

CHANGING BIODIVERSITY IN THE CHESHIRE POND LANDSCAPE: SOME PRELIMINARY FINDINGS

Jim Hollinshead, Andrew Hull & Jonathan Guest
Ponds Research Unit, Liverpool John Moores University, UK
E-Mail: a.p.hull@ljmu.ac.uk

Introduction

Between 1995 and 1998, the PondLife project surveyed one thousand ponds in north-western England for plants, amphibians, macroinvertebrates, and surrounding land use. In 2006, fifty of these, surveyed in 1995/6 and all in Cheshire, were resurveyed to assess stability and change at *Triturus cristatus* (Great crested newt) ponds over the decade. While the survey methods fall short of the multiple visit, nocturnal trapping and torchlight counts required for comprehensive amphibian survey, results are directly comparable between surveys as they were carried out using the same surveyor and methodology. Ponds were randomly selected from those containing *T. cristatus* in 1995/6 and surveyed between 14/05/06 and 23/06/06. As in 1995/6, a single daytime visit was made, with marginal egg search and abundance estimate, and netting for adults and larvae. *T. cristatus* was recorded at only 31 of the 50 ponds, a 38% decrease in recorded presence. Probable causes are summarised in Table 1. Multiple causes may be involved at any pond: increase in shading may lead to loss of rough grassland; cause thinning and loss of emergent vegetation (egg substrates) and may allow predatory fish to enter a once dense swamp as emergent vegetation thins.

Table 1	Probable explanations for "loss" of GCN in 2006
Suggested cause	Number of ponds affected
Arrival or increase of fish	5
Shading of margins	2
Deterioration of associated terrestrial habitat	2
Thinning or loss of emergent vegetation	8
Loss of open water	7
Small non-viable population	4
Filling in of pond	1
Draining of pond	2
Small population missed by survey	2

Fish

Fish were deliberately introduced at two sites, one prior to the 1996 survey, though the loss of fringing emergent vegetation was probably more important. At the other (CH32/96 Fig. 1) created as a receptor pond in mitigation of development disturbance) Perch (*Perca fluviatilis*) were introduced by illicit anglers. At three others, fish have been introduced or have spread from adjacent ditches and a canal during flood events. Sticklebacks (*Gasterosteus aculeatus*) have become a considerable problem, especially where little flexible vegetation is present in ponds or emergent and little submerged marginal vegetation cover is available due to inappropriate management or shading.



Fig 1
CH32/96

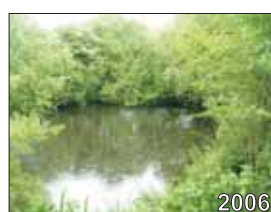


Shading of margins

At 2 ponds dense growth of scrub has suppressed and reduced marginal emergent vegetation providing egg laying substrate and refugia for younger larvae, and caused chilling of the water, slowing development of eggs and larvae (CH61/96 Fig. 2). At another, fringing rough grassland in 1995 has turned to dense scrub over bare soil.



Fig 2
CH61/96



Emergent vegetation

Thinning or loss of emergent vegetation arose from its destruction by wading cattle (2 cases), shading by overhanging scrub (2 cases); and by dredging (1). Boarding of pond margins preceded the 1995 survey in all three cases where this is a significant factor in preventing the spread of emergent vegetation (2 Golf courses, and 1 environmental education centre - CH44/96 Fig. 3). The failure to find *T. Cristatus* at these ponds in 2006 may be a delayed consequence of this boarding, which prevents slumping and maintains an abrupt margin accessible to predatory fish.



Fig. 3
CH44/96



Terrestrial habitat

Deterioration of terrestrial habitat adjacent to a pond may be a significant factor. Change in farm management regime has led to reduction in availability of rough grassland. One farm, once a "messy" farm with piles of rubble and old tyres (refugia) and patches of rough grass, has been extensively "tidied", though, whether this has caused the loss of *T. cristatus* from the pond is questionable.

Loss of open water

The importance of open water is often overstated, but *T. cristatus* does require more depth of water and ease of movement than the common *Lissotriton vulgaris*. At 1 pond, dredged to about 1m deep shortly before the 1995 survey, a field drain silted the pond, now containing less than 0.15m of water, with one open pool 0.3m in depth. 80% of the pond surface is vegetated, the pool having a bed of silt where newts are highly visible and vulnerable to predation. *T. cristatus* could not be found in 2006. One pond (CH113/95 Fig. 4) was less than 0.5m deep in 1995 and only 40% vegetated. By 2006 vegetation cover increased to 95% and *T. cristatus* could not be found. One development mitigation pond, neglected since 1995, rapidly silted due to its small size, with accompanying spread of *Glyceria fluitans*. At another a fringe of *Glyceria fluitans* and *Ranunculus aquatilis* with shallow pools was kept open by the trampling of cattle. The surrounding pasture is now grazed by sheep (avoiding wet areas and insufficiently bulky to maintain open pools) so the outer zone of the pond is densely grassed over, and *T. cristatus* could not be found in 2006. In extreme cases, water was lost twice through drainage, once through in-filling.



Fig. 4
CH113/95



Non-viable and Small Populations

At four ponds, no clear reason could be identified for the loss of *T. cristatus*. It was suspected that the population recorded in 1995/6 was too small to remain viable. At one site, 2 adjacent ponds (CH22/96 Fig. 5 and CH23/96) both held tiny populations in 1996 but no evidence was found in 2006. These two ponds are part of a cluster, linked by ditches and with high mobility of sticklebacks (*Gasterosteus aculeatus*). It is possible that the population is primarily dependent on one or more key ponds, which recruit well in good breeding years. Other satellite ponds may subsequently be the site of breeding attempts when the adult population is high. One other pond was considered an unlikely breeding site because of the unsuitability of surrounding terrestrial habitat. The pond appears in better condition in 2006, but was probably another satellite pond, dependent in this case upon a pond since drained. There remains the possibility that small populations of *T. cristatus* were missed during the survey, in particular where no negative change in condition of aquatic or terrestrial habitat is evident. This applies in one case, where little evidence could be found in 1995, conditions in the pond remain highly suitable, and the retention of unmown field margins now constitutes an improvement in terrestrial conditions.



Fig. 5
CH22/96



Conclusions

Full results from the 2006 resurvey will be forthcoming, however, broad headline findings from the survey can be summarised as;

- A Substantial decrease (38%) in recorded occurrence of *T. cristatus*, indicating a need for more extensive and intensive survey.
- A general increase in recorded amphibian presence (*L. vulgaris*, *Rana temporaria*, *Bufo bufo*), with these more common species tending to persist or being recorded for the first time at locations where *T. cristatus* was not recorded in 2006.
- An overall increase in recorded *Alpha* and *Beta* diversity.
- Substantial turnover (around 50%) in macroinvertebrate species recorded in each pond in 2006 against 1995/6.
- Decrease in occurrence of submerged and floating macrophyte species (9%), a general increase in emergent and woody plant cover and the disappearance of some marginal communities (particularly of poached mud) due to successional and terrestrial management changes.