# SUCCESSES AND FAILURES OF AMPHIBIANS IN GARDEN PONDS

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## INTRODUCTION

The value of garden pond habitats to amphibians in Britain has been increasingly appreciated in recent years, and surveys have revealed their widespread colonisation by *Rana temporaria, Bufo bufo* and *Triturus vulgaris* in places as far apart as Leicester and Brighton (Mathias, 1974-5; Beebee, 1979). *T. helveticus* can also invade garden ponds successfully in districts where it is abundant, but *T. cristatus* seems to do so less frequently unless it is deliberately introduced. During April 1984 I undertook a survey of gardens in the area closest to my home, with the hope of finding out: (1) The extent of use of all ponds within a specific defined area, rather than a random sample survey of the kind I have previously attempted in Brighton; and (2) whether the populations of *T. cristatus* and *T. alpestris* which have been established in my own ponds since 1977 had succeeded in spreading to any of the nearby garden sites.

## METHODS

A large scale (1:1250) ordnance map of the part of Woodingdean in question, showing individual garden plots, was obtained during the winter of 1983/84. The 155 houses and bungalows closest to my own home were visited in February to ascertain which ones maintained garden ponds, and to obtain preliminary details from the owners. Those with ponds were then visited again during the first half of April, shortly after dusk, for an inspection lasting 10-20 minutes per pond. Adults and spawn of common frogs and toads, newts and fish were identified using a powerful hand torch. The survey was timed such that, in my own ponds, frog spawn was present but not yet hatched and all 4 species of newts were present in good numbers. It was also known that toad breeding activity in the district was well underway and usually approaching completion.

## RESULTS

The basic layout of the suburban area being surveyed is shown in figure 1. Open Downland west of the main road contains no ponds of any kind for kilometre distances in every direction. 18 gardens, excluding my own, were identified as maintaining a total of 22 ponds; 4 gardens each had 2 ponds. Access was obtained to 16 of these gardens (20 ponds). Direct distances of these ponds from my own pools varied from about 60-230 metres, as the newt walks. 10 out of the 22 ponds were separated from mine only by gardens, the remainder by both gardens and minor estate roads.

Data from the ponds, excluding my own, are summarised in table 1. 7 (35%) of them contained no fish, but these constituted a distinct small size class with a mean volume less than one fifth of the average for all ponds and eight times smaller than the 'with fish' group. This size difference was highly significant (Mann-Whitney 'U' = 6, n = 7/13, $p = < 0.005$).

Frogs had spawned in 15 ponds (75% of the total) and showed no discrimination on the basis of size or the presence of fish. The smallest pond encountered in this survey (25 cm square and 10 cm deep) was full of spawn, and the largest (3 x 7 metres, more than 1 metre deep) was also heavily used. Toads were much fussier; only the single large pond mentioned above (which in turn was 6-7 times larger in volume than its nearest rival) was a major breeding site, with many animals and much spawn. Two other ponds just had odd ones or twos, and like my own were apparently used irregularly from year to year. Both of these were also at the 'large' end of the pond size spectrum (with volumes of about 2,700 and 3,000 litres) and all 3 toad ponds contained fish.

Common newts only cropped up in 3 ponds; 2 of these were small with no fish, and the third was the very large toad pond, though in this case newts were seen only in shallow bays almost inaccessible to the huge fish present. No other newt species were seen in any of the ponds examined.

## DISCUSSION

The pattern of garden ponds and their use by amphibians in this part of Woodingdean was similar to the 'average' situation in the Brighton area, as determined by an earlier sampling survey (Beebee, 1979). Thus in Woodingdean about 12-13% of gardens had at least one pond (Brighton average = 15%); 35% of ponds were fishless (B.a. = minimum of 25%); 75% had frogs (B.a. = > 50%); 15% had toads (B.a. = 15%); and 15% had common newts (B.a. = 20%). However, this bit of Woodingdean had rather more large ( > 2,000 litre) ponds than average for the district (30% cf 15%).

Woodingdean frogs, again like those in Brighton as a whole, made no selection against fishponds as breeding sites despite the fact that tadpole losses in them were often heavy or total (according to pond owners). Nevertheless it was clear that the presence of fish was not necessarily catastrophic and several owners also related observations of froglets leaving their fishponds. Precise shapes of ponds, as well as numbers of fish, were probably the crucial factors influencing tadpole survival. In any case, densities of frogs in the study area were amazingly high; including my own garden sites, I estimated a total production of 200-250 spawn clumps in 16 ponds within a total area of 4 hectares. Assuming at least equality in the sex ratio, there must be about 100 adult frogs per hectare in this section of Woodingdean.

The belief that toads choose larger ponds, preferably those containing fish (which may selectively predate competing tadpoles of other species) was also borne out in the Woodingdean survey. It may be that the 'average-to-good sized' garden pond, of 2,000-3,000 litres, is on the lower edge of the size range usable by toads. Clearly they were doing much less well than frogs, but nevertheless were benefiting from the garden environment.

It looks as if newts suffer more from the presence of fish than anurans do. Although a substantial number of smaller ponds were fishless, this was not as conducive to newts as might intitially be expected. It was not coincidental that the smallest ponds were the fishless ones; a frequent situation was that their owners regularly tried to establish fish, but equally regularly lost them due to extreme summer or winter temperatures. They were not, therefore, by any means a consistently predator-free environment. Only 1 of the 3 ponds with common newts had substantial numbers (tens) of individuals; this pool did not have fish.

