A SURVEY OF AMPHIBIAN SITES IN THE UPLAND POOLS OF MID-WALES

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This is a summary of a survey made in 1987. A full report of the survey has been deposited in the BHS Library.

INTRODUCTION

This survey was carried out from 5.6.87 to 1.10.87, using a trapping technique on a similar principle to the crab pot, but without bait (funnel trap).

The objective was to trap adult and larval urodeles and larval anurans and, to a lesser extent, to sight young and adult anurans at the pools as these were not expected to be caught in this type of trap.

Pools included in this survey were those at 300 metres above sea level and higher although fourteen pools which are below 300 metres were included for the sake of supplementing the amphibian records for Mid-Wales as no previous data had been collected.

104 pools were visited. Of these 85 were trapped and amphibians were recorded in 52 of them.

Six species of amphibians are native to Britain but only the following five are to be found in this area: three urodeles, the great crested or warty newt *(Triturus cristatus),* the palmate newt *(T. helveticus),* the smooth or common newt *(T. vulgaris)* and two anurans, the common frog *(Rana temporaria)* and the common toad *(Bufo bufo).*

The ponds were classified in size as small, medium and large and I took as my examples, Beilibedw Mawn Pool, Llanerch and New House (Maelienydd) pools which were 180, 875, 2200 square metres respectively. (These figures are approximations only).

METHOD

The number of traps laid down reflected the size of the pools. Traps were placed in order to cover a variety of habitats that were available in each pool, except in large deep pools where it was not possible to reach the deep water.

The traps were, in the majority of cases, lying on the bottom of the pool or in aquatic vegetation just above the bottom. In many of the pools, because they were shallow, this was also near the surface. Whenever there was dense aquatic vegetation, submerged or emergent, a trap (or traps) was placed amongst it. A few traps were tried floating in open water but specimens were never caught in them even when amphibians were present and were caught in other traps in the same pool. As a result, the placing of floating traps in open water was abandoned.

The traps were placed out in the afternoon and collected on the following morning to avoid asphyxiating the adult newts although there were occasional mortalities (notably when a warm evening followed a hot sunny day and the water temperature remained high so that the newts' metabolic rate and, consequently, oxygen consumption, was higher).

Clear plastic squash bottles had been used to make the traps, with the top cut off and inverted into the base, secured with three or four paper clips. They were made more easily seen and retrievable by attaching to each one, with cord, a brightly coloured (red and yellow taped) floating cork. The traps also had holes to facilitate sinking but these were not large enough to allow larvae to escape. Traps were sometimes thrown out into deeper water attached to a line and weighted with a stone or lead weight.

I found that it facilitated collection and avoided loss of the traps if a diagram was made of the pool, marking the location of each trap.

SUMMARY OF RESULTS

1. Altitude

There was no significant relationship found between the number of amphibian species present in a pool and the altitude of pools between the parameters encountered. Great crested newts and toad larvae were found up to 420m above sea level. Palmate newts and smooth newts were found up to 440m above sea level, although palmate/smooth newt larvae were found at 500m above sea level. (In the conditions that prevailed these were most likely palmate newt larvae). Frog larvae were found up to 500m above sea level.

2. pH

Of the urodeles, the palmate newt was found at the lowest pH of 4.8. Smooth newts and great crested newts were found only down to pH 5.4. They were all found at the highest pH encountered of 6.6. At the lower pH range the populations of all urodeles was smallest.

Of the anurans, toads were found at pH 6.4 to pH 6.8 and frogs from pH 6.6 down to pH 4.7, and froglets were encountered on a mire where the pH range was 4.2 to 8.1. Frog larvae were found in the severest conditions encountered: pH 4.7 at 500m above sea level, with a very high ammonia level (probably due to a black-headed gull colony) and a high aluminium level. But they were by no means universal.

3. Size and Depth

All the amphibians were found in small, medium and large pools except the toad, which was not found in medium sized pools (probably due to the limited number of pools in which they were found). The newts were found in the shallowest pools, 8-10cm, the anurans in pools of minimum depth 23cm. All the amphibians were found in pools with depths of over 1m. The great crested newt was found in the smallest pool (Aberedw Hill 8) which was only 8-10cm deep and 6m^2.

