RECOVERIES OF BLACK SHAGS (*Phalacrocorax carbo*) BANDED IN WAIRARAPA, NEW ZEALAND

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ABSTRACT

During 1976-89, 490 Black Shag (*Phalacrocorax carbo*) nestlings were banded at Matthews and Boggy Pond wildlife reserves, and Te Hopai Lagoon, Wairarapa. Forty-one (8.4%) have been recovered, all dead, 20 of unknown causes. Of 21 for which the cause of death was known, 13 drowned in set nets, 11 of these birds being less than six months old. Six shags had been shot, all prior to 1986 when the Black Shag received partial protection. While 85% of the shags were found within a 100 km of the banding sites, mainly to the north and west, one bird was recovered about 2000 km away on Lord Howe Island.

KEYWORDS: Black Shag, *Phalacrocorax carbo*, recoveries, mortality, Wairarapa

INTRODUCTION

The Black Shag (*Phalacrocorax carbo*) is widespread in New Zealand (Bull *et al.* 1985), with colonies at coastal and inland sites throughout the country. The species feeds in a variety of habitats. It appears to favour open water, such as coastal waters, estuaries, lakes and major rivers, but it also feeds in small ponds and streams (Marchant & Higgins 1990). Despite its widespread distribution and relative abundance in New Zealand, the Black Shag has been little studied. Stonehouse (1967) and Stidolph (1971) reported on its foraging behaviour, and Stead (1932), Falla and Stokell (1945) and Lalas (1983) described its diet. This paper examines recoveries of Black Shags banded in Wairarapa.

METHODS AND STUDY AREA

From 1976 to 1989, DS banded a total of 490 Black Shag nestlings, seven to 64 birds per year (none banded in 1981 and 1986). The nestlings varied in age when banded from about 15 days old (down covered, just large enough for the leg to retain the band) to about 45 days old (fully feathered, nearly ready to fly). Each nestling was banded with an individually numbered metal band. The banding took place at colonies at Matthews and Boggy Pond wildlife reserves, and Te Hopai Lagoon, approximately one kilometre inland from the eastern shore of Lake Wairarapa (41° 16′ S, 175° 15′ E). All nests were in willows (*Salix* spp.) growing in the ponds and lagoon, with the nests being 1.5 to 8.0 metres above water level.

RESULTS AND DISCUSSION

Over the 14 years of this study, the earliest nestling was banded on 17 September and the latest on 4 December. Since nestlings were at least two weeks old when banded and incubation lasts 27-31 days (Marchant & Higgins 1990), egg-laying at the colonies must have occurred between early August to mid October. In contrast, at a colony near Lake Kohangatera, Wellington, about 30 km from the Wairarapa colonies, clutches were laid from April to August (Powlesland *et al.* 1993). Whether the later nesting season at the Wairarapa colonies relates to differences in diet, disturbances by waterfowl hunters' activities at maimais among the Wairarapa colonies just before and during the hunting season (April-July), or other factors is unknown.

Although every effort was made to minimize disturbance when banding nestlings, a few jumped from their nests to avoid capture. The proportion of these nestlings that survived is unknown, but the recovery of one of them suggests a few did. Nestling O-20901, large but only down-covered, jumped from a low nest and was last seen swimming and diving about 400 m out in the lagoon. It was recovered eight months later, fully feathered, about 16 km away. This finding indicates that it survived its premature swim, presumably by returning to, or nearby, its nest and continued to be fed by its parents.

TABLE 1 – Mortality factors of Black Shags banded in Wairarapa, 1976 to 1989.

Age	Found dead	Drowned in Net	Drowned in Crayfish pot	Shot	Road killed	Total
<6 months	9	11	-	1	-	21
>6 months	11	2	1	5	1	20
Total	20	13	1	6	1	41

Of the 490 nestlings banded, 41 (8.4%) had been recovered by July 1994, all dead. This recovery rate is much lower than that of Black Shags banded on Ynysoedd Gwylan in Wales, where 19.7% of 420 banded shags were recovered (Roberts 1985), and lower than for the whole of Britain where 23% of 8009 shags were recovered (Coulson & Brazendale 1968). Twenty (49%) of the Wairarapa shags were found dead of unknown causes (Table 1), four having died at the colonies before fledging. The largest number of explained deaths were of shags drowned in set nets in the wetlands of southern Wairarapa (32%). Proportionately more young (< 6 months old) were drowned in nets than older shags (Table 1, chi-squared test with Yates' correction, $X^2 = 10.57$, df = 1, $p < 0.01$). This suggests that Black Shags learn to avoid contact with nets. Adult-plumaged shags have been seen foraging amongst nets many times, with the birds surfacing about two metres from a net, flying over it and diving again (DS pers. obs.). Black Shags have been recovered dead from a variety of types of nets in other parts of the species' range (Coulson & Brazendale 1968, Roberts 1985, Carss 1993).