The complete absence of palmate, crested and alpine newts was surprising in view of the colonies of all 3 species established in my own garden since 1977. The situation with palmates is perhaps the most easily explained, since this species does not thrive on the chalk Downs and only just about maintains itself (vastly outnumbered by common newts) in my ponds. However, from small introductory stocks in 1977 both crested and alpine newts have built up to substantial populations (many tens) and have bred consistently successfully since 1979/80; yet not even a single individual of either species was seen in neighbouring ponds at a time when my own had been swarming with them for at least 2-4 weeks. Again, the fish problem may be the primary cause of this failure. Both species prefer larger ponds, and in Woodingdean these are invariably stocked with goldfish or other members of the carp family. Crested newt larvae are even more susceptible to fish predation than those of common newts (Dolmen, 1980).

If Woodingdean garden ponds are typical of this kind of habitat throughout the country, it is clear that toads and frogs are going to do moderately to very well under normal management regimes, but that newts are not. The attitudes of local pond owners were generally encouraging; most ranged from being indifferent to mildly interested in their amphibian colonists, and only one had actually removed frogspawn from his pond (and even this had been taken to a local 'wild' pool). Two of the four houses with 2 ponds had turned over one of their pair to frogs, as a deliberate conservation exercise. There was, however, little enthusiasm for giving up fish and newt conservation seems to be the key area in which more education and publicity is needed.

Figure 1

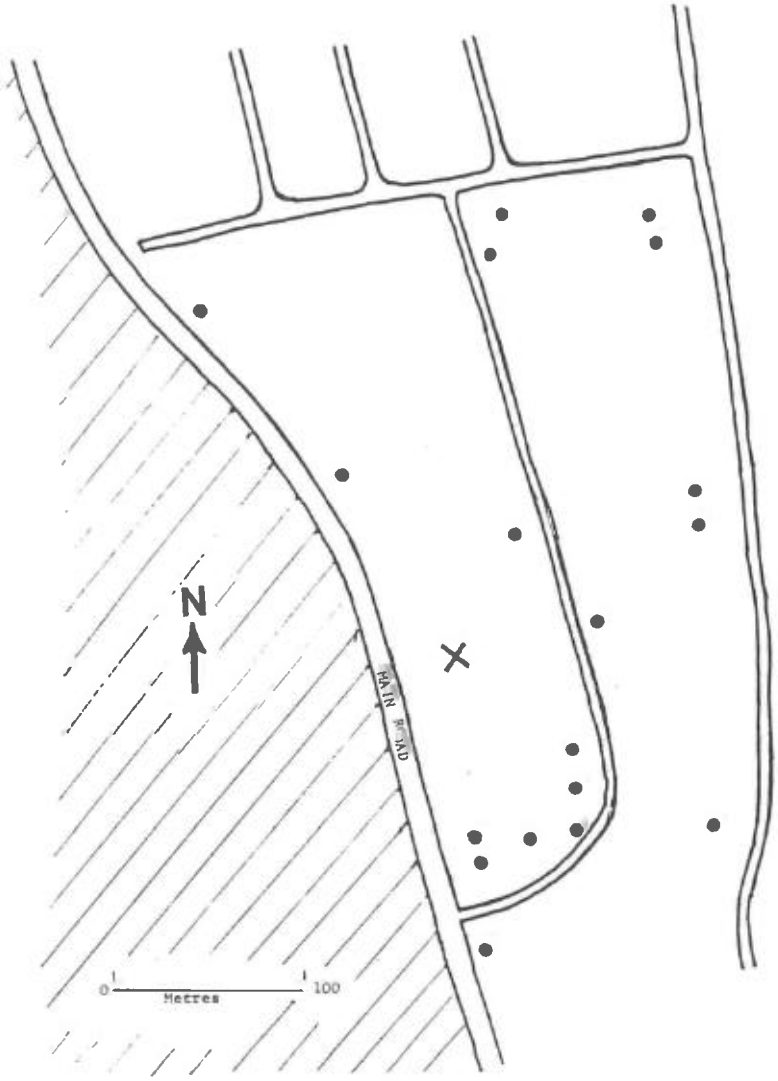


**Fig. 1. Study area in Woodingdean**
Unshaded areas = garden habitats; // = open Downland; ● = garden pond locations; 'x' = my own garden pond area. Woodingdean is situated on chalk downland with a 30-100 cm overlay of brickearth and a south-facing aspect. Altitude of the study area varies between 77-90 metres above sea level.

| | Total | Pond category | |
|---|---|---|---|
| | | Without fish | With fish |
| Number of ponds | 20 | 7 | 13 |
| Approximate average volume (litres) | 2300 | 400(60-600) | 3300(120-21000) |
| Number with frogs breeding | 15 | 5 | 10 |
| Number with toads | 3 | 0 | 3 |
| Number with common newts | 3 | 2 | 1 |
| Number with other newt species | 0 | 0 | 0 |

**Table 1.** Woodingdean garden ponds

Figures in brackets indicate the ranges of pond sizes in the without and with fish classes.

## REFERENCES


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