Danger Signals

Invasive species have been hitting the headlines recently. In 2010, the "killer shrimp" (*Dikerogammarus villosus*) was discovered at Grafham Water, Cambridgeshire, and sites in Wales, whilst in Ireland, the Asian clam (*Corbicula fluminea*) was found in the River Barrow. Both these species have the potential to dramatically alter the ecology of the waters they have newly colonised, but it remains to be seen exactly what their effects will be. But what about a non-native species that has been with us for a number of years now – the signal crayfish (*Pacifastacus leniusculus*)?

The signal crayfish was originally introduced to Great Britain in the 1970s for aquaculture but escaped into rivers and has become increasingly widespread since then. Its devastating impacts upon our native white-clawed crayfish (*Austropotamobius pallipes*), particularly through the spread of the fungal disease crayfish plague, have been well documented. It also has negative impacts upon aquatic plants, other invertebrates and bottom-dwelling fish such as bullhead and stone loach. But do they have any effect on trout? A recent study, led by Stephanie Peay of the University of Leeds, on a headwater stream of the River Ribble in the Yorkshire Dales suggests they might (*Knowledge and Management of Aquatic Ecosystems* vol 12 p394).

The Bookill Gill Beck is a small upland limestone stream where a population of signal crayfish became established from a suspected illegal introduction in the mid-1990s. In this case the signals weren't carriers of crayfish plague (fatal to the native white-claws in a matter of days), hence it was possible to study the longer term effects of the invader on its native cousin as well as the local fish community. The beck is home to brown trout, salmon, bullhead and low numbers of eels.

Signal crayfish have spread from their point of introduction progressively replacing the white-claws and the densities of signal crayfish recorded are much higher than those previously found for natives. The study showed significantly fewer fish in areas with signals compared to those where the native crayfish was still present: where signal crayfish numbers were high, the numbers of juvenile trout were correspondingly low. Bullheads were also found to be absent from areas where they had previously co-existed with native crayfish.

Exactly how the reduction in juvenile trout numbers is occurring is not clear. Direct predation upon young trout by signal crayfish could be a factor, particularly following their emergence from the gravel in spring when their mobility is most limited. There could also be competition between crayfish and juvenile fish for refuge areas, such as under stones. Hand searches in the areas most densely populated with signals showed that virtually every potential refuge area was occupied; something that may force juvenile trout and salmon into locations where they are more vulnerable to other predators such as herons. Increased competition for food between crayfish and trout may also be a contributory factor; for example, reduction in the numbers of freshwater shrimps and caddis species.

Native crayfish, bullheads and trout – all threatened by signals?

"The study showed significantly fewer fish in areas with signals compared to those where the native crayfish was still present"