Population Index of paradise shelduck and black swans in North Canterbury Region 2023

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Executive Summary

NCFG conducted annual aerial summer surveys of moulting paradise shelducks and black swans on January 24th, 2023. There were 4,470 black swans and 5,256 paradise shelducks counted. This is the second-lowest swan count in the last 27 years and the second lowest paradise shelduck count in the last nine years. Future surveys will incorporate aerial surveys and foot counts to reduce the costs of the survey.

Introduction

North Canterbury Fish and Game Council (NCFGC) is charged with the management of sports fish and game bird resources in the recreational interests of anglers and hunters. Under the Conservation Act 1987, the functions of each Fish and Game Council shall be to manage, maintain, and enhance the sports fish and game bird resource in the recreational interests of anglers and hunters, and in particular—

1) *to assess and monitor—*
    a. *sports fish and game bird populations*

NCFG staff conducted annual aerial surveys in 2023 to

1) Assess the population status of paradise shelducks and black swans
2) Assess historical survey methodology and inform future monitoring protocols

Methods

Aerial flights were conducted on January 24th with two observers, with one observer counting swans and the other counting paradise shelducks. Flights were conducted between 213 m and 350 m AGL. Voice recorders were used for counting birds. There were 26 locations surveyed (Figure 1).

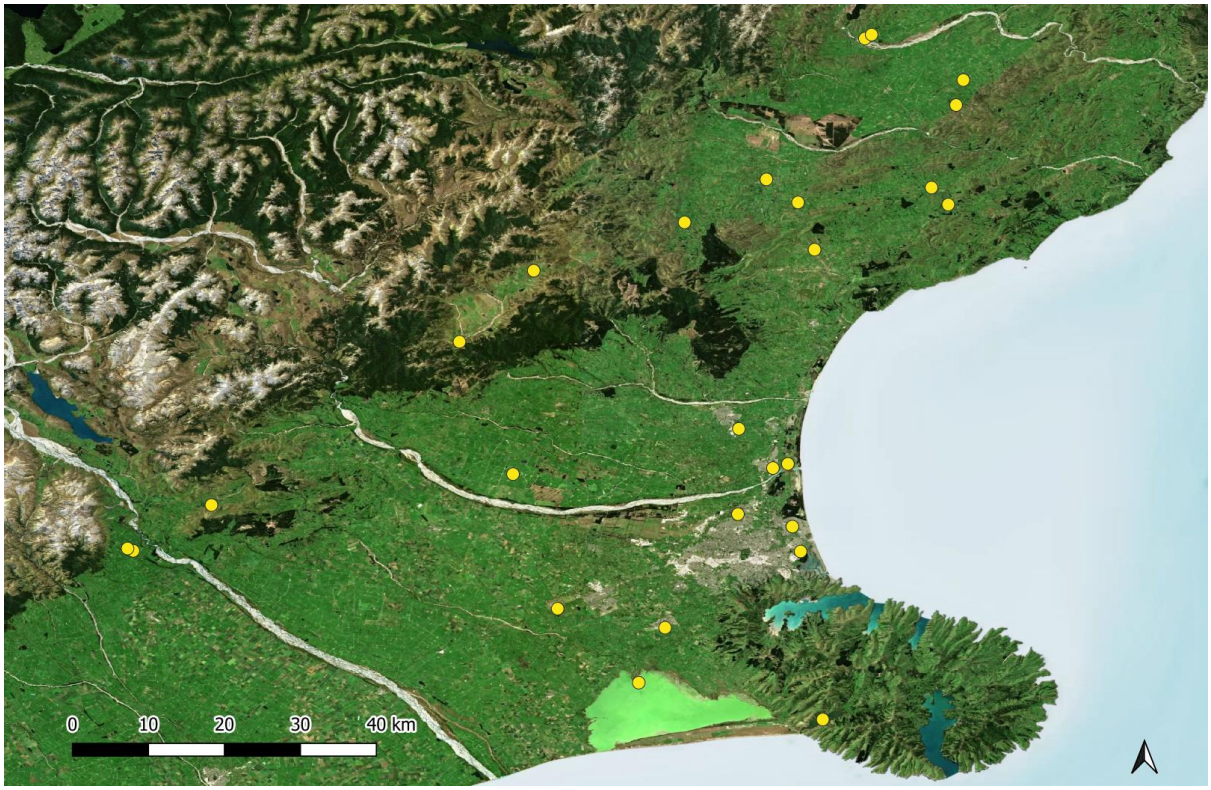

Figure 1. Paradise shelduck and black swan survey locations in North Canterbury, 2023.

Results

There were 5,256 paradise shelducks counted, 39% below the long-term average (Figure 2). A total of 4,470 black swans were counted, 25% below the long-term average (Figure 3).

