

First documentation of leopard seal predation of South Georgia pintail duck

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Abstract Leopard seals are regular winter visitors to Bird Island, South Georgia, where they mostly prey on fur seals and penguins, and to a lesser extent on Antarctic krill and fish. Leopard seals can exploit many different species, but there are no records of predation on flying shorebirds in the wild. On 4 October 2008, an individually identified juvenile leopard seal female was observed killing and eating a South Georgia Pintail duck. It also preyed on Antarctic fur seals and gentoo and macaroni penguins during its 2-month temporary residency around the island. The varied diet of this seal exemplifies the generalist prey utilization typical of its species. Long-term diet studies at Bird Island and the published record suggest that predation on ducks is a rather exceptional finding; individual ducks are more likely to escape leopard seal attacks than penguins and provide a far less substantial ration. This note documents the first observation of this species of duck in the diet of leopard seals.

Keywords Leopard seal · Pintail duck · Predation · South Georgia

Introduction

Leopard seals (*Hydrurga leptonyx*) are frequently sighted at Bird Island, South Georgia (54°00'S, 38°03'W) during the winter months, between April and November, and the

numbers fluctuate from year to year in response to environmental drivers (Jessopp et al. 2004). Leopard seals can prey on many species depending on the availability of these while they reside on the island. They mostly prey on juvenile Antarctic fur seals (*Arctocephalus gazella*) and gentoo (*Pygoscelis papua*) and macaroni (*Eudyptes chrysolophus*) penguins. Fur seals and gentoo penguins are resident in winter and macaroni penguins arrive on the island for their summer breeding season just before the leopard seals return to the pack ice (Forcada et al. 2009). The highly variable individual leopard seal residency times observed (Walker et al. 1998; Forcada and Robinson 2006) are likely to indicate a flexible prey choice.

The South Georgia pintail duck (*Anas georgica georgica*) is a subspecies of the South American species *A. georgica* that is endemic to South Georgia. They are omnivorous in their diet, and spend a lot of time during the winter feeding on seaweed, crustaceans and other invertebrates on the shoreline. They are also scavengers and have been observed feeding on the carcasses of dead fur seals, amongst other organic remains. The species thrives on the rat-free islands off the coast of South Georgia including Bird Island, where it can safely nest and lay eggs.

Flying seabirds have been occasionally reported in the leopard seal diet at Bird Island and elsewhere (Laws 1984 and references therein), but there are no records to date of predation of shorebirds in the wild, including ducks. This note reports the first documentation of leopard seal predation of South Georgia pintail duck.

Materials and methods

All observations of individual leopard seals and their diet are recorded (Jessopp et al. 2004; Forcada and Robinson

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2006) as part of a long-term monitoring programme at Bird Island, South Georgia. Through photo-identification of unique pelage patterns, we recognized and monitored a young female leopard seal (Fig. 1a) from 1 September to 31 October 2008. Its diet was characterized via direct observation of predation, and through scat analysis. Observed prey species were mostly fur seals and penguins, and for the scat analysis all remains (fur, feathers, skin, muscle and bone) were sorted taxonomically to species level. Observations of predation were recorded during daily systematic surveys of the island.

Results and discussion

The leopard seal was a female and was observed on 23 different days between 1 September and 31 October 2008 during the daily survey rounds, and also on other occasions. It measured 199 cm (standard length), indicating that it was a 1–2 year old juvenile (Laws 1957). It was photographed hauling out at several locations, but it was most regularly observed in Johnson Cove, at the western end of

Bird Island. This cove has one of the largest concentrations of gentoo penguins in winter and a breeding colony of more than a 1,000 nests in summer. The seal usually patrolled the water's edge surface and on at least six different days it was observed killing and feeding on gentoo penguins (Fig. 1b) as they returned to the beach in the evenings from their foraging trips. By the end of October, the leopard seal was also observed frequently in nearby Payne Creek, at the bottom of the largest breeding colony of macaroni penguins of the island. The macaronis arrive in mid-October and as many as 40,000 pairs concentrate there to breed. The seal was observed killing and eating macaroni penguins on at least one occasion (Fig. 1c). From six collected scats, 2 contained both penguin and Antarctic fur seal remains, and four contained penguin remains alone.

