

This Week's Citation Classic

CC/NUMBER 8
FEBRUARY 21, 1983

Perrins C M. Population fluctuations and clutch-size in the great tit,
Parus major L. *J. Anim. Ecol.* 34:601-47, 1965.

[Edward Grey Inst. Field Ornithology, Dept. Zoological Field Studies,
Univ. Oxford, England]

A study of factors affecting the number of birds in a population with special emphasis on the survival rates of the young birds in relation to date of hatching, their weight at fledging, age of parents, etc., is presented. [The SCJ® indicates that this paper has been cited in over 175 publications since 1965.]

C.M. Perrins
Department of Zoology
Edward Grey Institute of Field
Ornithology
University of Oxford
Oxford OX1 3PS
England

October 19, 1982

"I was lucky to 'inherit' a population study, started by David Lack and John Gibb in 1947, and hence I had 18 years of data available for analysis when this paper was published.

"With birds much more than most animals, one can mark the young from known parents. The great tit has proved particularly convenient for study in that it nests readily in nest boxes and so its nests can easily be found and safely visited.

"This paper dealt with two sorts of studies. One was of factors affecting the population fluctuations in which I was able to show, using long-term forestry data, that the year to year fluctuations in population size were correlated with the presence or absence of the beech crop *Fagus sylvaticus*. However, the situation was complicated (and still is not properly understood). Although the survival of birds is high over a winter with a good beech crop, it cannot be the beech alone that is responsible for this, since the birds survive well even before they start eating the beech crop in any quantity; the beech seems

to be an indicator of good feeding years.

"The fact that the great tits nested in nest boxes enabled me to follow up my other main interest—the survival rates of different classes of birds—by looking for selection acting on reproductive rates and timing of breeding. These studies probably led to the two aspects of the paper which have been most quoted. 1) The demonstration that large clutches produced young that were lighter in weight than those in smaller broods and which had poorer survival after leaving the nest, the outcome being that broods that were larger than average tended to produce fewer surviving young than broods of average size. This would be expected on the grounds of natural selection but perhaps had not been demonstrated well before. I also manipulated brood size by switching young from one nest to another. This was perhaps the first time that this had been done extensively, though the underlying rationale of the study (and of most of those done since!) turned out to be partly faulty.¹ 2) It had been thought that the timing of laying was adapted to be that which resulted in the young being in the nest at that time when food was most abundant. However, I showed that survival was usually highest from early broods and tailed off as the season progressed. Most birds, it appeared, would have been more successful had they nested earlier—so why did they not do so? I suggested that, at the best time for laying, the female may be unable to find food in sufficient quantity to be able to form eggs. This argument was elaborated later.²

"Several generations of students and research assistants have, while studying many aspects of these patient birds,³ extended the long-term data until we now have 35 years of information."⁴

1. Perrins C M & Moss D. Reproductive rates in the great tit. *J. Anim. Ecol.* 44:695-706, 1975.
2. Perrins C M. The timing of birds' breeding seasons. *Ibis* 112:242-55, 1970.
3. Krebs J R. Bird song and territorial defence. *New Sci.* 70:534-6, 1976.
4. Perrins C M. *British tits*. London: Collins, 1979. 304 p.