Fig. 1. Purple Sandpiper nest with seven eggs on the Melrakkaslétta Peninsula, north-east Iceland, June 1987.

Table 1. Lengths (mm) and breadths (mm) of Purple Sandpiper eggs in two nests on the Melrakkaslétta peninsula, northeast Iceland, in June 1987.

	Nest A		Nest B	
	Length	**Breadth**	**Length**	**Breadth**
Initial eggs	38.1	27.8	38.1	27.9
	38.1	28.2	38.0	27.9
	38.7	28.1	39.2	27.7
	37.8	28.6	39.0	27.1
Means	**38.18**	**28.18**	**38.58**	**27.65**
New eggs			40.0	27.0
			36.9	28.0
			37.5	27.2
Means			**38.13**	**27.40**

The vegetation was composed largely of *Empetrum nigrum*, mosses (*Rhacomitrium* sp.), lichens (*Cladonia* and *Cetraria* spp.), *Dryas octopetala, Silene acaulis* and *Carex* sp. (Summers *et al.* 1987).

Two nests, A and B with four eggs each, were found 130 m apart on 7 June 1987 and were judged to have been incubated for only two and four days respectively. The state of incubation was determined by "floating" the eggs in water (Summers *et al.* 1987). We suspect that the two clutches had been laid by different females because of the similarity in the state of incubation and slight difference in egg dimensions (Table 1). The eggs from nest A were, on average, shorter and broader than those of nest B, but not significantly so.

An incubating male (based on bill length: Summers *et al.* 1988) was trapped on nest A on 7 June and colour-ringed. On 9 June, he was flushed off nest B and, thereafter, was found associating only with this nest. Meanwhile, another bird, which was judged to be a female from the apparent length of the bill, was seen incubating at nest A. This clutch was depredated on 12 or 13 June. The shape of the hole in one of the depredated eggs suggested an avian predator, perhaps an Arctic Skua *Stercorarius parasiticus*. On 15 June, an additional three eggs had been laid in nest B. The measurements of the three new eggs were quite variable, so it was difficult to relate them to the sizes of the eggs in the original clutches. The seven eggs continued to be incubated. A female was eventually trapped on 25 June while incubating this large egg-set. At the end of incubation, only one egg of the original clutch hatched, on 1 July. None of the other six eggs showed signs of hatching and were deserted. Some eggs were cool when we made nest checks, indicating that the incubating birds were having difficulty in keeping all of them warm.

It seems unlikely that the female at nest B had laid extra eggs, because the maximum is generally four in sandpiper clutches (Cramp & Simmons 1983). Rather, we speculate that the egg-set of seven eggs and the male's link between nests A and B are related. Thus, we suspect that the male had two females that had initially laid separately, but when one lost a clutch, she re-laid in the other nest. Unfortunately, we were unable to catch more than one female to see if there was a bigamous relationship.

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Silver Gull preys upon Hooded Plover chick

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The decline of some threatened plovers has been attributed in part to low chick survival (e.g., Loegering & Fraser 1995), which plays a major role in the poor reproductive success of the threatened Hooded Plover *Thinornis rubricollis* of southern Australia (Garnett & Crowley 2000, Weston 2000). The reasons for chick mortality in Hooded Plovers are so poorly understood that the vast majority of chick deaths have to be categorised as "due to an unknown cause". Only five definite causes of chick mortality have been recorded (Table 1). Typically, chicks simply disappear, so it is very difficult to know why – their bodies are rarely found (Dowling & Weston 1999, Weston 2000, 2001).

Concern has been expressed that gulls, particularly Silver Gulls *Larus novaehollandiae,* might prey upon Hooded Plover eggs and chicks (e.g., Schulz & Bamford 1987, Schulz 1992). Although there are two informal reports of this (D. Ryan *in litt.*, I.D. Stewart *pers. comm.*) there are no published observations (see Marchant & Higgins 1993).

One of us (PB) was watching a brood of Hooded Plovers on the afternoon of 2 January 2002 on a deserted beach at

Table 1. Known and suggested causes of mortality of Hooded Plover chicks (after Weston 2001).

Cause	Definite cause of mortality	Suggested cause of mortality[a]	Source
Nankeen Kestrel *Falco cenchroides*	*		Weston 1998
Silver Gull		*	D. Ryan *in litt.*, I.D. Stewart *pers. comm.*
Conspecific aggression		*	Teoh & Weston 2002
Interspecific aggression – Fairy Terns *Sterna nereis*		*	P. Park *in litt.*
Domestic Dog	*	*	Weston 1998, B. Baird *in litt.*
Crushing by vehicle	*		Buick & Paton 1989, V. Natt *in litt.*
Crushing by people	*	*	P. Park *in litt.*, Baird & Dann in prep.
Collection of chicks by holiday-makers		*	see Weston 2000
Disease/injury		*	Unpubl. data[b]
Drowning/washed out to sea		*	Unpubl. data[c]
Dehydration or overheating	*		B. Dowling *pers. comm.*
Starvation		*	I.D. Stewart *pers. comm.*

[a] This column presents causes of mortality that have been suggested in the literature, or which are likely to cause mortality but where the evidence is not clear.

[b] MAW has observed (1) a chick that hatched with a leg deformity (swollen and lengthened knee joint) and (2) a chick that had a graze or disease over much of its back. This chick was also grossly underweight compared with its sibling (they were captured on the same day and had weights of 28.8 g and 38.5 g respectively).

[c] Broods have been hit by large waves, and chicks washed seaward before they were able to escape (MAW *pers. obs.*).

Koonya, Mornington Peninsula, Victoria, Australia. PB watched the brood from 25 metres with binoculars and saw the two adult Hooded Plovers with two downy chicks foraging in seaweed along the high water strand line. One adult plover was colour banded and had been seen sitting on a nest in the fore-dune nearby until two days beforehand. Therefore at most the chicks were only two days old. After the adults and chicks had been observed for about ten minutes, a lone Silver Gull landed a few metres from the adult plovers, which were positioned between the gull and the chicks. The adults made several attempts to drive the gull off, running at it with their heads held down and forward.

This defensive behaviour was observed for 1–2 minutes. The chicks were not concealed and did not crouch while the Silver Gull was present. The defensive behaviour of these adults did not appear as persistent or vigorous as that of other Hooded Plovers we have watched in established breeding territories nearby. The gull then flew round the adult plovers to one of the chicks, caught it in its bill and flew to the water's edge, 20 metres away. The gull dropped the chick on the sand for a moment; then picked it up again and flew a few hundred metres along the beach. The adult plovers did not initiate any pursuit of the gull.

Two days later and in several subsequent surveys over the following two weeks, there were no chicks with the adult pair in this breeding territory.

Weston (2000) observed broods for more than 270 hours in coastal Victoria and never recorded any such predation incident, despite seeing many encounters between broods and gulls. Similarly, in another intensive study of Hooded Plovers over 9 years, no such attacks were recorded (Dowling & Weston 1999, B. Dowling, V. Teoh and M. Urquhart *pers. comms*). Therefore it seems that successful gull attacks are either rare or difficult to detect or both.

Human developments, especially the availability of garbage, have induced increased gull populations in parts of Europe (e.g. Belant 1997) and some Australian Silver Gull populations have undoubtedly increased since European settlement (Blakers *et al.* 1984). Additionally, refuse left on beaches, the habitat of Hooded Plovers, may attract scavengers such as gulls (Schulz & Bamford 1987). Thus, Silver Gulls are native predators with probably an artificially high population. If future studies confirm that they are significant predators of the chicks of Hooded Plovers and other vulnerable species, they may warrant some form of management.

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