How many ducks is meant by “they’re everywhere”?*

Kristiansen Alix Marit Ingrid[1], Arnould John[2], Lens Luc[1] and Baylis Alastair[3]

[1] EcoBird, Ghent University, K.L. Ledeganckstraat 35 9000 Gent
E-mail: alix.kristiansen@ugent.be
[2] School of Life and Environmental Sciences, Deakin University, 221 Burwood Hwy, Burwood VIC 3125, Australia
[3] South Atlantic Environmental Research Institute, 845Q+797, Stanley FIQQ 1ZZ, Falkland Islands (Islas Malvinas)

In the global context of biodiversity loss and climate change, conservation has become a more crucial tool than ever. For conservation of a given species to be effective, a deeper understanding of its ecology is required. When detailed information is not available, stakeholders rely on simpler measures such as occurrence and abundance, as indicators for areas to prioritise.

An example of data-limited environment is the Falkland Islands /Las Malvinas (FLK). This archipelago, set 300 miles off South America, is of recognised importance for bird species. Amongst the species thriving on the coastal interface is the endemic, flightless, Falkland Steamer Duck (FSD; *Tachyeres brachypterus*). Because coastal areas globally are expected to be negatively impacted by sea level rise, coastal erosion and land-use, the need to understand the relationship between this habitat and the FSD is increasing. Yet, their locations, distribution and abundance around the coastlines of the FLK has rarely been studied (Augé *et al.*, 2018; Woods and Woods, 1997).

This study aimed to estimate both the occurrence and abundance of the FSD. A two-step approach was chosen; firstly, identify suitable habitats; secondly, identify areas of low and high use. To predict and map probability of presence throughout the FLK using presence-only data, we used the Non-Parametric Probabilistic Ecological Niche (NPPEN) model. To predict abundance, we tested three algorithms: General Additive Model (GAM), Boosted Regressive Trees (BRT) and Random Forest (RF). Both approaches relied on seafloor morphology variables, and distance to kelp and ponds. Land elevation, bathymetry and distance to kelp were the most important variables for our models. They predicted that the FSD was indeed expected to occur throughout the FLK coastline, though areas of low probability of presence were identified. BRT provided the best results, though correlation between observed and predicted abundance was only of 30%, and its estimates differed most from the two other models. The total breeding population throughout the FLK is predicted to be between 49,633 (BRT), and 51,000 (RF). These estimates are higher than previous studies but are in agreement with densities observed in the field. The low correlation suggests that unexplained variance exists and may be linked to environmental variables not included in the present study.

These findings confirm that FSD are ubiquitous around the FLK coastline. This information, especially the link to kelp forests and the fact that they live on the coastal interface, suggests that the species could be used as indicator for environmental change, both on the terrestrial and marine coastal ecosystems. Further research is still required to assess how sensitive this emblematic coastal waterfowl might be to climate change and human impact.

Keywords
Species Distribution Models; Conservation; Population Estimates; Sea Duck; Falkland Islands