

Antarctic Fur Seals (*Arctocephalus gazella*) Observed Predating Adélie (*Pygoscelis adeliae*) and Chinstrap Penguins (*P. antarctica*), Antarctic Peninsula

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Abstract

Fur seals of various species are known to feed on penguins. This has been ascertained primarily from scat analyses and occasionally from behavioural observations. In February 2007, five cases of Antarctic fur seals (*Arctocephalus gazella*) predating on Adélie (*Pygoscelis adeliae*) and Chinstrap penguins (*P. antarctica*) were observed. These observations might indicate an increase in fur seal predation on seasonally abundant penguins or simply might reflect a biased sample of a few individuals who specialize in this type of foraging.

Key Words: Antarctic fur seal, *Arctocephalus gazella*, Adélie penguin, *Pygoscelis adeliae*, Chinstrap penguin, *Pygoscelis antarctica*, feeding behavior, predation

Introduction

Seven of the 10 species of fur seals have a range that is overlapping with at least one species of penguin. Of these seven, five are known to prey on penguins (see du Toit et al., 2004, for reviews of pinniped predation on penguins). Records for the Antarctic fur seal (*Arctocephalus gazella*) now indicate they prey on more species of penguins ($n = 5$) than any other species of fur seal (Table 1).

Although both the Adélie (*Pygoscelis adeliae*) and Chinstrap (*P. antarctica*) penguins are relatively common in Antarctic waters, recent work emphasizes the importance of common species to ecosystems, whereby even relatively small proportional declines in their abundance can result in large absolute losses of individuals and biomass, significantly disrupting ecosystem structure, function, and services (Gaston & Fuller, 2007). Consequently, in addition to threatened species,

conservation biologists need to pay more attention to the depletion of common species.

The observations reported here are most likely not in themselves unique events. Yet, given the paucity of published records describing such behaviour, along with the possible long-term implications should this type of predation increase (i.e., penguin numbers may decline as fur seal predation increases), each predation event will be outlined in detail.

Methods

Observations were made around the Antarctic Peninsula and outlying islands (see "Results" for individual latitude and longitude of observations) from "Zodiac" inflatable boats (5.8 m), which operated as tenders to the eco-expedition tourist ship *National Geographic Endeavour*. Either the naked eye or binoculars (Swarovski 10 × 42 EL) were used. Photographs were taken with either a Nikon D2X and 80-400 f 4.5-5.6 ED VR Nikkor lens or a Konika-Minolta Dimage Z3 with an integral 12x optical zoom lens.

Results

On 3 February 2007, the authors observed at least one, possibly two, Antarctic fur seals with captured Adélie penguins. Both observations were made within 1 km of a landing site for Antarctic tourists at the base of Brown Bluff on the northeastern tip of the Antarctic Peninsula (63° 31' S, 56° 52' W).

The first observation was made at approximately 0930 h and approximately 5 m from shore. The seafloor could be clearly seen through the water, and the depth was estimated to be no more than 5 m. The fur seal was first noticed as it approached an inflatable boat. MPD, SFM, and

Table 1. Fur seal species known to prey on penguins

Fur seal species	Penguin species	Source
Antarctic <i>Arctocephalus gazella</i>	King	Hofmeyr & Bester, 1993
	<i>Aptenodytes patagonicus</i>	
	Chinstrap	Hofmeyr & Bester, 1993
	<i>P. antarctica</i>	Casaux et al., 2004
		Paulian, 1964
		This report
	Gentoo	Bonner, 1968
	<i>P. papua</i>	Green et al., 1989
	Macaroni	Bonner & Hunter, 1982
	<i>Eudyptes chrysolophus</i>	Hofmeyr & Bester, 1993
		Green et al., 1989
		Warham, 1963
		This report
Subantarctic <i>A. tropicalis</i> New Zealand <i>A. forsteri</i>	Adélie	
	<i>P. adeliae</i>	
	Rockhopper	Hofmeyr & Bester, 1993
	<i>E. chrysome</i>	
	<i>Pygoscelis</i> sp. unknown	Ciaputa & Siciński, 2006
		Daneri & Coria, 1992
		Kirkman et al., 2000
		Doidge & Croxall, 1983
		Paulian, 1964 (cited in Bonner, 1968)
	Rockhopper	
		Bailey & Sorensen, 1962
		Csordas & Ingham, 1965
		Sorensen, 1969
	Stonehouse, 1968	
	Warham, 1963	
	Warham, 1971	
Cape (African) <i>A. pusillus</i>	Royal	
	<i>E. chrysolophus schelegeli</i>	
	Erect-crested	Spellerberg, 1975
	<i>E. atratus</i>	
	Fiordland	Spellerberg, 1975
	<i>E. pachyrhynchus</i>	
	Little Blue	Dix, 1993
	<i>E. minor</i>	Notman, 1985
		du Toit et al., 2004
	South African	Cooper, 1974
	<i>Spheniscus demersus</i>	du Toit et al., 2004
		Mecenero, 2004
		Shaughnessy, 1978
	Rand, 1959	
	Rebello, 1984	

