



**3rd World Seabird Conference**  
**October 4 – 8, 2021**



**#WSC3**

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### **1A-F-26: Modelling density dependence in UK seabirds, in the context of population viability analysis**

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Population viability analysis (PVA) is a well-used approach for assessing how changes to vital rates will impact population dynamics, and is commonly used in environmental impact assessments to quantify potential threats to seabirds. These models typically do not account for density dependent regulation because the strength of these relationships is poorly understood. However, this omission is likely to influence the impact predicted by PVA, and thus compromise our understanding of seabird vulnerability to human activity. A small number of studies have demonstrated density dependent regulation in several species of seabird, however wider representation of the strength and direction of these relationships is lacking. In this study, we quantify the strength of density dependent regulation of breeding success in different species and populations of seabirds, addressing the likely bias in our understanding of its prevalence due to under-reporting of insignificant relationships. and examine how PVA predictions differ using five different structures for describing density dependent regulation. To do this we use long-term count and breeding success data collected from 30 populations and eight species of seabird that breed in the UK. We found evidence of positive and negative density dependent regulation that varied in strength and direction within and between species. Applying these relationship coefficients to theoretical populations of our study species using a pre-existing seabird specific PVA tool will allow us to measure the effect of differing strengths and models of density dependence on resulting rates of population change. Understanding the ways in which density dependence can be modelled in PVA and how it influences outcomes will facilitate more accurate environmental impact assessments for seabirds, and improve confidence in PVA findings.

### **G – Diet**

#### **1A-G-27: Trophic niche variation throughout the year in the opportunistic Kelp Gull at different trophic scenarios in Patagonia, Argentina**

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Changes in foraging strategies throughout the year are key determinants of seabird population dynamics. However, due to seabird post-breeding dispersal, year-round trophic ecology studies rarely focus on individuals from known colonies. Using stable isotope analysis ( $\delta^{15}\text{N}$ ,  $\delta^{13}\text{C}$ ) of blood and primary feathers, we tested during 2012 the trophic niche variation throughout the year in Kelp Gulls *Larus dominicanus* from three colonies in Patagonia, Argentina, located in areas with different availability of anthropogenic food subsidies. Isotopic niche width, measured using multivariate ellipse-based metrics, was wider at all colonies during the non-breeding season, suggesting that during this period gulls forage on a greater variety of food sources possibly related to post-breeding dispersal, seasonal changes in food resources, and/or the relaxation of central place foraging. Individuals from the colony with year-round availability of fisheries discards (Isla Vernaci) presented the lower isotopic niche width year-round compared to those from the other two colonies, one with discards only available during the breeding season (Punta Tombo) and the other with only open-air refuse dumps available all year-round (Punta



León). At Isla Vernaci, an abrupt expansion in niche width occurred later in the non-breeding season, after the start of a fisheries moratorium, suggesting that Kelp Gulls remained in nearby areas and partly associated to trawl fisheries between breeding events. Preliminary diet results indicate that most studied individuals from Isla Vernaci were feeding on demersal prey, only available from fisheries discards as Kelp Gulls are surface feeders. These results suggest that the availability of discards can greatly influence Kelp Gull foraging strategies and non-breeding movements, and that changes in niche metrics can be context dependent. Future studies should complement the assessment of niche variability with studies of diet composition throughout the year.

### **1A-G-28: Sexual segregation in the diet of the dimorphic Imperial Cormorant breeding in northern Argentine Patagonia**

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Knowledge of sexual differences in diet composition is key to properly understand aspects of seabird life history, their role in marine food webs, and how human activities such as fisheries may differentially affect individuals of each sex. We assessed differences in diet composition between male and female Imperial Cormorants (*Leucocarbo atriceps*) breeding at Islas Blancas (44°46'S, 65°39'W), Argentina. Imperial cormorants show sexual size dimorphism, with males being 18% heavier than females. We obtained stomach samples through induced regurgitation from 60 adult individuals, 10 of each sex during three stages of the breeding cycle (incubation, small chicks and large chicks) in 2019. At least 11 and 28 prey taxa were recorded in stomach samples of males and females, respectively. Females consumed a greater diversity of prey species and a significantly higher number of prey items per stomach content. A two-way crossed analysis of similarities showed significant sex differences in diet composition in terms of numerical frequency along the breeding cycle. Males mainly consumed demersal species, with Argentine Red Shrimp *Pleoticus muelleri* (43.6%) and Argentine Hake *Merluccius hubbsi* (35.9%) being the main prey during incubation, and hake (>77%) the dominant prey during both chick rearing stages. Females preyed upon benthic species mostly inhabiting rocky reefs. Prey with higher representation in the diet in the three stages analyzed were the fishes *Patagonotothen* spp. (30.84%, 36.43% and 19.37%). Results show a clear sexual segregation in the diet of Imperial Cormorants, in agreement with studies in other dimorphic seabirds, and also suggest that sex differences reflect the spatial segregation in feeding behavior of male and female individuals. Males and females may be playing different roles in coastal food webs and may be differentially affected by coastal trawl fisheries as hake and shrimp are their main target species.

### **1A-G-29: Geographical and temporal variation in the diet of Bank Cormorants *Phalacrocorax neglectus* in South Africa**

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Geographical and temporal variation in the diet of Bank Cormorants *Phalacrocorax neglectus* in South Africa BM Dyer<sup>1</sup>, J Cooper<sup>2</sup>, RJM Crawford<sup>1</sup>, RB Sherley<sup>3</sup>, S Somhlaba<sup>1</sup>, A Cockcroft<sup>1</sup>, L Upfold<sup>1</sup>, AB Makhado<sup>1,4</sup> <sup>1</sup>Department of Environment, Forestry and Fisheries, Cape Town 8000, South Africa <sup>2</sup>Department of Botany and Zoology, Stellenbosch University, Matieland 7600, South Africa <sup>3</sup>Environment and Sustainability Institute, University of Exeter, Penryn, Cornwall, United Kingdom <sup>4</sup>