk through forest and hence is a frequent tourist destination. During our study (9 months, spring-fall) 19,102 tourists visited the water-

fall, including people brought by tour operators (data provided by the Department of Conservation, Wellington). Ohau Stream flows into the ocean next to a breeding colony of New Zealand fur seals (Boren et al. 2006). The trail to the waterfall ends in a small (40 m<sup>2</sup>) cement platform approximately 500–1000 m from the colony. Fur seal young travel upstream to the waterfall, where interactions between humans and young occur. Regulations stipulate that people remain 20 m away from marine mammals on land (DOC 2007a). Posted regulations at viewing areas have no effect on the behavior of people observing New Zealand fur seals (Acevedo-Gutiérrez et al. 2010), and there are no signs with regulations posted along the trail to the waterfall or at the platform. Hence, we could isolate the effect of the presence of an official-looking observer on deterring people from harassing young seals.

### Experimental Procedure

The goal of our experiment was to determine whether an official-looking volunteer would be viewed by tourists as authority figure and thus decrease harassment to young fur seals. During October 2008 to June 2009 (Austral spring-fall), we randomly selected the days of the week and the time of the day in which to conduct observations of tourist groups at Ohau waterfall. From behind a tree and out of sight of the tourists, we had a view of the waterfall, the pool, and the platform and observed young seals and humans. Each observation day we flipped a coin to determine whether an official-looking observer would be present. The observer was L.A. As the observer, she wore a neon vest and sat on a rock in the platform in plain view of all those arriving at the waterfall. The woman said nothing to tourists unless they addressed her first. Typically, tourists asked L.A. what the young seals were doing at the waterfall. The observer responded that they swam to the waterfall on their own to play and rest.

The recorder behind the tree tallied the number and composition of tourist groups (sex and age [child, adult, senior]), the duration of each group's visit, and the instances and types of harassment. We defined children as any person who looked <18 years old, seniors as any person who looked >60 years old, and adults, as any person who looked 18–60 years old. The recorder also tallied the number of young at the waterfall, including those in the creek and on land, and noted any changes in their abundance over time. We defined *harassment* as the action of crossing to the waterfall edge of the platform (which brings a person near swimming or resting seals) or throwing an object toward the seals. Although we based our definition of *harassment* on human behavior and not the reaction of young, humans approaching or throwing objects affect the behavior of pinniped young (Newsome & Rodger 2008).

**Table 1. Logistic-regression model of tourist harassment of fur seal young at Ohau waterfall, New Zealand.\***

Parameter	B (SE)	$\chi^2$	df	p	Exp (B)
Constant	2.772	0.000	0		15.990
Duration of interaction	-0.056 (0.017)	12.328	1	<0.001	0.945
Number of people in group	-0.177 (0.076)	9.239	1	0.002	0.838
Number of seals	0.000 (0.008)	0.004	1	0.948	0.999
Observer presence	1.719 (0.396)	22.469	1	<0.001	5.578
Other tourist groups	0.055 (0.421)	0.017	1	0.897	1.056
Female in group	-0.762 (0.796)	1.066	1	0.302	0.467
Male in group	-0.312 (0.649)	0.238	1	0.626	0.732
Child in group	-1.500 (0.405)	13.709	1	<0.001	0.223
Adult in group	0.331 (0.608)	0.297	1	0.586	1.392
Senior in group	0.349 (0.513)	0.474	1	0.491	1.418

\*The response variable harassment of young was a categorical variable (yes or no). The independent variables duration of interactions, number of people in group, and number of seals were recorded as integers. The remaining independent variables were tallied as categorical (yes or no) variables. The significance of each parameter was assessed with a likelihood-ratio test and the  $\chi^2$  statistic.

**Data Analyses**

We compared the behavior of tourists in the presence and absence of an observer. We examined duration of time at the waterfall and number of people per group with a Z statistic approximation of the Mann-Whitney U test. We report the results of this test as median values (interquartile range) because data were skewed to the left. We used a log-likelihood test to compare groups that harassed and did not harass seals. Groups were categorized as groups with children, groups with adults and seniors, and groups with seniors only.

We used a log-likelihood test to compare the frequency with which tourist groups harassed pups with and without the observer present. We used forward and backward logistic regression (Hosmer & Lemeshow 1989) to examine which variables explained variance in harassment of seals (Table 1). We used the Pearson  $\chi^2$  to examine the fit of the model (Hosmer et al. 1997).

**Results**

We conducted observations on 68 days. We observed 254 tourist groups when seals were present, 146 groups in the absence of an official-looking observer, and 108 groups in the presence of an observer. Groups with and without an observer were similar in composition to one another. The median time a group spent at the waterfall was 10 (range 5–16.25) min without an observer and 10 (7–16.75) min with an observer ( $Z_{145,107} = 1.10, p = 0.27$ ). The median group size was 2 (2–4) people for both groups and with and without the presence of an observer ( $Z_{145,107} = 0.06, p = 0.96$ ). Tourists observed on average 24.3 seals (SD 24.68) without an observer and 26.2 seals (SD 19.40) with an observer ( $t_{145,107} = 0.65, p = 0.52$ ). The percentage of groups with children, groups with adults only, and groups with seniors only was 21.9%, 61.0%, and 17.1% respectively when no observer was present and 22.2%,

61.1%, and 16.7% respectively when an observer was present ( $G_2 = 0.01, p = 0.995$ ).