LCL observed and photographed the fur seal as it approached the boat and swam at the surface with the penguin in its mouth. The penguin was alive, although its head was hanging loosely down into the water. As it was not observed to move or struggle, it appeared to be catatonic. The fur seal was followed for a few minutes as it slowly moved to the east, after which it released the penguin just under the surface. Once released, the penguin immediately surfaced, took a breath, and attempted to swim away. The fur seal then took

no further notice of the penguin and moved off, swimming at the surface. The observation was terminated at this point.

The second observation began at approximately 1130 h by INV in a similar boat to that described above. Water temperature was 1.3° C and the water was approximately 20 m deep. A subadult male fur seal was first sighted as it swam between grounded icebergs and scattered bergy-bits (large chunks of glacier ice—small icebergs) floating in the sea; bergy bits are usually less than 5 m in

size and are generally spawned from disintegrating icebergs (National Snow and Ice Data Centre, www.nsidc.org). The fur seal approached a small (approximately 2 × 2 m wide and 1 m above the surface) bergy-bit on which were two recently fledged Adélie penguin chicks (based on both the lack of dark feathers under the chin and white ring around the eye; Harrison, 1983). The fur seal swam up to the edge of the bergy-bit, and when it raised its head above the surface, one of the penguins entered the water at speed and swam away. The other penguin ran behind a slightly higher piece of ice. The fur seal meanwhile dove under the ice and surfaced on the far side of the bergy-bit (now on the same side as the penguin).

The fur seal then quickly climbed up onto the ice and attempted to grab the penguin, which was continuing to avoid the seal. The fur seal was photographed as it grabbed the penguin by the tail and began to “flick” and vigorously shake it. The penguin was vocalizing loudly and continued to attempt to escape. The fur seal then entered the water with the penguin still in its mouth and again vigorously shook it. This time, while shaking it, the skin ripped and the fur seal had a chunk of feathers, skin, and meat in its mouth (confirmed by photographs), which it swallowed. The penguin floundered at the surface, slowly flapping and gasping for breath, but continuing to try to escape by swimming at the surface. The fur seal easily pursued it and repeatedly shook it and removed bite-sized chunks, which it ate.

After repeating this shaking and feeding behaviour for approximately 10 min, the fur seal then began carrying the penguin at the surface. Approximately 2 min after it started carrying the penguin, the fur seal dropped it and swam off. The penguin was bleeding profusely and had at least six bites into its body, which could clearly be seen as the penguin feebly swam at the surface and rolled over onto its back and sides. Given the number of visible wounds and the likely internal damage from the flicking, it is unlikely this animal survived. The observation was terminated approximately 2 min after the fur seal left.

On 17 February 2007, at Baily Head on the southeastern side of Deception Island (62° 57' 6" S, 60° 29' 6" W) at 0920 h. RWW and INV, in two separate boats (similar to the ones described above), approached to within 15 m of a fur seal that was in the water (2.2° C) approximately 500 m off the beach. This beach is a known entry and egress zone for Chinstrap penguins to their nesting colony. The authors were attracted to the fur seal by a mixed group of birds (Wilson's storm petrels [*Oceanites oceanicus*], Kelp gulls [*Larus dominicanus*], Pintado petrels [*Daption capense*], and Giant petrels [*Macronectes* sp.]), which were picking up scraps from the surface. As the authors arrived, it was noted that the fur seal was flicking a Chinstrap penguin carcass vigorously from side to side. After less than 1 min, the fur seal dived and abandoned the carcass. It



Figure 1. A subadult male fur seal grasping a fledgling Adélie penguin (Photo by INV)

was not possible to ascertain if the fur seal had killed the penguin or scavenged it; however, it was clearly an adult bird with much of the meat from the breast area removed. The skin (with feathers still attached) was turned inside out and lay floating, still attached to the carcass by the neck and head of the bird.

