

**Kampp, K. & N.O. Preuss 2005: The Greylag Geese of Utterslev Mose. A long-term population study of wild geese in an urban setting. – Dansk Orn. Foren. Tidsskr. 99: 1-78.**

Individually marked Greylag Geese *Anser anser* were studied during 1959-1994 in Utterslev Mose (UM), a park and lake area in Copenhagen, Denmark. During the study period the population increased from less than 100 to more than 200 pairs, with two temporary set-backs in the early 1970s and the early 1980s, respectively – the first caused by local factors in UM, the second by problems with the water regimen in the most important wintering area, Doñana in Spain. The breeders returned to UM in February and March, hatching their clutches in late April and May. A total of 1165 of the marked geese were recovered dead, a great majority from the four countries Denmark, Netherlands, France and Spain; 86 % of them were shot.

Survival of goslings from ringing to the following spring was estimated from the number of returned females, since almost all surviving females will settle and breed in their natal area. Although varying considerably between years, this first-winter survival increased through the study period, from about 0.50 to 0.64. Return rates of male goslings decreased and were only about half as high as those of females towards the end of the study; many males emigrate and settle outside the natal area, however, and males probably survived about as well as females. Survival of older birds was likewise estimated from return rates, since very few birds – females and males alike – appear to leave UM when first established here; the overall mean for birds at least five years old was 0.70 for females, 0.77 for males, again with much variation and with an increasing trend. Females ringed as adults survived significantly better than females ringed as young but at least five years old, showing that in bird-ringing analyses, birds ringed as adults are not always equivalent to 'old' birds ringed as young. Shooting appeared to be an important mortality factor for both young and old birds, and the decreasing mortality rates during the study period coincided with a decreasing level of shooting.

On average, females first paired when 1.9 years old. Corresponding ages for first breeding attempt, first successful hatching, and first successful breeding, were 3.3, 4.2 and 4.5 years, respectively. Males started at similar ages. Breeding propensity increased until the birds reached an age of about six years, where 70-80 % bred in any given year. Nest success of old breeders was roughly 0.7, but lower in younger birds. Brood success cannot be calculated owing to widespread occurrence of brood amalgamation in UM, but gosling survival from shortly after hatching to ringing after about six weeks was high, about 0.9. Initial brood size varied without any time trend, with an overall mean of about 5 goslings; it appeared to increase with the age of the female parent until at least five years. Breeding propensity and success were adversely affected in newly formed pairs after the death of a former mate, or after a 'divorce'.

The post-fledging survival of goslings was weakly, but significantly connected to parent age; it increased with the age of the mother, whereas a peak survival of fledglings having middle-aged fathers (6-10 years) was suggested. Fledglings from early broods also appeared to survive better than fledglings from late broods, but this may essentially have been an effect of parent age, since older birds bred earlier. The body mass of goslings at ringing also affected their apparent survival: heavy females were more likely to return than light females, probably because they survived better. Curiously, however, heavy males were less likely to return than lighter males, presumably because they were more liable to emigrate. Although suggested in some other goose studies, no relationship between brood size and survival could be found. Finally, post-fledging survival was affected by the death of one or both parents before the following spring, as would be expected in a species where parents and offspring stay together during this period. The loss of the father appeared to have the greatest effect. Nevertheless, some goslings did survive, even after losing both parents in the early autumn.

The lifetime reproductive success (LRS) and its variation could be estimated for females born in 1981 or before. Of an estimated 794 fledged females, 241 settled in UM and reached an age of two years, so had a chance to breed. At least 17 other females survived but produced at least some of their offspring elsewhere, and an estimated 1620 fledglings were produced by these 438 females. Of the 241 regular UM females, 125 produced at least one

brood, the most productive hatching 71 goslings; 17 % of the 125 females produced 50 % of the goslings. Longevity was the most obvious factor influencing LRS, although the success of females attaining similar ages varied considerably. An early breeding start did not seem to be important, and neither did the birth year of the female, except that unusually few females from the late sixties produced any young.