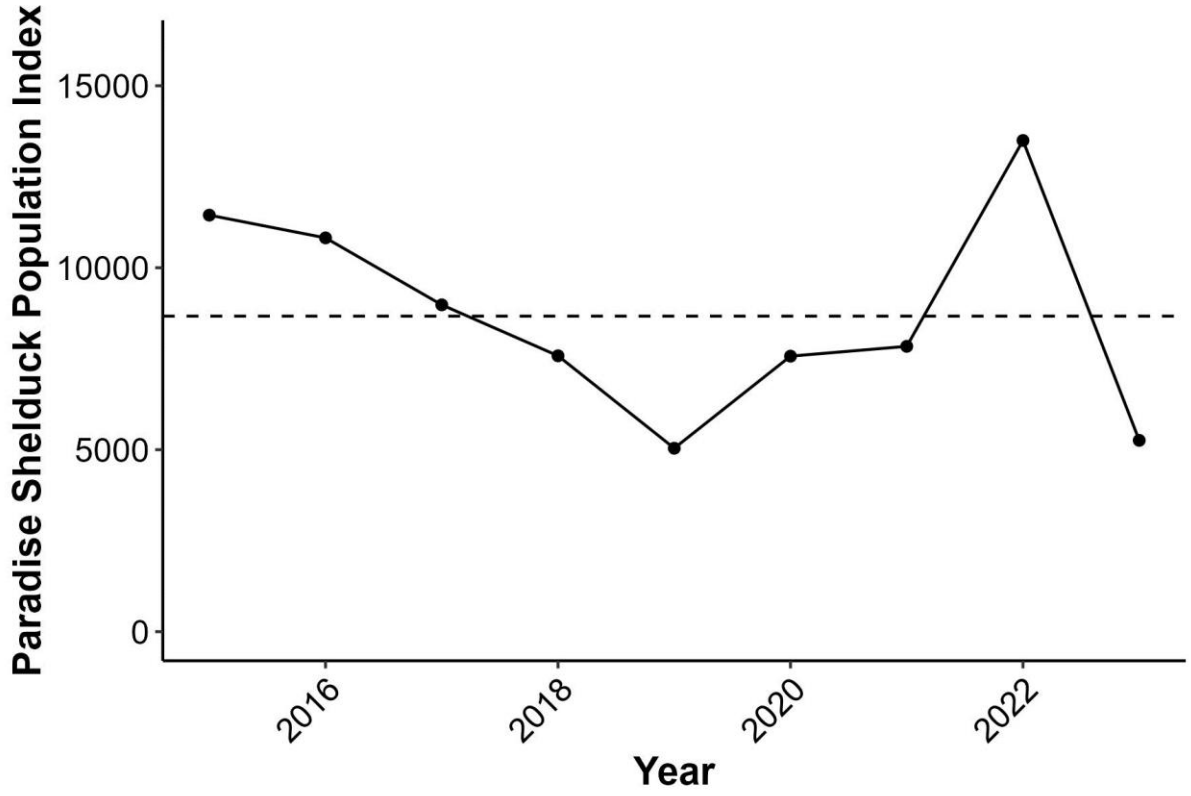

Figure 2. Paradise shelduck population counts of moulting birds 2015-2023.