At approximately 1200 h, RWW and INV were approximately 20 m offshore when they observed with the naked eye and binoculars a subadult male fur seal move at speed towards a group of approximately 100 adult Chinstrap penguins standing on the beach. These penguins had just returned from the sea and were agitated, as is typical for penguins moments after egress. The fur seal chased the penguins approximately 30 m before catching one by the tail. It proceeded to flick and shake the penguin vigorously. The shaking dislodged the penguin from the fur seal's mouth, and it immediately attempted to escape. A Giant petrel (GP) (which had been observed chasing, catching, and killing at least two Chinstrap penguins on the same beach minutes earlier by RWW and INV) had followed the chase and was within 1 m of the fur seal when the penguin began its escape. The GP, using its beak, grabbed the penguin as it ran by in a similar manner to that described by Bonner & Hunter (1982). The fur seal then attempted to take the penguin from the GP, but the GP released the penguin from its beak and stood on it. The GP then raised and spread its wings, and vocalized at the fur seal, which immediately turned and ran towards another group of penguins approximately 10 m away, coming in from the sea. It chased these penguins as they emerged from the waves and caught one, which it again proceeded to flick and shake vigorously. The GP remained with the original penguin and could be seen to rip open the organ cavity and eat part of the penguin or its stomach contents.

The fur seal had apparently killed the second penguin and was also eating part of it or the stomach contents as small bits could be seen as the carcass was flung around. This observation was terminated after approximately 5 min.

Discussion

Although these are possibly the first published records of fur seals taking and eating fledgling Adélie penguins from the ice and adult Chinstrap penguins on land, the competence with which the fur seals executed the attacks implies that this was not the first time they had made such kills.

Casaux et al. (2004) stated "a seal was seen eating three *P. antarctica* chicks consecutively" (p. 63), but they offer no further details of this observation; therefore, it is not clear if these

"chicks" were on a nest, crèched, or fledged and at the edge of, or in, the water. Ciaputa and Siciński (2006) stated that based on their results (from scats collected early February through early April of various years), "[Adélie penguins are] unlikely to become prey of Antarctic fur seals" (p. 181) as they felt that the birds had departed too soon for predation to occur. However, at Brown Bluff, there were clearly fur seals and Adélie penguins in sympatric attendance at the penguin breeding colony during the observations recorded there. This cohabitation of penguin species and fur seals is widespread around the Antarctic and its surrounding Sub-Antarctic islands, and it is probable that predation events occur wherever the two types mix, especially later in the season when fur seals become more abundant around the Antarctic Peninsula (pers. obs. of the authors).

Du Toit et al. (2004) recorded 544 predation events on penguins by Cape fur seals and noted that all predations took place in the water. They also described one fur seal shaking the penguin about with a vigorous flicking, similar to that described by Bonner & Hunter (1982), which du Toit et al. (2004) call "thrashing." They state that this resulted "in the skin being torn loose and flung over the head or legs to expose the viscera and breast muscles" (p. 48). During the events described here, only one vigorous shaking resulted in the skin being turned inside out. However, it is also possible, given this event was not observed from the beginning, that the penguin may have been scavenged from a Leopard seal kill, where the carcass is often turned inside out with the skin, flippers, and feet left intact as described by Müller-Schwarze & Müller-Schwarze (1975).

Du Toit et al. (2004) stated that two Cape fur seals caught penguins returning from sea (i.e., presumably those with full stomachs), and another took both adult and juvenile penguins. Yet another fur seal targeted the viscera of birds, and a similar situation was observed by Cooper (1974). Du Toit et al. (2004) suggested that individual seals who hunt for seabirds are not exhibiting stereotypical behaviour but, rather, that individuals develop their own preferences and techniques. Bonner & Hunter (1982) and du Toit et al. (2004) have suggested that predation on seabirds may be an extension of play behaviour, yet the observations recorded here were clearly not play as the fur seals were intent from the outset on attacking the penguins, although it cannot be determined if these techniques originally developed from play behaviour.