Fifteen percent of recovered birds from the Wairarapa colonies had been shot, one in March and the other five during the May-July waterfowl hunting season. Following the introduction of the brown trout (*Salmo trutta*) in 1867 and the rainbow trout (*Oncorhynchus mykiss*) in 1883 (McDowall 1990),

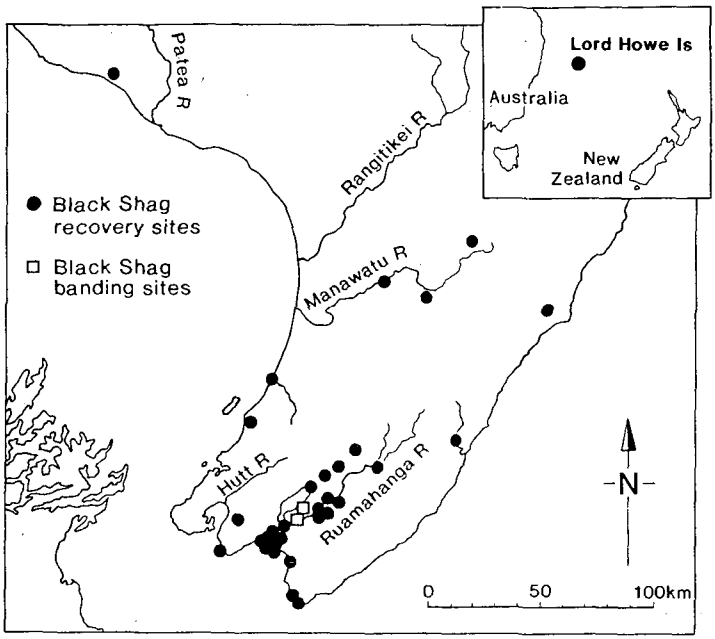

FIGURE 1 – Locations of Black Shag banding and recovery sites.

and the stocking of many rivers and lakes with these fish by Acclimatisation Societies, Black Shags, which eat trout, were outlawed. The societies paid a bounty for each shag killed, and between 1890 and 1940 Black Shag numbers decreased greatly and some colonies were exterminated (Stead 1932, Williams 1945, Stidolph 1971, Fleming 1982). The last of the banded shags recovered shot was found in May 1985, prior to the Black Shag receiving partial protection in 1986. Hopefully, the lack of further recoveries of shot birds is because indiscriminant shooting of Black Shags has ceased.

One unusual recovery was of a shag that had drowned in a crayfish pot at a depth of 12 m. Stonehouse (1967) studied the foraging behaviour of the Black Shag in the coastal waters at Kaikoura and found that it seldom dived in water more than three metres deep. Only nine (22%) of the Wairarapa Black Shags were recovered within 5 km of the nesting colonies, the rest dispersed mainly to the north and west (Figure 1). The most distant recovery was of a bird found on Lord Howe Island, about 2000 km from its banding location. This is the first evidence of the species crossing the Tasman Sea to Australian waters, and indicates that Black Shags cross the Tasman in both directions. There was an influx of Black Shags from Australia to New Zealand in 1976-77. Up to 49, all immatures, were seen at the Snares Islands from November 1976 to February 1977, a new species record for

the group (Sagar 1977). A nestling banded at Lake Menindee, New South Wales, Australia in July 1976 was found dead at Charleston, South Island, New Zealand in October 1977 (Anon. 1983). Recoveries of banded Black Shags in Britain and Europe indicate that the species disperses widely, especially during its first year of life (Coulson 1961, Coulson & Brazendale 1968, Cramp 1977, Roberts 1985). Similarly, the recoveries of shags banded in Wairarapa suggest that some individuals in New Zealand also disperse widely.

The youngest shag recovered was just 10 weeks old when it drowned in a set net, and the oldest was shot when 4.5 years old. The oldest known banded Black Shag, a European bird, lived to nearly 20 years of age (Cramp 1977).

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