

Behavioral plasticity of Wood pigeons in migratory and feeding strategies

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BACKGROUND

The Common Woodpigeon (*Columba palumbus*) is a polytypical species with a Palearctic distribution, occurring throughout Europe, except in northern Scandinavia and Russia (Fig. 1). The migratory status of the species differs according to the latitude, with a northeast/southwest gradient, in connection with the duration of snow cover on the ground and the winter temperature. It therefore employs three migratory strategies (strictly migratory, partially migratory and sedentary) throughout its European breeding areas. Individuals migrating from northern and central Europe to France and Iberia may take three main routes based on banding data and naturalist observations (Fig. 2). Over the past twenty years, the number of Wood pigeons has continued to grow, as evidenced by the results of counts carried out in southern Sweden and Belgium (see Fig.2). On the other hand, the numbers of individuals crossing the Pyrenees to winter in Spain and Portugal did not increase significantly. We have therefore tried to understand the reasons behind these observed changes.

Figure 1. Geographical distribution of the Woodpigeon *Columba palumbus* (see map for explanation of the colors).

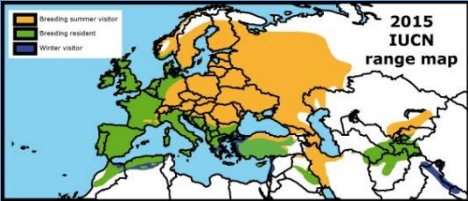
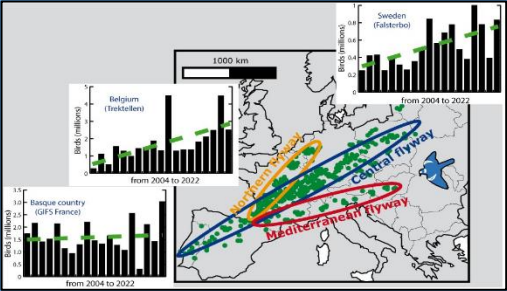


Figure 2. The different routes taken by migrating populations of Wood pigeons in Europe. Short-term terms in the population sizes of birds leaving Sweden, crossing Belgium and crossing the Basque mountains are highlighted.



METHODS

Migration strategies - While the ringing data had provided some elements to identify the different behaviors used by Wood pigeons, many gray areas remained. In partnership with the University of Giessen, we conducted a study on the migration strategies used by individuals breeding in Central Europe (Germany) and South-West Europe (Portugal, France) taking into account seasonal environmental variations (Schumm *et al.* 2022). To this end, satellite data from individuals equipped with Argos trackers were analyzed precisely. Of the sixty birds captured and then fitted with Argos trackers, only those that provided multi-year data were retained.

Food resources - The Woodpigeon is an herbivore, specialized on seed consumption. In agricultural fields, it consumes a wide variety of wild seeds, grains of crops, as well as sown seeds, potentially causing damage. It also eats the green parts of different plants and, in the forests, different fruit of forest trees. Other items such as earthworms or snails can also be ingested. For many animals, birds in particular, access to food is an essential factor behind the decision to migrate or not. We therefore studied the composition of the diet of migrating and wintering Wood pigeons from birds collected by hunters in southwestern France (Négrier *et al.* 2021). Inguvies contents were recovered, macroscopically and microscopically identified, and then weighed before and after drying.

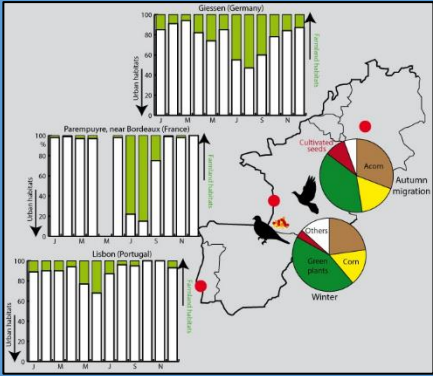


Figure 3. Bar charts showing space occupancy of Wood pigeons at three sites, by month (from January to December); and diet pie charts of Wood pigeons during their fall migration and wintering in south-western France. The main bird wintering area is also shown on the map.

RESULTS

Migration strategies - Tracking data provided information on migratory behavior in consecutive years, clearly showing that individuals may switch migratory strategies (resident vs. migrant) between years, *i.e.* are facultative partial migrants. These variable behaviors can result in annual fluctuations in the number of migratory and resident individuals (see Fig. 2). While individuals from Portugal mainly stayed within a large green urban park year-round, Wood pigeons from the city of Giessen (Germany) regularly left the urban area to forage on surrounding farmland, particularly from July to September (Fig. 3). In Paremputre (France), birds occupy the contiguous agricultural areas mainly in July and August. They join the urban spaces at the opening of the hunting season, which takes place on the second Sunday of September.

Food consumption - A total of 762 Wood pigeons were collected from local hunters and then analyzed in the laboratory. Most frequent food groups were "green plant material", acorns and corn (Fig. 3). In terms of grams of dry matter, the most important food in the crop content were acorns. Cultivated seeds contributed to the diet more during migration ($p = .007$), while "green plant material" and others more during wintering ($p = .011$; $p = .004$).

CONCLUSIONS

Overall, the results highlight the behavioral plasticity of wood pigeons in migratory strategies, across individuals and populations. Therefore, the very significant inter-annual variations highlighted by the monitoring of trans-Pyrenees migration carried out by our studies could be linked, at least in part, to the different migratory strategies adopted by the birds, which can vary dramatically from one year to the next.

On another side, it seems that accessibility to food resources is also an important factor in the decision to stay or migrate. At this level as well, Wood pigeons are particularly opportunistic in terms of the use of its habitats, at all latitudes and in all seasons. Results confirm the opportunistic nature of the Woodpigeon, balancing its diet according to food availability. Recent studies confirm our findings, with wood pigeons even consuming cherries in urban settings (Fazekas 2023).

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