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PREDATION OF LITTLE PENGUIN EGGS BY KING'S SKINKS ON PENGUIN ISLAND, WESTERN AUSTRALIA

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Egg loss of Little Penguins by King's Skink predation on Penguin Island, Western Australia, is reported over two avian breeding seasons. Predation may depress the reproductive success of penguins at this colony.

INTRODUCTION

King's Skink *Egernia kingii* is one of the largest (200 g) Australian members of the family Scincidae (Storr *et al.* 1981). Although viewed as unusual reptiles because of their viviparity and essentially herbivorous diet, they have been little studied in the field (Swanson 1976). Arena (1986), who examined the general ecology of King's Skinks on Penguin Island, Western Australia, suggested that the population densities of this species were greater on Penguin Island than on the nearby mainland, and averaged approximately 100 skinks per hectare, or 1 200 adult skinks on the entire island.

Though essentially herbivorous, King's Skinks have a varied diet of plants and insects and, reportedly, they are the consumers of seabird eggs (Swanson 1976). Reptiles may take a wide range of eggs and chicks of birds (Vestjens 1977; Kopan and Yom-Tov 1982), which are excellent

sources of protein that can supplement a low nitrogen diet. On the islands off south-western Australia, King's Skinks have been implicated as the predators of some seabird eggs. Wooller and Dunlop (1990) excluded reptiles from a fenced 0.2 ha area of Carnac Island and found that Silver Gull *Larus novaehollandiae* egg loss was reduced from 60 per cent to 20 per cent, but did not clearly delineate whether King's Skinks or Tiger Snakes *Notechis scutatus* were preying upon the eggs.

Penguin Island is an important nesting area for colonial seabirds in south-western Australia. The two most abundant species, Silver Gulls and Little Penguins *Eudyptula minor*, both have protracted breeding seasons of eight and six months respectively (Wooller and Dunlop 1979; Klomp 1987), resulting in a nearly constant source of eggs for King's Skink's consumption. This paper reports egg loss of Little Penguins during the breeding seasons of 1986 and 1988.

METHODS

The breeding ecology of Little Penguins was investigated on Penguin Island, Western Australia (32°18'S, 115°42'E) from March to December in both 1986 and 1988. Reproductive performance was monitored weekly in 80 natural burrows and 55 artificial nestboxes and observations were made of egg loss and probable cause.

Eggs destroyed by predation were easily recognized. Typically, eggs eaten by gulls were punctured with the bill at the larger pole, whereas eggs destroyed by skinks had either two opposing holes along the egg's equator or crushed shells. Skinks were observed to open eggs by pushing the egg against a solid object, such as a shrub bole or the side of a nestbox, thereby creating two opposing holes.

RESULTS

During 1986, 71 (36%) of 198 Little Penguin eggs laid did not hatch (i.e. were infertile, rotten, cracked or disappeared). Of these 71 eggs 44 (62%) were deserted and subsequently disappeared as did a small number (39% of 25) of chicks less than two weeks old. It was thought that these losses were the result of predation by skinks.

In 1988, 44 (46%) of 96 eggs laid by penguins did not hatch. In 15 cases (34%), eggs had apparently fallen prey to King's Skinks as evidenced by doubly-holed or crushed shells in nestboxes and natural nests. On six occasions, King's Skinks were observed consuming eggs in the artificial nests.

DISCUSSION

Coloniality in seabirds is thought to have evolved partially as an anti-predator defence because of the protection afforded by numbers (Lack 1954). However, colonial nesting birds offer a dense, predictable food source to existing predators. During 1986 and 1988, the penguin eggs and chicks that disappeared were probably preyed upon by King's Skinks as no other ground predator is present on Penguin Island.

Klomp (1987) documented that a large number of 'natural nest-sites' used by penguins are located in the human settlement area of the island's

tombola. Here, nests for penguins are in and under metal structures, such as roof-sheeting, vehicle chassis, etc. These metal structures, and the tops of artificial nestboxes, are also the prime basking sites for King's Skinks, as no large, natural, fallen vegetation is present on the island. Night temperatures are often warm enough for skinks to be active, and this was when they may prey upon temporarily abandoned penguin eggs/chicks whose parents are outside nests displaying, courting, etc.

If King's Skinks scavenged only deserted eggs, rather than actively killing penguin eggs, their effects upon the reproduction of penguins would be negligible. However, direct observations during 1988 of eggs being taken from active nests (i.e., parents in attendance after egg loss) suggests that the skinks may be true predators. Detailed reptilian gut and faecal studies would be needed to assess fully the predator-prey interactions between King's Skinks and Little Penguins on Penguin Island. Small colonies, such as the one of c. 250 pairs under study, and isolated by 1 500 km from the nearest large penguin colony, may be particularly vulnerable to egg predation.

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