# Population Index of paradise shelduck and black swans in North Canterbury Region 2024

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**Executive Summary**

NCFG conducted annual aerial summer surveys of moulting paradise shelducks and black swans on January 24th, 2024. There were 7,338 black swans and 9,477 paradise shelducks counted. This was the first year of the mixed mode survey with some sites being counted from the ground and others from helicopter. Helicopter counts allowed flying all sites at lower altitude, which would have increased detection probability of birds.

**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 2024 to

1) Assess the population status of paradise shelducks and black swans

**Methods**

Aerial flights were conducted via helicopter January 24th with one observer. Flights were conducted between 300-500ft AGL. Voice recorders were used for counting birds. There were five sites across the region counted from the ground with binoculars and spotting scopes. There were a total of 14 locations surveyed (Figure 1).

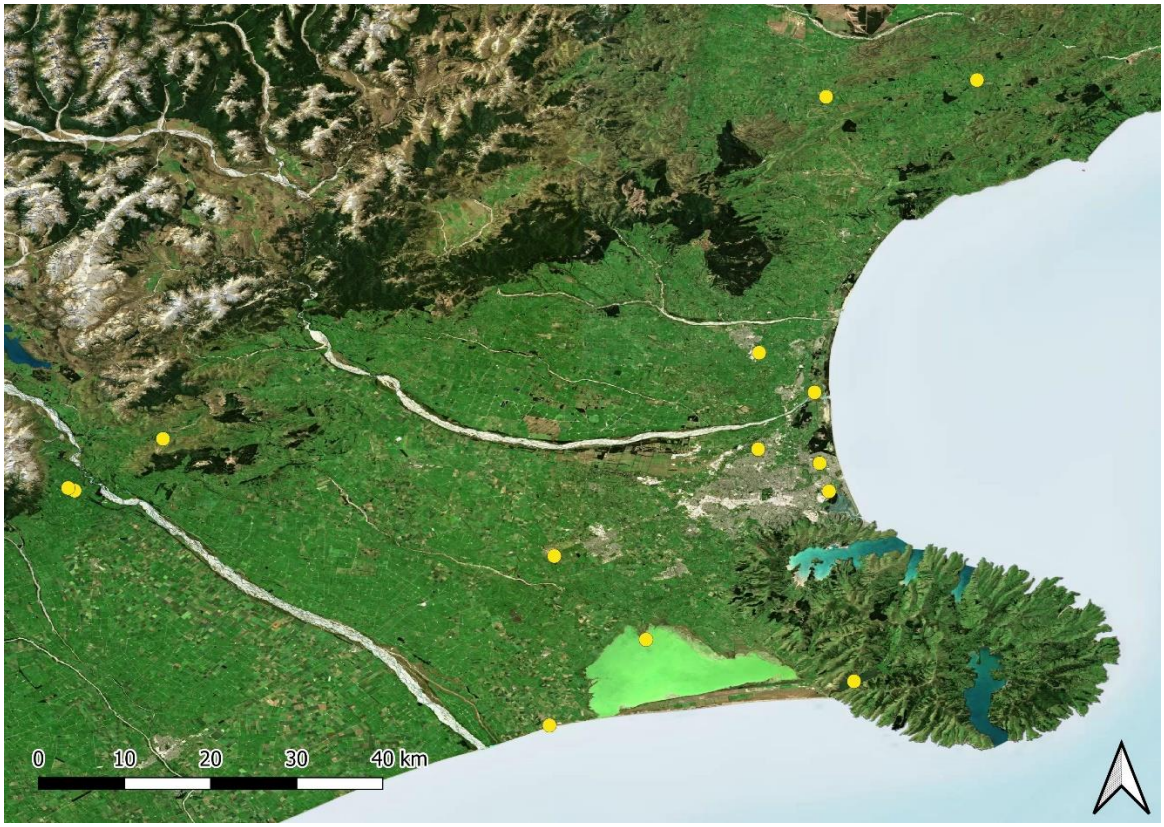


*Figure 1. Paradise shelduck and black swan survey locations in North Canterbury, 2024.*

**Results**

There were 9,477 paradise shelducks counted, 8% above the long-term average (Figure 2). A total of 7,338 black swans were counted, 24% above the long-term average (Figure 3).

