'Short-stopping' unwrapped

Shifting distributions: what do we know and not know, and how best to describe them?

'Short-stopping' has become an increasingly familiar term in ecology to describe spatio-temporal changes in occurrence of migratory species. Spurred on by the insight that it is now being used in a variety of contexts, Elmberg e*t al.* (2014) reviewed its use in avian ecology. A literature search yielded 59 papers explicitly referencing short-stopping in birds, most of them published in peer-reviewed journals. Well-cited examples spearheaded by WeBS data and which represented the vanguard of northwest European research in this field include Austin & Rehfisch (2005) and Maclean *et al.* (2008).

'Short-stopping' was first used in 1967 to describe a northward shift in wintering Canada Geese in North America, and has been used with increasing frequency since then. Geese continue to dominate the associated literature, which is so far confined to the northern hemisphere. Short-stopping has been used to describe three basic phenomena: (i) a shortened autumn migration that results in a wintering distribution closer to breeding areas, (ii) a shortened spring migration that results in a breeding distribution closer to wintering areas, and (iii) a delay in autumn migration that leads to a perceived reduced abundance in some part of the winter range.

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▲ **European White-fronted Geese: 'short-stopping' or 'shifting range'?**

Elmberg e*t al.* (2014) advocate that the term 'short-stopping' be used only to describe range shifts that involve shortening of the migratory corridor, and that they are qualified explicitly by season (i.e. breeding or winter) and degree (i.e. full or partial range shift). In other cases of breeding, wintering or entire range shifts where the migratory corridor is elongated or remains the same, it is recommended that the term 'range shift' is used, qualified by season, geography and orientation (i.e. the direction of the range shift). There is the need for spatially explicit avian count monitoring mechanisms (rather than capture–recapture or hunting bag data), designed specifically to track changes in distribution in the future.

The consequences of climate change for bird populations have received much attention in recent decades, yet comparatively little has been written on ducks (*Anatidae*) despite them being major elements of wetland diversity. Guillemain *et al.* (2013) reviewed the major known consequences of climate change for birds in general, and related those to the limited information available specifically for ducks.

Climate change can influence migration distance and phenology, thereby potentially affecting patterns of mortality, as well as distribution and reproductive success in ducks. Studies addressing effects of climate change are, however, restricted to a limited number of duck species, most recently through collaborative research led by Lehikoinen *et al.* (2013) and Pavon-Jordan *et al.* (2015) (see pages 14-15). Although shifts in duck distributions have been observed, the mismatch hypothesis (mis-timing between the periods of peak energy requirements for young and the peak of seasonal food availability) has received very little attention (or support) when it comes to ducks.

In order to fill these gaps, Guillemain *et al.* (2013) and others propose a range of monitoring initiatives, including population surveys, breeding success monitoring schemes and individual duck marking, all of which should later be integrated through population modelling and adaptive management methods.

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