The percentage of groups in which at least one person harassed young seals was two-thirds lower when an official-looking observer was present (13.0% when observer was present versus 38.4% when an observer was not present;  $G_1 = 21.37, p \leq 0.001$ ). Children were present in 25% of groups and harassed seals more than adults, which explained considerable variation among groups in harassment of seals (Table 1). The model that best fit the data was the same for both forward and backward regressions. The presence of children, the duration of the interaction, and the number of people in the group were positively related to harassment, whereas the presence of an observer was negatively related to harassment (model goodness of fit:  $\chi^2_{243} = 241.074, p = 0.52$ ; Table 1). The model correctly classified 92.4% of non-harassment occurrences and 40% of harassment occurrences (overall correct classification 78%).

**Discussion**

The presence of an official-looking observer was associated with a decrease in the frequency of harassment by tourist groups, which suggests that posting volunteers effectively deters harassment of wildlife. Even if the observer said nothing to the tourists, the number of incidents of harassment was significantly reduced when the observer was present. This result, coupled with the lack of posted regulations at the site, indicates that the presence of someone who appears to be official deters people from harassing wildlife even if it is unclear to them what behaviors are permitted. We predict that wildlife harassment may decrease even more if observers also informed tourists of the regulations.

Approximately half the tourist groups asked questions of the observer and conversed with her, all of them had misconceptions about the reason for young seals being

at the waterfall and how to behave around young. After speaking with the observer, many groups expressed their gratitude for the learning opportunity. Thus, besides helping to decrease wildlife harassment, we believe observers can also educate the public (Martin et al. 2007). Use of volunteers is cheaper than use of paid enforcement officials; nevertheless, volunteers are seldom used.

In general interactions between humans and fur seals are rare. Yet, because of the accessibility and popularity of the Ohau Stream waterfall, interactions between young fur seals and humans were common. Most instances of harassment involved tourists approaching young to within <2 m and, in some cases, attempting to touch them. Seals that were thus approached moved farther into the pool or downstream out of the pool. Tourists expected the seals to play with the objects they threw at them, and although rare, people also brought food to feed them. Actions by tourists could cause young to choke on an object (Derriak 2002) or be trampled by other, fleeing young (Mattlin 1978). We believe harassment of seals is likely to increase, given the popularity of the waterfall, which may in turn increase the possibility of accidental death of young or abandonment of the site. In the latter case, pups may search for other areas to explore around the colony, increasing the likelihood of mortality through vehicle collisions (Boren et al. 2008). Our results provide evidence that an effective and relatively inexpensive strategy to reduce wildlife harassment is to post official-looking volunteers at wildlife-viewing sites.

## Acknowledgments

We thank M. Morrissey and the Department of Conservation in Kaikoura for providing permission to conduct the research and data on the number of visitors. S. Dwyer provided field assistance, and D. Lundquist provided advice. The paper was improved by comments from B. Miner, M. Peterson, and anonymous reviewers. This work was conducted while A.A. was on sabbatical from Western Washington University.