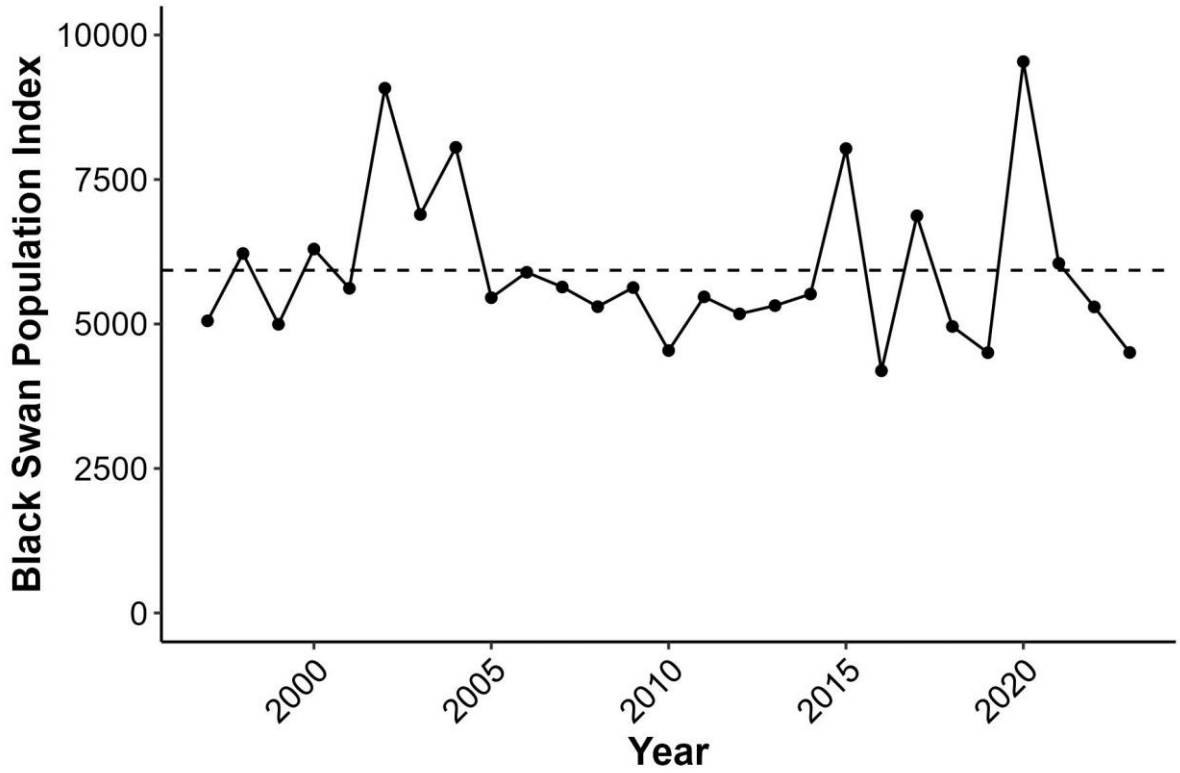

Figure 2. Black swan population index for North Canterbury 1997-2023.

Discussion

Population indices can provide important information for management; however, objectives and methodology must be clearly defined (Engeman 2003). The primary issue surrounding population monitoring is appropriate versus inappropriate experimental design and data analyses to achieve the investigators' objectives (Engeman 2003).

Surveys of congregated moulting birds are an effective method for sampling a portion of the population when the methodology is consistent, i.e., *when, where,* and *how*. Historically, this survey has been conducted across a wide range of survey dates spanning mid-January to mid-February, which is not conducive to sampling the same portion of the population. The number of sites surveyed also decreased from 110 locations to 26 locations in 2020. Wing moult in paradise shelducks takes approximately four weeks to complete; however, the chronology of wing moult varies in that sub-adults and failed breeders moult in January, and successful breeders moult in February and March (Williams 1979). Therefore, year-to-year comparisons are meaningless when the number of sites varies ***and*** survey dates vary over a month. This results in both different age classes of the population being compared and location bias data.

Waterfowl surveys are commonly flown between 30 and 150 m above ground level (Reinecke et al. 1992, Pearse et al. 2008, Ramsey and Fanson 2021). Undoubtedly, detection probability is negatively correlated with the height above ground level. Our surveys were flown at least 213 m and, at times, over 300 m above ground level. Detection of paradise shelducks at 300 m is near zero for birds swimming and loafing and will be unacceptably low for the much larger-bodied swans. The Christchurch City Council (CCC) conducts ground monitoring of waterbirds on Te Waihora (Ellesmere), Wairewa (Lake Forsyth), and wetland habitats in and around Christchurch City, which are all part of the NCFG aerial survey. These habitats encompass the majority of black swans in the North Canterbury region. Swan counts by NCFG are, on average, 48% lower than the CCC (Andrew Crossland, unpublished data), which is likely largely attributed to detection probability relative to the altitude surveys are flown.

Additionally, weather, observer experience, and time of day all affect the detection probability of waterfowl (Pagano and Arnold 2009, Yetter et al. 2016, Roy et al. 2022). Due to staff turnover, 2023 marked the first year of new observers, with flights occurring during particularly windy conditions causing motion sickness. These variables all would have had a negative effect on the number of detected waterfowl.

Management Implications

Due to the significant financial burden of flying surveys and the fact that most survey sites can be counted from the ground relatively easily, a mixed-mode survey is appropriate. Survey methodology going forward will need to be revised, primarily that Te Waihora (Lake Ellesmere) and Wairewa (Lake Forsyth) should be flown at a much lower altitude (150 m at most), and every other site should be counted from the ground to reduce total monitoring cost while increasing data quality significantly.

Further, monitoring by itself is important; however, because there are currently no specific population objectives or management frameworks in place, harvest regulations of paradise shelducks and black swans have historically not been informed in a consistent, scientific

manner. Developing clear objectives is essential for designing any population monitoring protocol (Witmer 2005). Population management plans need to be developed and implemented as soon as feasible.

Literature Cited

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