4. State of Hydration

Great crested newts were not found in pools that dried out readily (not in *Calluna* heathland) and the same applied to frogs and toads. Palmate newts were found in pools that could dry out by late summer (surrounded by *Calluna* heath). They were found in smaller numbers in these pools but these were also the least productive. Smooth newts were found in pools that did dry out by late summer and in one of these pools a palmate/smooth newt larva was found.

5. Substrata

The amphibians were found in pools with clay, peat and concrete substrates, all with overlying silt, except the toads, which were not found in peat pools. The great crested and smooth newts were only found in a peat-based pool with a relatively high pH of 6.3. The palmate newt was found in a peat-based pool with a low pH of 4.8.

6. Inter-Association of Amphibian Species

Of 85 pools trapped, amphibians were found in 52 of them. Great crested newts were found in 21 pools, 6 of these without any other amphibians. Smooth newts were found in 19 pools, 5 of these without any other newt species, only 2 pools without other amphibian species. Palmate newts were found in 10 pools, 2 of them with no other amphibian species. Great crested and palmate newts when associated with other newt species were found mostly with smooth newts. Smooth newts when in association were found mostly with great crested newts. Palmate newts when associated with other newts were the predominant species only in the least productive pool (Red Hill).

Frog larvae were found in 15 pools, in 5 pools with no other amphibians. When they were associated with other adult amphibian species, in every case smooth newts were also present. In the 5 pools where found alone the frogs had either appeared to quickly colonise recently dug out pools or were living in adverse conditions perhaps unsuitable to the other amphibian species.

Toad larvae were found in 5 pools, in 3 of these without any other amphibian species. When they were with other amphibians, smooth newts were present as well.

7. Land Quality and Animal Grazing

There were larger populations of great crested newts where the pools were fertilised by cattle. They have a preference for pools in better quality land (where the land is usually artificially fertilized and limed, if necessary), where there are cattle with high stocking densities and, here, the most productive pools.

There was a trend with smooth newts towards better population in the more fertilized pools and smaller populations in those with low stocking densities of sheep, which was also the poorer land. They showed a preference for the better quality land where cattle grazed and watered but this was not as marked as with great crested newts.

The largest population of palmate newts from catches per trap were found in a pool fertilized by cattle, but this did not bear any relationship to where they were usually found which was particularly in the poorer quality land where there were no cattle, only sheep, horses/sheep or no animals grazing.

Frog larvae populations did not bear any relationship to the animals grazing the pools (although approximately 2 out of 3 pools were in better quality land).

Toad larvae were not found in poorer quality land and the populations were bigger in the more productive better fertilized pools with cattle. However, the least productive pool (few animal taxa and plant species) had a huge population of minnows which may be affecting the toad larvae.

8. Fish

Great crested newts and palmate newts were not found in pools with fish. Smooth newts and frog larvae were found with fish (mirror carp – not active carnivores) in only one pool. The toad larvae were also found in this pool and had managed to colonize 2 other pools where there were fish (sticklebacks and carp/minnows) which the other amphibians had not succeeded in doing. This maybe because they are unpalatable.

Statistically, it was found that the presence of fish in a pool makes it much less likely that amphibians will also be found there.

9. Populations

Of the three urodele species, adult smooth newts were in greatest abundance in the upland pools, the great crested newts second and the palmate newts were the smallest population.

Of the anuran species the frogs had by far the greatest population of larvae and therefore adults, with a very much smaller population of toads.

10. Immigration-Emigration

Larval frogs and toads were caught from the first week of June at the start of the survey. Larval great crested newts and palmate/smooth newt larvae did not appear until the beginning of July. During July some frog larvae were metamorphosing and all found had metamorphosed by August. Larval palmate/smooth newts and larval great crested newts were still being caught in the second week of August although the great crested newt larva caught was almost completely metamorphosed. There is insufficient data to indicate in which month the larval toads metamorphosed and emerged from the pools. Adult anurans had already left the pools at the start of the survey, having spawned before the newts. No adult urodeles were caught after the first week in August.