What Makes a Meadow Bird a Meadow Bird?

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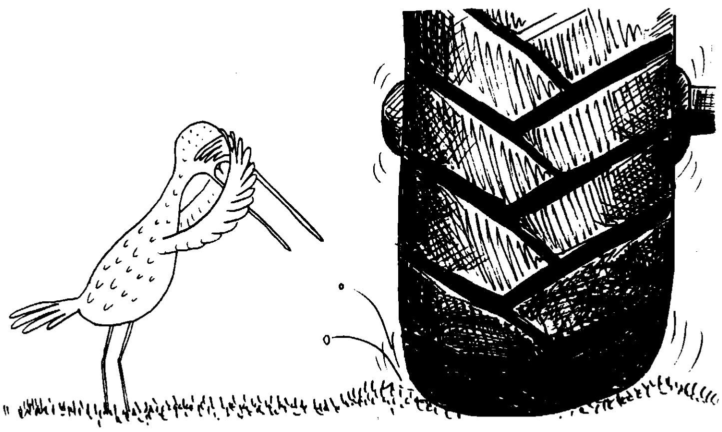
Although nothing really new is presented here, and *WSG Bulletin* readers may already be familiar with most of it, I would like to put things a bit together once more, to give a more distant look at the whole meadow bird phenomenon, putting it in a wider perspective. This may help to let all sorts of bits and pieces of meadow-bird work fall into place.

A meadow bird can be defined as a bird breeding in meadows (or agricultural grasslands in general), which may appear an irrelevant statement. We have to realize that farmland is a very recent phenomenon, from an evolutionary point of view. All species concerned must have moved in from other (natural) habitats, where they still can be found. The phenomenon is not confined to Europe.Southern Lapwings *Vanellus chilensis* in South America are found amongst Frisian cows on farmland, in a very similar way. Cultivated meadows in Minnesota, USA, may have a surprisingly Frisian look, not only because of the cattle, but also because of Snipe *Gallinago gallinago* drumming in the air and screaming godwits, in this case the Marbled Godwit *Limosa fedoa,* sitting on fence poles. The North American meadow bird community is as varied as the Dutch and includes many wader and duck species, but a far greater proportion of the meadow bird populations are still to be found in natural grasslands (Beintema 1986a). The transition of natural grasslands into farmland may be a very gradual one, *e.g.* when cattle replace bison, and the distinction between the two may not even always be clear. The transition may also be very abrupt (*e.g.* ploughing up, reseeding, arable farming), in which case it can be classified as habitat destruction. Natural grasslands in Europe have practically disappeared. On the other hand, deforestation, draining of marshes, *etc.*, have created much new grassland. Thus, in Europe a very large proportion of the meadow bird population is at present nesting in farmland. In the nominate subspecies of the Black-tailed Godwit *Limosa l. limosa*, this is true for practically the entire population.

Initially, agriculture (fertilization) was of benefit to waders, but only where climatic and soil conditions permitted it. Conditions have been particularly favourable in the Netherlands, especially on soggy soils, kept wet by our humid climate. Maintainance of wet conditions through the nesting season helps to keep early cattle and machines out, in spite of high fertilization levels, and it guarantees good feeding conditions for chicks. One can find fine looking meadows with lots of feeding waders in winter and early spring, in places like northern Tunisia, Italy, and southern California. But later in spring these meadows have dried out, and almost no nesting waders are to be found.

In a secondary phase, agricultural intensification has turned out bad for the birds. In fact we have to recognize two counteracting forces: intensification results in potentially higher bird densities due to an increase of macrofauna biomass, but at the same time the probability of producing offspring is reduced due to the accompanying management activities (trampling, mowing). Thus, we can define a minimum level of agricultural intensification required to let the process of meadowbirdification bloom, versus a maximum level tolerated, above which things go wrong. In a historical sense, assuming an ever increasing farming intensity, this will be equivalent to the rise and fall of the meadow bird era, when these two limits are surpassed. We know a lot more about the fall than about the rise, because the rise has mostly taken place in the past when nobody was concerned about meadow birds. Various aspects of the 'fall' have been studied in detail, and the different bird species appear to differ considerably in their susceptibility. Accordingly, they can be ranked on a 'vulnerability scale' (Beintema 1983). There is a tendency for larger birds to fall into the category of less vulnerable birds. We can speculate about the 'rise'. Suppose the big birds need bigger



prey in larger quantities to be able to nest. If so, they would require higher levels of management intensity (fertilization). In the historic sense, this would mean a later rise of the population. Godwits have increased as recently as the late 1940s or early 1950s, the heavier Oystercatcher *Haematopus ostralegus* started to breed on meadows in the 1950s and 1960s, and now we see the heaviest of all, the Curlew *Numenius arquata*, moving into the scene in the 1970s and 1980s. Thus, each species has its own range of tolerance, as shown in Figure 1. The highest densities should be reached just below the upper limit of tolerance. Beyond that limit, populations must decline due to insufficient recruitment. This seems already to be the case in many agricultural areas today.

