SURVIVAL OF SOME CAPTIVE-REARED GREAT CRESTED NEWTS ON RELEASE INTO THE WILD

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The captive rearing of great crested newts for release into either garden ponds or conservation areas has been considered as a potentially useful element of conservation strategy for this species (Whitten, 1990, Elebert, 1991). The present note reports the survival of newts that were reared in captivity, from wild caught eggs, and released back into their original population as adults.

Newt eggs were collected from a pond on the campus of the Open University, Milton Keynes, in 1988 so that larvae could be reared to allow a study of growth. This resulted in sixteen newts attaining sexual maturity in 1990. Sexual maturity can be reached more rapidly under captive conditions than in the wild (Elebert, 1991), but this is not the case here, because free-living newts have also been found to mature at two years at this particular study site (personal observation). The newts were released back into the pond of origin in January 1990. It was possible to assess the subsequent survival of these released newts, because of regular monitoring of the great crested newts at this site. To assess the survival of the captive-reared newts, their frequency of recapture was compared with that of adult great crested newts already present in the population. 53 adults from the wild population were captured at a drift fence as they migrated towards the breeding pond (7-2-90 to 20-3-90). Once the newts had entered the pond, the population was further sampled from 12-4-90 to 26-4-90, by capturing newts in funnel traps. Records of all newts were made by photocopying the belly patterns of animals that had been anaesthetized in a 1:1000 solution of MS-222, modifying Hagström's (1973) photographic technique for recognition of individual great crested newts.

During the course of their first aquatic season, survival of the captive-reared newts seems to be no different to that of the wild newts. Table 1 shows the number of newts from the captive-reared group and from the sample of wild newts, taken at the drift fence, that were recaptured in the pond. The proportion of captive-reared newts recaptured (38%) was similar to the proportion of the wild sample recaptured (42%), with no significant difference in the numbers of recaptured and unrecaptured newts between the two groups (X^2 = 0.82, 1 d.f., $p > 0.05$). To assess the survival of the captive-reared newts one and three years after release, the population was again intensively monitored in 1991 and 1993. The same trapping procedure was used in 1991, whilst in 1993 only funnel traps were used. After one year, the percentage of captive-reared newts that was recaptured dropped to 6%, compared to 64% of the wild newts (see Table 1). The difference in the proportion of recaptured to unrecaptured newts between the two groups is statistically significant, X^2 = 16.5, 1 d.f., $p < 0.001$. The recapture data three years after the release of the captive-reared individuals, repeat the pattern for 1991. Only 6% of the captive-reared newts were captured compared to 45% of the wild sample. The recaptures of captive-reared newts were again significantly lower than that of the wild sample, X^2 = 8.1, 1 d.f., $p < 0.01$.

TABLE 1. **Recaptures of newts over three** breeding seasons (1990-91 and **1993)**

	initial no. 1990	no. recaptured 1990	no. recaptured 1991	no. recaptured 1993
Captive-reared newts	16	6 (38%)	1 (6%)	1 (6%)
Wild newts	53	22 (42%)	34 (64%)	24 (45%)

The results of this monitoring show that a cohort of great crested newts, reared under captive conditions until maturity, and released back into its original population, exhibited much lower survival than the adults already present. The captive-reared newts disappeared from the population after their first terrestrial phase in the wild. I propose four, non-mutually exclusive, possible explanations for this reduced survival of the captive-reared stock. First, it is possible that some aspect of the captive-rearing regime had an adverse effect, reducing the vigour of the newts and lowering subsequent survival in the wild. Second, it is possible that captive rearing allowed individuals, that in nature would not have survived, to attain sexual maturity. Consequently these animals were unsuited to survival in the original habitat. Third, the captive-reared newts, although of similar size to the smallest wild newts captured, were smaller than most of the wild individuals. Snout-vent lengths of captive-bred males and females were 61-64 and 60-72 mm respectively. The smallest wild male and female captured measured 62.5 and 63 mm, but mean snout-vent lengths were 80.1 and 86.6 mm for males and females respectively. Hence, differences in body size could be related to the differential survival between the two groups. Fourthly, it is possible that the captive-reared newts were denied the opportunity to develop a spatial map of their terrestrial environment. The terrestrial habitat at this site does not appear to be particularly hospitable to newts. Moreover, it was noticeable that newts migrating to the pond tended to approach from the north, suggesting that the terrestrial habitat is not randomly occupied by overwintering newts. If newts do utilize a spatial map, then it is possible that those newts breeding in this pond are those that have successfully located favourable terrestrial overwintering sites. The disappearance of the captive-reared newts from the population may be due to their failure to locate suitable overwintering quarters.

The findings of this study raise questions pertinent to several issues in great crested newt conservation. If it is the case that the low survival of the artifically reared newts was due to some effect of the rearing regime, then this would suggest that captive rearing programmes should utilize ponds rather than aquaria in which to rear the 'captive stock'. If low survival was due to small body size, then this would also have implications for captive rearing schemes, namely that newts should be well-grown prior to release. If, however, newts do develop a spatial map of their terrestrial habitat, then this would bring into question the policy of translocation of newt populations. Unfamiliarity with the terrestrial habitat around a recipient pond may result in lowering adult survival. Translocation is a commonly used strategy for 'saving' populations of great crested newts in disputes over land development. However, the success of these translocations had not been sufficiently monitored to allow the effectiveness of the strategy to be fully evaluated (Oldham et al., 1991).

It should be feasible to answer the questions raised above. The individually recognisable belly patterns of this species and the relative ease with which a breeding population may be sampled make it possible to trace the long-term survival of individuals. Further

work on this species is needed to assess the survival of captive-reared and translocated great crested newts, and to investigate the terrestrial ranging of individuals.

ACKNOWLEDGEMENTS

I am grateful to Ken Hollinshead for allowing me to work at the Open University pond, to English Nature for issuing licences required to handle the newts, and to Tim Halliday for helpful comments.

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