## Literature Cited

- Acevedo-Gutiérrez, A., L. Acevedo, O. Belonovich, and L. Boren. 2010. How effective are posted signs to regulate tourism? An example with New Zealand fur seals. *Tourism in Marine Environments* 7: in press.
- Balmford, A., J. Beresford, J. Green, R. Naidoo, M. Walpole, and A. Manica. 2009. A global perspective on trends in nature-based tourism. *Public Library of Science Biology* 7:e1000144. DOI: 10.1371/journal.pbio.1000144.
- Beale, C. M., and P. Monaghan. 2004. Human disturbance: people as predation-free predators? *Journal of Applied Ecology* 41:335–343.
- Bejder, L., A. Samuels, H. Whitehead, H. Finn, and S. Allen. 2009. Impact assessment research: use and misuse of habituation, sensitisation and tolerance in describing wildlife responses to anthropogenic stimuli. *Marine Ecology Progress Series* 395:177–185.
- Bejder, L., A. Samuels, H. Whitehead, N. Gales, J. Mann, R. Connor, M. Heithaus, J. Watson-Capps, C. Flaherty, and M. Krützen. 2006. Decline in relative abundance of bottlenose dolphins exposed to long-term disturbance. *Conservation Biology* 20:1791–1798.
- Boo, E. 1990. *Ecotourism: the potentials and pitfalls*. World Wildlife Fund, Washington, D.C..
- Boren, L. J. 2001. *Assessing the impact of tourism on New Zealand fur seals (Arctocephalus forsteri)*. MS thesis. University of Canterbury, Christchurch, New Zealand.
- Boren, L. J., N. Gemmel, and K. Barton. 2009. The role and presence of a guide: preliminary findings from swim with seal programs and land-based seal viewing in New Zealand. *Tourism in Marine Environments* 5:187–199.
- Boren, L., M. Morrissey, and N. J. Gemmel. 2008. Motor vehicle collisions and the New Zealand fur seal in the Kaikoura region. *Marine Mammal Science* 24:235–238.
- Boren, L. J., C. G. Muller, and N. J. Gemmel. 2006. Colony growth and pup condition of the New Zealand fur seal (*Arctocephalus forsteri*) on the Kaikoura coastline compared with other east coast colonies. *Wildlife Research* 33:497–505.
- Constantine, R., D. H. Brunton, and T. Dennis. 2004. Dolphin-watching tour boats change bottlenose dolphin (*Tursiops truncatus*) behavior. *Biological Conservation* 117:299–307.
- Derriak, J. G. B. 2002. The pollution of the marine environment by plastic debris: a review. *Marine Pollution Bulletin* 44:842–852.
- DOC (Department of Conservation). 2007a. *Sharing our coasts with marine mammals*. DOC, Wellington, New Zealand. Available from <http://www.doc.govt.nz/publications/conservation/native-animals/marine-mammals/sharing-our-coasts-with-marine-mammals/> (accessed September 2010).
- DOC (Department of Conservation). 2007b. *The seal deal: caring for kekeno together*. DOC, Wellington, New Zealand. Available from <http://www.doc.govt.nz/publications/conservation/native-animals/marine-mammals/seal-deal-caring-for-kekeno-together/> (accessed September 2010).
- Gianecchini, J. 1993. Ecotourism: new partners, new relationships. *Conservation Biology* 7:429–432.
- Goslinga, S., and A. Denkers. 2009. Motives for non-compliance: a study among business entrepreneurs. *Gedrag & Organisatie* 22:3–22.
- Hayward, M. W., and G. J. Hayward. 2009. The impact of tourists on lion *Panthera leo* behaviour, stress and energetics. *Acta Theriologica* 54:219–224.
- Hosmer, D. W., T. Hosmer, S. Le Cessie, and S. Lemeshow. 1997. A comparison of goodness-of-fit tests for the logistic regression model. *Statistics in Medicine* 16:965–980.
- Hosmer, D. W., and S. Lemeshow. 1989. *Applied logistic regression*. Wiley, New York.
- Martin, K., A. Staines, M. Studer, C. Stivers, C. Moravek, P. Johnson, and J. Flannery. 2007. Grunion greeters in California: beach spawning fish, coastal stewardship, management and ecotourism. Pages 73–86 in M. Lück, A. Gräupl, J. Auyong, M. L. Miller, and M. B. Orams, editors. *Proceedings of the 5th international and coastal & marine tourism congress: balancing marine tourism, development and sustainability*. School of Hospitality and Tourism and the New Zealand Tourism Research Institute, AUT University, Auckland, New Zealand.
- Mattlin, R. H. 1978. Pup mortality of the New Zealand fur seal (*Arctocephalus forsteri* Lesson). *New Zealand Journal of Ecology* 1:138–144.
- Müllner, A., K. E. Linsenmair, and M. Wikelski. 2004. Exposure to ecotourism reduces survival and affects stress response in hoatzin chicks (*Opisthocomus hoazin*). *Biological Conservation* 118:549–558.
- Newsome, D., R. K. Dowling, and S. A. Moore. 2005. *Wildlife tourism: aspects of tourism*. Multilingual Matters Limited Books, Clevedon, United Kingdom.

- Newsome, D., and K. Rodger. 2008. Impacts of tourism on pinnipeds and implications for tourism management. Pages 182-205 in J. Higham and M. Lück, editors. *Marine wildlife and tourism management: insights from the natural and social sciences*. CABI, Oxfordshire, United Kingdom.
- Pagh, P. 1999. Denmark's compliance with European community environmental law. *Journal of Environmental Law* 11:301-319.
- Rode, K. D., S. D. Farley, J. Fortin, and C. T. Robbins. 2007. Nutritional consequences of experimentally introduced tourism in brown bears. *Journal of Wildlife Management* 71:929-939.
- Rowcliffe, J. M., E. de Merode, and G. Cowlishaw. 2004. Do wildlife laws work? Species protection and the application of a prey choice model to poaching decisions. *Proceedings of the Royal Society of London B: Biological Sciences* 271:2631-2636.
- Sergio, F., T. Caro, D. Brown, B. Clucas, J. Hunter, J. Ketchum, K. McHugh, and F. Hiraldo. 2008. Top predators as conservation tools: ecological rationale, assumptions, and efficacy. *Annual Review of Ecology and Systematics* 39:1-19.
- Tapper, R. 2006. *Wildlife watching and tourism: a study on the benefits and risks of a fast growing tourism activity and its impact on species*. United Nations Environmental Program, Bonn, Germany.