On 4 October 2008, the seal was observed hunting, killing and consuming a male South Georgia pintail duck. At 17:30 h, it was patrolling the shallow waters of Johnson Cove approximately 5 m from shore, near a large aggregation of gentoo penguins. It was then seen approaching, beneath the surface, a group of four ducks that were swimming and feeding in the surf at the edge of a rocky

Fig. 1 Juvenile leopard seal (*Hydrurga leptonyx*) female at Bird Island, South Georgia: **a** disturbed at haul out by juvenile male Antarctic fur seal (*Arctocephalus gazella*) and snowy sheathbill (*Chionis alba*); **b** jerking and thrashing a gentoo penguin (*Pygoscelis papua*), its most commonly observed prey, and **c** a macaroni penguin (*Eudyptes chrisolophus*); **d** chasing a male South Georgia pintail duck (*Anas georgica georgica*) on the sea surface; **e** grabbing the pintail, which already had a broken left wing; **f** jerking and thrashing the pintail to dismember it before eating it



outcrop. The seal suddenly attacked one of the ducks and then dove away while the other ducks flew off. One minute later, the leopard seal resurfaced 20 m offshore in close pursuit of the wounded duck (Fig. 1d, e). For the next 15 min, we watched as the leopard seal chased and corralled the duck around the near shore area in what seemed a playful manner. Eventually however, any perceived playfulness came to an end and the leopard seal carried the duck further out into the cove and began thrashing and eating it for ca. 15 min before disappearing. Despite its smaller size and stature relative to a gentoo penguin, the duck was thrashed and jerked repeatedly and eaten piecemeal rather than being eaten quickly whole (Fig. 1f). This behaviour was very similar to that commonly observed in leopard seals when preying on penguins, which are dismembered with powerful jerks of the head (Fig. 1b). Later in the day, the seal reappeared in the same cove and was seen killing and eating gentoo penguins.

With a mean mass of 0.55 kg, South Georgia pintails at Bird Island are an order of magnitude lighter than the ca. 5.5 kg adult gentoo penguins. It is thus unlikely that pintail would contribute a considerable proportion to the daily energy requirement of a leopard seal. Given its size, age, sex, growth and activity patterns, the daily energy requirement for this seal would be satisfied by the consumption of four or five gentoo penguins (Forcada et al. 2009). Accordingly, on 29 September 2008, this seal was observed killing and eating at least five gentoo penguins during an approximately 3-h period. To meet a similar energy requirement, the seal would have to kill and eat at least six or seven pintails for each penguin consumed, or 20 or 25 pintails per day if its diet was based solely on duck. However, ducks like other flying aquatic birds are quite mobile on water and presumably difficult to catch and it seems reasonable to assume that it may be easier to catch a lower number of penguins to meet the daily energy requirements. In addition, penguins at that location are far more abundant than pintail ducks and this may be one reason why leopard seals predation of South Georgia pintails has not been previously recorded.

Though leopard seals have been observed preying on flying seabirds, including diving petrels, prions, giant petrels, shags, seagulls and terns, most records suggest that predation on these prey is marginal compared to predation of its main prey group of seals, penguins, krill, fish and squid (Laws 1984 and references therein). At Bird Island, diving petrel remains have been recorded only once in scat samples (Walker et al. 1998), and our observation of predation on pintail duck is unprecedented. The question begs: why would a leopard seal hunt a pintail duck? Our observations suggest that this act of predation was not due to energetic necessity. The leopard seal spent a considerable

amount of time, and presumably energy, pursuing, capturing and thrashing the small duck before finally ingesting it. Furthermore, we observed the seal eating penguins that same day. So if we assume that the seal had been feeding at maximum ration, which seems possible given our observations and the relative abundance of gentoo penguins and other prey available at that time of the season, then it is possible that the seal was energetically free to explore other prey items. This incident could also reflect juvenile play behaviour, individual variation in hunting strategy, typical of this species (Rogers and Bryden 1995; Hiruki et al. 1999), or the availability of accessible prey; captive leopard seals at Taronga Zoo (Sydney, Australia) have been observed feeding on ducks when these were accessible (Tracey Rogers, personal communication). The fact that this particular juvenile leopard seal was observed feeding on at least three different species in addition to pintail duck lends support to this idea, and highlights the generalist dietary pattern that characterizes this species.

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