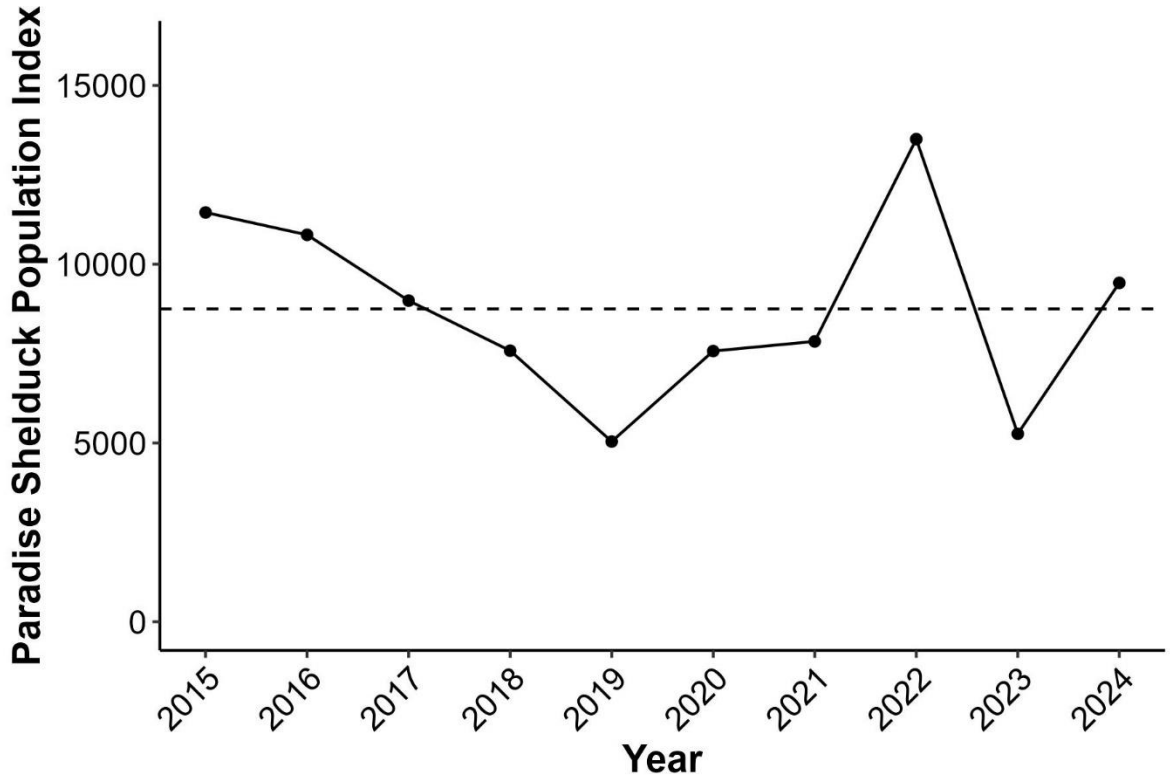


*Figure 2. Paradise shelduck population counts of moulting birds 2015-2024.*

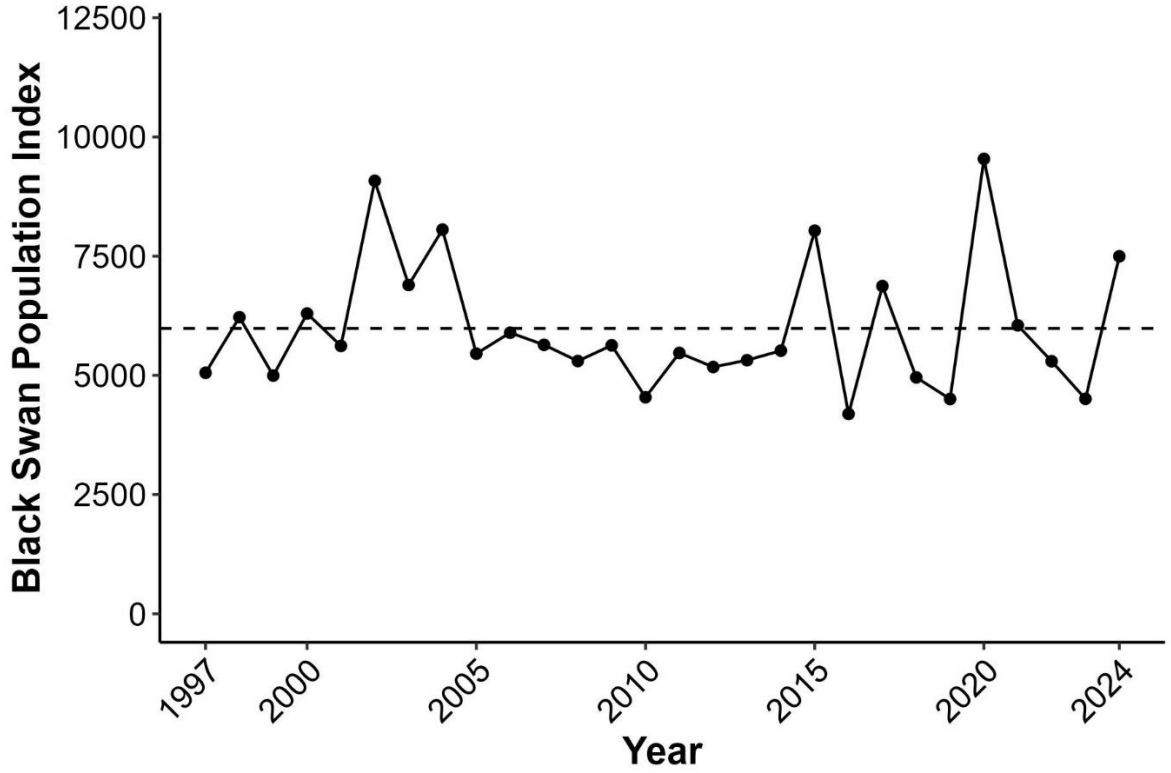


*Figure 2. Black swan population index for North Canterbury 1997-2024.*

**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. 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.

The number of sites surveyed surveyed decreased from 110 locations to 26 locations in 2020. It has been further reduced again in 2024 to 14 sites that have been consistently monitored over the life of the survey. When 110 locations were surveyed, the numbers of paradise shelduck counted were between 9,000 and 15,000. Estimates of paradise shelduck harvest in the region during the May-July season are typically between 10,000 and 15,000 birds (Fish and Game, unpublished data), with another 5,000 harvested during the summer season in February (Garrick and Sanders Garrick 2023). Assuming harvest rate is somewhere between 10% and 20%, the population of paradise shelduck in North Canterbury may be between 100,000 and 200,000 birds. It is a “leap of faith” to make generalisations to the greater population when the survey counts 5-10% of the population and also relies heavily on assumptions around population distribution and site fidelity (Mackenzie and Royle 2005, Barker et al. 2010).

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. In past years, 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 is unacceptably low for the much larger-bodied swans. The mixed mode method used this year of flying some sites with a helicopter and surveying from the ground is much more appropriate and fit for purpose than fixed wing flights flown at a much higher altitude.

**Management Implications**

This year marked the first year of flying the survey with a helicopter. Surveys were conducted between 90 m and 150 m height above ground level. There were also a number of sites surveyed from the ground. Wairewa (Lake Forsyth), Te Waihora (Lake Ellesmere), and the Bromley Estuary with the surrounding oxidation ponds encompass the majority of black swans in North Canterbury. Although the black swan count is up considerably from last year, this is mainly attributed to the change in methodology, not a population increase. This will need to be considered in the context of harvest management plans in place.

To properly inform harvest regulations and management, a more robust survey is needed. This will require quantifying paradise shelduck habitat across the landscape and a proper survey design to estimate total population size (Mackenzie and Royle 2005). A pilot for these works has been started in North Canterbury, and will be progressing over the next couple of years to replace current survey methodology.

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.

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