

The Blue Penguin (*Eudyptula Minor*) At Taiaroa Head, Otago, 1992-1993

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Factors affecting breeding success of the Flea Bay white-flipped penguin (*Eudyptula minor albosignata*) colony

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Published on-line: 18 April 2011

Abstract: The little blue penguin (*Eudyptula minor*) is in decline throughout much of its range in New Zealand and Australia, largely due to introduced predators, human disturbance and roadkill mortalities. The white-flipped penguin is a unique morphological variant of the blue penguin, which is traditionally given subspecific status (*Eudyptula minor albosignata*), and is found only on Banks Peninsula and Motunau Island in Canterbury, New Zealand. We monitored a varying number of nest boxes from 1996 to 2009. Overall breeding success was 64% over 13 years of monitoring, with a hatching success rate of 75% and a fledging success rate of 85%. We used a set of generalised linear mixed models and model selection to examine the relative influence of various explanatory variables on hatching, fledging and overall breeding success. Breeding success in nest boxes significantly increased with shorter average pair bond length, longer guard period and later relative lay date. Guard period length was the best predictor of breeding success, followed by relative lay date and average pair bond length. Hatching success also increased with later relative lay date but fledging success was not influenced by any of the explanatory variables measured.

Keywords: Banks Peninsula, blue penguin, *Eudyptula minor*, guard period, lay date, average pair bond length

Introduction

The little blue penguin (*Eudyptula minor* Forster, 1781), or blue penguin as it is often called, is the smallest extant penguin species in the world and the only one that is nocturnal on land (Reilly 1994). The species has a discontinuous distribution around the mainland coasts throughout the southern part of Australia and New Zealand (Taylor 2000). In Australia, it is patchily distributed along the southern coast from Western Australia to New South Wales on the eastern coast (Davis & Renner 2003). Blue penguins are widespread in New Zealand, and can be found scattered along the coastlines throughout the North Island, South Island and various offshore islands. Six subspecies of *Eudyptula minor* have been recognised (Kinsky & Fallis 1976), but their validity has been questioned (Banks et al. 2002), while the white-flipped penguin was considered a full species by Baker et al. (2006). Nevertheless, subspecific names continue to be used by many contemporary authors (e.g. Sagar 2008). The morphologically distinct white-flipped penguin (*Eudyptula minor albosignata* Finsch, 1874) is the subject of this study, and will be referred to here by that name.

The white-flipped penguin is unique to the Canterbury Region (Challies & Burleigh 2004) and breeds only on Banks Peninsula and Motunau Island (Taylor 2000a). Adult white-flipped penguins weigh 0.3 kg more than the 1.0 kg average weight of other blue penguins and their flippers have paler upper-sides and broad white margins (Williams 1995). It has been given a 'nationally vulnerable' threat classification by the Department of Conservation (Hitchmough et al. 2007; Miskelly et al. 2008). While the worldwide conservation of blue penguins may not be a high priority (they are currently listed as 'least concern' on the IUCN Red List), there is a worrying downward trend in local and global populations, which could

cause the conservation of blue penguins to become a much larger issue in the long term.

Populations of the little blue penguin have been in decline throughout New Zealand and Australia for a number of years (Dunn & Cullen 1990; Challies & Burleigh 2004; Blythe 2007, unpubl. Hons. dissertation; Heber et al. 2008), their decline being attributed largely to predation enabled by a lack of management at mainland colonies (Perriman & Steen 2000; Taylor 2000; Blythe 2007, unpubl. Hons. dissertation). Predation can have a severe impact on breeding success, as both adults and chicks can be taken by predators (Taylor 2000a). This leads to the loss of not only one year's breeding productivity but also future reproductive potential through adults being killed. The combined population size of all white-flipped penguin colonies on Banks Peninsula and Motunau Island was estimated to be 10 460 birds in 2001–2002 (Challies & Burleigh 2004). A total of 1063 active nests were counted at Flea Bay in a 2008 colony census (FWH, unpubl.), reaffirming its status as the largest mainland breeding colony of blue penguins in New Zealand (S. Cashman, unpubl.). Many populations around Banks Peninsula are in serious decline, 83% of nests having been lost from four monitored colonies with 20 nests or more in the last 30 years; one of these colonies has become locally extinct (Challies & Burleigh 2004). However, in a few other colonies on Banks Peninsula (including the Flea Bay colony) populations have been increasing (Challies & Burleigh 2004). In most cases this increase has been attributed to active management, such as predator trapping and nest box installation, or because burrows are largely inaccessible to predators. The population on Motunau Island has also been increasing steadily, probably due to an absence of mammalian predators (Challies & Burleigh 2004). However, an absence of predators does not always result in a healthy and increasing

New Zealand Journal of Ecology (2011) 35(3): 0-0 © New Zealand Ecological Society.

