

European ducks in a changing world: human impacts, population processes and species interactions

On the 7–11 April 2015, ca one hundred duck researchers from all over Europe and beyond gathered at the 4th Pan European Duck Symposium in Hanko, southern Finland, to present and discuss ongoing research. We encouraged the delegates to submit their research to *Ornis Fennica*, which offers free open access, with the aim to gather the resulting publications in one issue, applying the usual rigorous external peer review process and acceptance criteria.

We ended up with seven accepted articles (six original articles and one review), all edited by the Guest Editors and Editor-in-Chief. Here, we identify some shared foci of interest, providing guidance as to where to direct future waterfowl research efforts in Europe.

Responses to anthropogenic impacts

Many European duck populations are currently declining, and 56% of the duck species are red-listed in the EU (BirdLife International 2015). Populations are increasingly exposed to multiple anthropogenic impacts, including habitat change, hunting, and management actions.

One understudied large-scale anthropogenic influence on European ducks is the release of hand-reared ducks for hunting purposes, which is particularly common in Mallards (*Anas platyrhynchos*). Comfortingly, Champagnon *et al.* (2016) show that wild Mallards are fairly safe from hunting, while their captive-reared counterparts are more susceptible. In fact, the release of captive-bred Mallards may have allowed the current increase in Mallard harvest in southern France without reducing overall population size.

Less encouraging is the report by Fox *et al.* (2016a) analysing changes in the north-western European flyway wintering population of Eurasian Wigeon (*Anas penelope*). This study shows

that the population has recently decreased primarily due to poor productivity, associated with the summer weather conditions in northern Europe. As emphasized by Fox *et al.* (2016a), robust projections of species' responses to anthropogenic change rely on access to reliable bag statistics, such as the national Danish wing survey, which has been used for estimating annual sex and age ratios of shot waterfowl. To validate these data, Fox *et al.* (2016b) compare bag statistics against field observations of live birds. They find no major bias in the sex/age ratio of the kill relative to field data in the middle part of the season, indicating the utility of this data for inferring historical reproductive success in many quarry duck species.

Interspecific interactions shaping waterfowl population dynamics

Species interactions underpin the long-term sustainability of populations, yet they have largely been ignored in conservation biology (Soulé *et al.* 2005). Indeed, as becomes evident in the present issue, we may often need to go beyond single-species population dynamics.

Lehikoinen *et al.* (2016) analyse the population dynamics of alpine-breeding ducks and waders in Finnish Lapland, showing that wader breeding numbers reached a peak towards the end of the rodent cycle. This agrees with the hypothesis of less predation pressure on alternative prey (birds) in peak years of rodents – the main prey of many northern predators. In the study by Väänänen *et al.* (2016), the results stress the importance of viable colonies of small gulls, aggressively defending their offspring against predators, for the breeding success of ducks in Finnish boreal wetlands. Most duck species studied actively preferred the brood defence area of small gulls during brood rearing. The importance of both positive

and negative direct interspecific interactions is also shown by Kurvinen *et al.* (2016). In their study, the reasons behind the recent large-scale decline of Eiders (*Somateria mollissima*) in the Baltic Sea (Ekroos *et al.* 2012) were analysed based on island-level patterns of population change in the Archipelago Sea. On the one hand, they recognize important positive effects of nesting larids on Eider breeding numbers, mediated by their aggressive nest defence. On the other hand, however, they also report a negative effect of breeding White-tailed Sea Eagles (*Haliaeetus albicilla*).

As reviewed by Nummi *et al.* (2016), the spectrum of interspecific interactions affecting ducks may also involve taxonomically distant species, which has largely been ignored by extant research. In this review, the authors analyse the impact of duck–fish competitive relations in boreal lakes, as both taxa rely on the same invertebrate prey. They found that ducks foraging in open water are more strongly affected by fish competition.

Lessons learnt and challenges ahead

The contributed papers emphasize the need to develop adaptive management plans for duck populations. Essential in developing such plans is the need to ensure the availability of long-term demographic data, which are currently in short supply. Towards this end, a vital step will be to link together the heterogeneous pieces of data to larger integrated population models that can be used for assessing, e.g., species' extinction risks. This endeavour should take into account climate forcing on duck populations, the apparent impacts of other species, as well as the possible interactions between these two. Reaching these objectives is not easy, as “shortcuts” to increase population sizes, such as releases of captive-bred individuals, cannot replace more labour and cost-intensive management of habitats for ducks (Champagnon *et al.* 2016). As the breeding and wintering distributions of these species change, the current monitoring schemes as well as management plans for European ducks may also need to be revised (see also Elmberg *et al.* 2006).

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