Estimating the distribution, population status and trends of New Zealand scaup (*Aythya novaeseelandiae*).

Summary Report, Brenda Greene, 25 June 2020

To date, New Zealand scaup population estimates have been based on observation, rather than direct counts. The aims of this paper are to 1) collate and explore changes in distributional records of New Zealand scaup (if any); 2) collate count data to estimate the population status and trends; 3) review the literature to establish potential key ecological and environmental factors; 4) carry out exploratory statistical analysis to determine any correlates between counts and environmental or ecological factors; 5) identify ecological and environmental data sets for further statistical modelling and 6) make recommendations for further research.

Data was collated from Classified Summarised Notes, eBird, iNaturalist, the OZNZ Bird Atlas, research and governmental organisations, the grey and published literature and individuals. As sampling biases of systematic and opportunistic data were similar, and eBird data was further explored.

To enable a national distributional and population estimate to be made, the total number of birds in eBird was tallied between 2008-2018 and mapped in ArcGIS. Ecological and environmental factors (e.g. water quality, disease, predation) that influence *Aythya* populations globally were summarised from the literature.

Counts were significantly positively correlated with count effort and more precise during autumn/winter. Taking into account the limitations of data accuracy, a suspected gender and littoral zone area bias, low count effort in some regions, the probability that in general counts (particularly at strongholds) have overestimated the number of birds, variability of weather conditions and a total count from collated data of fewer than 15,000 birds per annum (2008-2018) it is more likely that the New Zealand scaup population is closer to the estimated 5,000-10,000 birds (Marchant & Higgins 1990, Birdlife International 2016) than 20,000 birds (Heather & Robertson 2015).

Globally, *Aythya* populations are in decline, which is strongly correlated with water quality degradation and habitat loss. As similar environmental trends occur in New Zealand, the New Zealand scaup population is also likely to be in decline. Research into count methodologies, bird movement, gender, diet, predation as well as littoral zone quantity and quality (< 10 m deep) is required. Analytical tools such as spatial modelling also need to be developed and tested so that the value of New Zealand

scaup as an indicator species for shallow freshwater and coastal habitats can be further explored. There is value in testing aerial vs ground base count accuracy, particularly for large waterbodies and flocks.

To improve the accuracy and precision of counts, at a minimum, observers undertaking New Zealand scaup and other waterbird surveys must record the following information: site name (accurately named from Land Information New Zealand LINZ Gazetteer of place names), GPS location, Geographic name of area counted, observers name(s), date, start and stop times, temperature (°C), wind speed (knots) and direction, cloud cover (8ths), rain (mm), gender and age (adult or juvenile). It is recommended that all of these parameters be included as prompts in e-Bird.

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Photo: Michal Klajban

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