

## Symposium 31 Bird population explosions in agro-ecosystems: common factors in case histories

### Introduction

Enrique H. BUCHER<sup>1</sup>, Ronald RANVAUD<sup>2</sup>

1. Centro de Zoología Aplicada, Universidad Nacional de Córdoba, Córdoba, Argentina; buchereh@si.cordoba.com.ar

2. BMB-Institute for Biomedical Sciences, University of São Paulo, 05508-900 São Paulo, Brazil; ranvaud@usp.br

Explosions of particular bird species in agro-ecosystems is a common phenomenon throughout the world. Well known cases include the eared dove (*Zenaida auriculata*) in South America, European starling (*Sturnus vulgaris*) in Europe, North America and Australia, and quelea (*Quelea quelea*) in Africa. In most cases, such birds are considered pests by farmers, who commonly call for control measures. Understanding the factors underlying these population outbreaks, therefore, has important practical implications.

Bird explosions in agro-ecosystems are closely associated with changes in land-use or crop technologies. Being amongst the most drastic and widespread alterations imposed by man on the natural environment, these changes may also be viewed as large-scale experiments in habitat and food supply change. Unfortunately, proper studies at this level are very difficult, since it is virtually impossible to systematically manipulate whole landscapes. For the present at least, the only alternative is to accumulate corroborated evidence from repeated observations for different species in different regions and at different times. Although somewhat unsatisfactory, it is often the only practical approach at the scale considered here.

This symposium follows this approach by analyzing several case histories for different species from different regions of the world. Historical cases of eared dove explosions in South America are reviewed, as well as its novel irruption in São Paulo, Brazil. The symposium also canvassed the quelea problem in Africa, population changes of the European starling in Great Britain, and the effects of habitat change and agricultural development on crane populations in India.

Enrique Bucher and Ronald Ranvaud found that historical eared dove outbreaks in South America appeared in areas where agricultural frontiers expanded into previously forested areas, particularly wherever sorghum became the main crop. A significant increase in food availability from sorghum crops, wasted grain, and weed seeds catalyzed a rapid population increase and a shift in breeding habits from isolated to colonial nesting in remnant forest fragments. This generalized model, developed from explosions studied in semi-arid regions, was confirmed in Ranvaud and Bucher's

analysis of a completely new situation in São Paulo, Brazil, where, under more humid conditions, eared dove colonies are establishing themselves in sugar cane plantations.

In the case of the starling in Britain, Robert Robinson and colleagues found that for this formerly very abundant species, food supply is a key determinant of local population density, mostly through its effect on first year winter survival. Recently declines in farmland populations have been associated with large scale changes in the management of both pastoral and arable systems, including a greater spatial separation between the two. Although decline has been driven largely by the drop in food in winter, the farmland population may have also been limited by the numbers of nest sites in woodlots, also drastically reduced by recent changes in land-use.

According to Clive Elliot, on the other hand, cycles in quelea populations appear to occur independently of agricultural change, populations fluctuating primarily according to rainfall in their breeding areas. There is no evidence of a population explosion and little evidence even to support any general trend towards increasing population levels other than temporary irruptions, despite repeated claims to the contrary. A completely different situation arose when irrigation programs created new wetlands associated with croplands, which provided both appropriate habitat and increased food for aquatic birds, as detailed by Aeshita Mukherjee for India.

The general conclusion drawn from the symposium was that land management, through its impact on food availability and breeding habitat, explains most of the bird explosions known. This generalization, however, clearly does not apply to species whose habitat is only marginally encroached on by agro-ecosystems, as in the case of African quelea. Attempts at lethal control, by whatever means, commonly have negligible impact because such mortality usually falls within the compensatory range. The factors and principles underlying population explosions also underpin population declines in agro-ecosystems, a situation that is becoming increasingly common as technology reduces grain spillage and weed abundance to a minimum while habitat becomes more and more uniform.