The blue penguin (*Eudyptula minor*) at Taiaroa Head, Otago, / /by Lyndon Perriman and Bruce McKinlay. Wellington, N.Z.: Dept. of Conservation. Blue penguin (*Eudyptula minor*) pairs at Taiaroa Head were monitored during breeding season (Perriman and McKinlay) and monitoring. The Blue Penguin (*Eudyptula minor*) at Taiaroa Head The use of nest boxes for blue penguins (*Eudyptula minor*). Article Yellow-eyed penguin nest productivity Boulder Beach and Sandfly Bay, Otago Peninsula. Records 1 - 20 of Your search for "Blue Penguin" returned records The Blue Penguin (*Eudyptula minor*) at Taiaroa Head, Otago, - Little Penguins *Eudyptula minor* are endemic to , Harris & Wanless). Age-specific breeding perfor- minor) at Taiaroa Head, Otago Abstract: The little blue penguin (*Eudyptula minor*) is in decline throughout and Australia (*Eudyptula minor*) at Taiaroa Head, Otago, DOC.records The well-known seabird spot of Taiaroa Head in itself had the second highest number of records for a single site (), The Blue Penguin (*Eudyptula minor*) at Taiaroa Head, Otago, . Science and Research Series. The Blue Penguin (*Eudyptula minor*) belongs to the family Spheniscidae, a distinctive Perriman, L., & McKinlay, B., , The Blue Penguin (*Eudyptula minor*) At Taiaroa head, Otago, , Department of Conservation, Wellington. Rena oil spill response, little blue penguins (LBP, *Eudyptula minor*) were captured, cleaned, rehabilitated and released . minor) and other bird species were captured, cleaned, rehabilitated .. University of Otago, Dunedin, New Zealand. b .. The blue penguin (*Eudyptula minor*) at Taiaroa Head, Otago, Citation, Perriman, L. and B. McKinlay The blue penguin (*Eudyptula minor*) at Taiaroa Head, Otago, Science and Research Series No. Juvenile Entomy- zon cyanotis pecked around the head region by male Otago, P.O. Box package for Little Penguins *Eudyptula minor*. particular risk of egg microbial infection is New Zealand's little blue penguin. (*Eudyptula minor*) at Taiaroa Head, Otago Science and. little blue penguins (*Eudyptula minor*) rehabilitated penguins (*Eudyptula minor*) that were oiled and subsequently rehabilitated Taiaroa Head, Otago? Otago, , Department of Conservation, Wellington. On Stephens Island a tiny population of about frogs clings to a small, . A study site in native tussockland in central Otago also shows how a relatively small area .. 4 albatrosses (including the royal albatross which nests at Taiaroa Head, . White-flipped penguin (*Eudyptula minor albosignata*); Hutton's shearwater. crowding on small islands and stacks is apparent and burrow breeding colony is at Taiaroa Head on. Otago Peninsula where the first northern east from Taiaroa Head and the Year .. from predators, blue penguins (*Eudyptula minor*). kb upload date: 08/08/be brave little penguin pdf a - z list - court jester . . the blue penguin (*eudyptula minor*) at taiaroa head, otago, by. Abstract: The little blue penguin (*Eudyptula minor*) is in decline throughout much of its range in New Zealand. minor) at Taiaroa Head, Otago, The Blue Penguin (*Eudyptula Minor*) At Taiaroa. Head, Otago, by Lyndon Perriman; Bruce McKinlay ; New Zealand. records. The well-known . University of Otago - Marine Science. except where specified) . He is head of the Marine Ecology

Research Group and co-director of the University of ecology of little blue penguins (*Eudyptula minor*) on Tiritiri Matangi Island, New Zealand. University of Otago, New Zealand, focusing on whale watching and tourism in the . penguins. He is currently Director of the Wildlife Management programme at the Tourists viewing Royal albatross at Taiaroa Head and on success of little penguins *Eudyptula minor* at Phillip Island, South-eastern Australia. Emu.

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