

Short Notes

Road mortality of common toads (*Bufo bufo*) near a breeding site, 1974-1994

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Mortality of common toads (*Bufo bufo*) on roads near a breeding site in Ramsey, Cambridgeshire, England was described by Cooke (1988) for the period 1974-1988. Counting dead toads on a single date at peak season has continued up to 1994, giving 21 years of results.

The number of toads counted will be a proportion of the total killed in any year. Whether the proportion varies from year to year, in response to weather conditions for instance, is not known. Although scavengers, such as corvid birds, can rapidly remove dead toads from roads in rural areas (Slater, 1994), corvids have never been seen feeding on carcasses at this suburban site. Toad carcasses that escape being flattened by road traffic often dry and mummify, persisting for weeks after death.

The proportion of the population that is killed each year will vary depending on the proportion of the population trying to cross roads, the volume of traffic and the activities of local conservationists who have recently carried numbers of toads across the roads (Cooke, 1988). Permanent toad warning signs for motorists were erected in 1993.

Thus while the data-set can be qualitatively used with confidence to indicate a continuing toad presence at the site, it should be used rather more cautiously to reflect numbers killed, and more cautiously still as an indicator of population trends at the breeding site. However, there has been recent concern and debate about global declines in amphibian species (eg Wake, 1993; Pechmann et al., 1991; Griffiths and Beebee, 1992) and as runs of data of this duration are rare for amphibian species, it is worthwhile making them available for use in the debate. The closely-related natterjack toad (*Bufo calamita*) has been studied since 1970 in Britain, both intensively and extensively (Banks et al., 1994). That study revealed some evidence for earlier spawning by natterjacks in warm springs. Long-term climate change could have significant implications for British amphibians (Department of the Environment, 1991; Banks et al., 1994). When phe-

nological records from Finland were examined for the period 1846-1986, a tendency was noted for the common frog *Rana temporaria* to spawn earlier because of milder springs (Terhivuo 1988). The current study provides an opportunity to determine whether time of peak migration has changed for this common toad population over the last 20 years.

The breeding pond is located beside Field Road, Ramsey (grid reference TL 283857). It measures about 50 x 30 m and is several metres in depth. A narrow belt of trees and shrubs grows densely around most of the bank, giving access to only about 15% of the edge. Access to the remainder of the pond's edge is either impossible because of thorny shrubs or can only be gained via private property. Consequently no systematic attempts have been made to count or estimate toad numbers in the pond.

Within 300 m of the pond, most of the land area is suburban housing and gardens, but there are also areas of rough ground and allotments. At the start of the study the amount of rough land increased following the closure of Ramsey North Railway Station; but during the course of the study, some derelict land was reclaimed for housing development. A second pond 100-200 m from the main pond was used by small numbers of toads until it was filled in during the winter of 1979/80. The two other major extant local breeding sites are 900 m and 1300 m away. Road mortality is concentrated close to the three sites and exchange between them may be limited.

During each breeding season a brief semi-quantitative check of casualties on the roads has been made virtually every day. When peak mortality appears to have occurred, dead toads are counted during daylight on a single day on all roads within 300 m of the site where significant mortality is known to occur. Beyond this distance dead toads are found relatively infrequently (except close to the other main breeding ponds). Typically, about 1.3 km of roads are checked thoroughly on foot during the count near the Field Road site. If further appreciable mortality is noted during the same breeding season, the count is repeated and the higher figure used for that year. The date of the count of peak numbers on the road can be taken to be an indication of when the main migration into the site has just occurred.

Counts of dead toads are presented in fig. 1. Dead toads were found each spring indicating that the breeding pond was used every year. There was no significant long-term trend in numbers, but there were considerable fluctuations from year to year. Numbers counted ranged from 28 to 250, a change of nearly an order of magnitude. While the lack of any significant trend may have resulted from a number of different causes, there is no evidence of any major, long term change in population numbers. From 1974 through to 1986 inclusive, the author was unaware of any concerted, organised efforts to carry toads across the roads in order to reduce the level of mortality. A linear regression line fitted to the data for this period showed a positive slope but the relationship between counts and years was not significant ($P = 0.16$). From 1987 onwards, there have been variable inputs from local conservationists to lift toads across the roads. The mean number counted dead during 1987-1994 was 93 (SE = 25), compared with a mean of 120 (SE = 20) for the previous eight years 1979-1986; the difference was not significant. Cooke (1988) estimated that for every eight toads helped