Interestingly enough, many population studies in many European countries have revealed insufficient reproduction to allow for a sustainable population. It might even suggest the idea of a

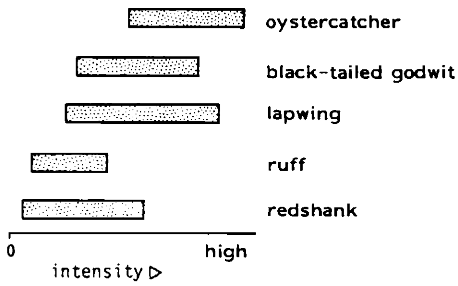


Figure 1. Preference and tolerance of meadow birds for intensity levels (arbitrary) of agricultural management. Alternatively, the intensity scale can be seen as an arbitrary time scale.

huge ecological trap that should not be allowed to exist (Witt 1986), where all the poor birds coming from good (natural) habitats are trapped. From now on, I shall define 'good habitats' as A-land, and a 'bad habitat' (ecological trap) as B-land. Suppose there would only be A-land, producing among other things a surplus of nonbreeders. What would happen if these were offered an unlimited resource of B-land? If the B-land were so bad as to allow no reproduction at all it would not make a difference: the birds might just as well have stayed in their nonbreeder flock on the sand bank. However, if the B-land allows for half the reproduction that would be needed to sustain a population (so in B

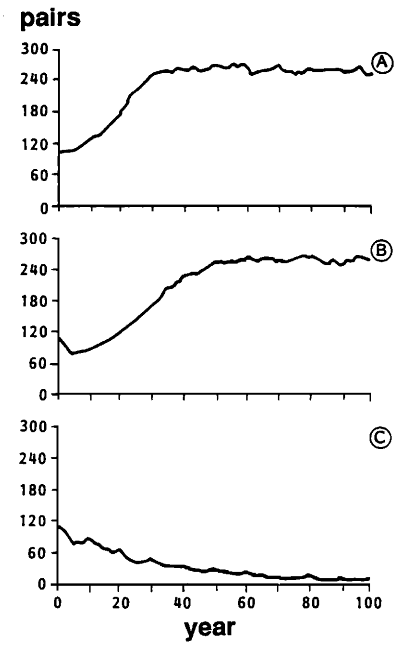
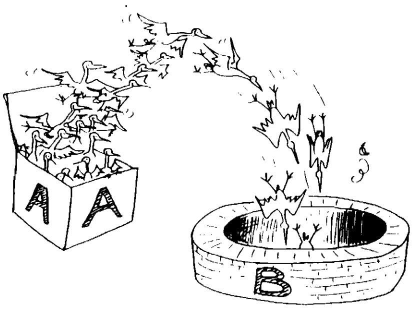


Figure 2. Population trends in combinations of 'A' and 'B' land; a) starting with high densities in 'A' and low densities in 'B'; b) starting with low densities in 'A' and high densities in 'B' (switching properties of A and B); c) switching A and B properties every 10 years.



alone a population would go extinct), the total population (A+B) may be almost doubled, depending on how well the performance is in A (Beintema 1986b). Thus, the role of B-land (and we have got a lot of that!) in sustaining large populations of meadow birds should not be underestimated. Of course, one must realize that the whole system depends on what is going on in A-land. If you take A away, the populations in B will become extinct. An interesting exercise is to simulate the development of numbers in different A-B combinations, using a simple population model, especially when parameters like site fidelity are also incorporated (Spaak 1988). An illustrative example is how one can allow a stable A-B combination to become extinct by switching the A and B proportions of the land every ten years (Figure 2). If A-which-has-become-B had higher bird densities than B-which-has-become-A, and the rate of decrease in the former is of the same order of magnitude as the rate of increase in the latter, there will be an initial net loss of numbers in the years following the switch, and the next switch may just come before recovery starts. If switching stops, there will be total recovery. A-B-switching has become a common phenomenon in modern farming.

This concept of A and B is very useful in designing measures for nature management and conservation, by zoning areas, always aiming at a nucleus of A (A should always be a reserve). Also, considering the differences in range of tolerance one should realize that the qualification A or B not only depends on the properties of the land, but also on the properties of the bird species. So, an A-place for Lapwing *Vanellus vanellus* can very well be already a B-place for Ruff *Philomachus pugnax*. Again, this concept is useful in designing conservation measures. For instance, one could never hope to obtain enough reserves to hold the very large populations of Lapwings and Black-tailed Godwits in the Netherlands. On the other hand, one could never hope to preserve the Ruff population if there were only schemes aiming in lowering the agricultural management intensity, spread all over the country (which would certainly benefit the Lapwing). It will be the combination of the two systems, in various degrees which will be best suited to maintain numbers and variety in the meadow bird community.

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