Du Toit et al. (2004) noted that younger fur seals may accompany an older individual preying on birds and thereby learn through observation. Additionally, learning such predation methods

may happen while observing a different species such as the Leopard seal, of which some individuals are known to specialize in hunting for penguins (Rogers & Bryden, 1995; Hiruki et al., 1999). Leopard seals are prevalent around both Brown Bluff and Baily Head and were seen to hunt and take penguins within 1 h of all observations reported here. It should be noted, however, that the Leopard seal kills were conducted in the water, while all but one of the fur seal kills discussed here were conducted on ice or land.

As penguins are known to be an important part of the diet for GPs (Bonner & Hunter, 1982), it cannot be ruled out that the fur seal at Deception Island learned from observing the killing methods of the GPs (i.e., on land), although GPs are also known to kill penguins as they enter the water (Swales, 1965). The converse is also possible, however, in that the GPs may have learned to kill penguins from observing the Leopard or fur seals. Bonner & Hunter (1982) suggested that GPs may utilize the hunting methods of fur seals (i.e., feeding on injured or abandoned animals), and this was apparent in our observation in which the GP kleptoparasitized the penguin from the fur seal. Lastly, it cannot be ruled out that both species (i.e., fur seals and GPs) may have learned to kill penguins independently.

Given our strong sampling biases (time spent at each location is typically under 4 h and is extremely localised around sites of interest to tourists), it is likely that predation events by fur seals on penguins are much more widespread than these few observations suggest.

Ashore at Brown Bluff, JMF observed subadult fur seals hauled out on the snow, and scats were prevalent. Some were coloured pink from consumption of krill, but despite their colouration, they were comprised predominantly of penguin feathers (species not identified). Similar observations have been made at Bouvetøya Island where some scats collected from Antarctic fur seals were comprised primarily of penguin feathers (species not identified) (Kirkman et al., 2000). The large number of fur seal scats with penguin feathers in them (at various locations around the Antarctic Peninsula, South Shetland, South Orkney, and South Georgia Islands; pers. obs. of the authors) also suggest that penguin predation may be a more regular occurrence than previously recognised, particularly at the end of the season when fledgling chicks are prevalent and adult penguins are maximising the amount of krill with which they are returning to the colony. Such seasonal trends could suggest that penguins may be important in the diet of some fur seals at certain times of the year (e.g., see Green et al., 1989; Kirkman et al., 2000; Casaux et al., 2004). Of course, it is also

possible that individuals occasionally supplement their more typical diet of krill and fish with penguins in an opportunistic manner. Casaux et al. (2004) found a temporal increase in the consumption of penguins, which may make up to 75% of the mass of the diet of nonbreeding male Antarctic fur seals, and noted that we might expect that penguins will be preyed upon more intensively at localities where they are abundant.

If fur seals only target fledgling penguins opportunistically, it is unlikely that their impact will have long-term effects on penguin populations; however, if fur seals are targeting primarily adult penguins and the trend increases, this will affect not only the adult penguins who are killed but also their chick(s). In some instances, this type of predation may have an overall effect on small colonies (e.g., Clark & Boersma, 2006). If predation increases as fur seal numbers increase or as they recolonise areas (Doidge & Croxall, 1983; Bengtson et al., 1990; Hofmeyr et al., 1997; Boveng et al., 1998; Casaux et al., 2004), it may have an effect on the ecology of penguins in general.

It is relevant to the discussion that fur seals were much more abundant in the South Shetlands and Antarctic Peninsula region prior to the 1820s than they are now (Wynen et al., 2000), so if fur seal predation on penguins occurred during that time, the impact on penguins may have been relatively much greater than present. In fact, if we are to believe that penguin populations have increased following the over-harvesting of the krill-eating whales or a loss in sea ice (Fraser et al., 1992), the earlier scenario would have seen more fur seals preying on fewer penguins, and the impact could have been considerable.

Although we recognize that the observations presented herein might simply reflect a biased sample of a few individual fur seals who specialise in this type of foraging, it may also indicate an increase in fur seal predation on seasonally abundant penguins, with a possible long-term result of declining penguin numbers if fur seals and their habit of preying on penguins continue to increase.

Through reports such as those presented here, the authors hope to encourage other naturalists to document anecdotal observations. Ultimately, it would be of value for scientists to conduct systematic observations at multiple sites to determine the scope and trend of this type of predation in the hope of increasing the general knowledge about the Antarctic ecosystem and predator-prey interactions, and perhaps to suggest areas of further research.

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