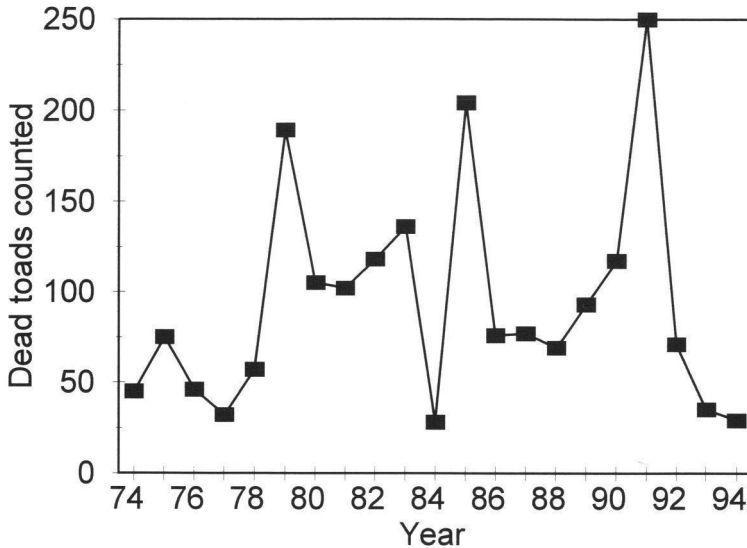


Figure 1. Peak count of dead toads each year, 1974-1994.

at the site, one was saved from death. Detailed records of numbers of toads moved have not always been kept, but numbers have varied from less than 100 in 1993 and 1994 to 343 in 1988 (J. Stott, P. Fearn, P. Peacock pers comm; Cooke, 1988). Evidently moving such numbers is not sufficient to reduce significantly the number counted dead at this site.

In the autumn of 1992, as part of a widespread search for a missing person, the pond was drained by Cambridgeshire Police, following liaison with conservation organisations over the timing of the operation. Although the pond has since virtually refilled and has been used for breeding, dead toad counts and numbers rescued were low in 1993 and 1994. There is no obvious causal mechanism, but there may be a link between the drainage operation and subsequent low numbers.

Data on when the counts were made are given in fig. 2. Although there were no significant trends for the overall data set, counts were made earlier in the year during the 1990s (mean day of year \pm SE, 75 ± 5) than in the 1980s (day 94 ± 4 , $P < 0.05$). In the 1970s, the mean day of counting was 89 (SE = 6). Count day was inversely related to mean February and March temperature, meteorological data being obtained from Monks Wood, which is 10 km distant ($P < 0.01$). In 20 out of 21 springs, count day was in March or April, so mean February and March temperature was selected to be indicative of conditions prior to migration. From the regression line (count day = $118 - 6.16$ mean temperature), peak season moved by six days for each increment of 1°C .

In conclusion, this study has indicated that the breeding site has been used every year from 1974 to 1994. Counts of dead toads on the roads have fluctuated considerably

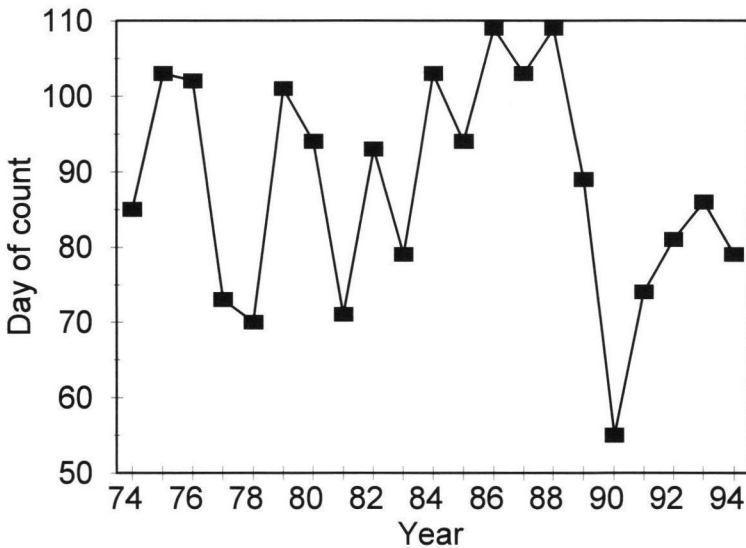


Figure 2. Day of year when counts of dead toads were made, 1974-1994. (In a non-leap year, 1 March = day 60, 1 April = day 91 etc).

from year to year, but have not changed significantly in the long-term. Peak migration has occurred significantly earlier in the year during the 1990s, seemingly in response to warmer weather in February and March.

Acknowledgements. I am grateful to J. Stott, P. Fearn and Mrs. P. Peacock for details of the rescue operations, to A. Frost for meteorological data and to Dr. A. Farmer and T. Sparks for statistical advice. H. Arnold, Dr. C. Cummins, Dr. A. Gent and Dr. R.S. Oldham kindly commented on an earlier draft of the manuscript which was prepared while on secondment to the Institute of Terrestrial Ecology.

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Received: July 17, 1994. Accepted: August 18, 1994.