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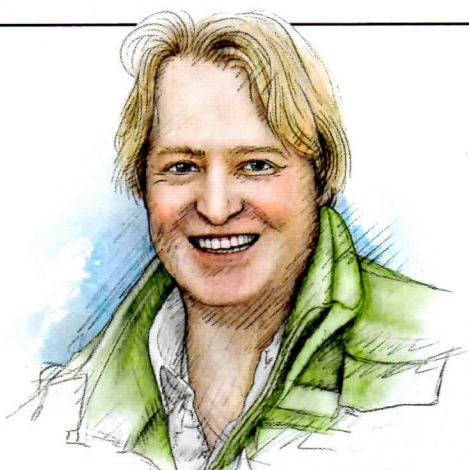
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CHALK TALK

Fear itself

*The killer shrimp's appetite is not the only reason why we should dread its spread, warns **Simon Cooper***

THE KILLER SHRIMP, AN INVADER from Eastern Europe, was first discovered in Britain in Cambridgeshire in 2010. The name alone is enough to strike terror into anyone with an interest in preserving the ecological equilibrium of our waters. As it turns out *Dikerogammarus villosus*, to give it its fancy Latin name, is deadlier than originally thought but not only for the reason its nickname suggests.

How it arrived here is unclear but the consensus seems to coalesce around the ballast water of commercial shipping. The shrimp, which originates from the Caspian and Black Seas, is hardy; it can survive out of water for five days, attaching itself limpet-like to boats, birds and the kit of anglers once in its new country. It is much bigger than our native *Gammarus* - two-and-a-half times bigger - but its mouth is proportionately ten times larger. It is deadly in habit and appearance.

Now logic might suggest that a bigger shrimp provides more food for its predators. After all, at certain times of the year 80 per cent of a trout's diet will be shrimp. However, our new arrival has a wicked set of spines along its back that ensures that its predators, especially small fish, find it hard to swallow and they soon learn to leave it alone.

It is described by the NNSS (Non-Native Species Secretariat. Yes, we have such a body in the UK that monitors the current list of 282 invasive species) as a "voracious predator". Even that phrase doesn't do justice to its eating habits. It consumes just about anything smaller than itself. Other shrimps are a given, as are invertebrates and their eggs. Damselfly and dragonfly nymphs are a particular favourite, as are hog lice and water boatmen. Plus, any fish fry. Unusually for this corner of the natural world, the killer shrimp does appear to kill for fun, leaving uneaten prey. And to cap it all, they are prolific breeders, reaching maturity in 6-8 weeks, breeding three times a year with 150 offspring each time.

If all that wasn't enough, recent research by independent consultant Calum MacNeil and University of Plymouth professor of animal behaviour Mark Briffa indicates that when the killer shrimp isn't killing it is intimidating its competitors to the detriment of the local ecology. The fear factor, if you like.

MacNeil and Briffa are experts in the non-consumptive effects (NCEs) of predators; that is to say the effect one animal has on the behaviour of another just by its sheer presence rather than any immediate physical threat. If you are wondering why this might be a field of study, it is thought we might be able to manipulate the landscape of fear to improve pest control; a bit like employing, at the most rudimentary level, a hawk to scare away pigeons. In the case of the killer shrimp the effect is subtler. In the experiment carried out by MacNeil and Briffa, native shrimps shared a tank with killer shrimps over a period of a week. However, though the natives were free to roam, the killers were confined to a cage within the tank. But even though they were in no danger the natives stopped doing what they constantly do - namely shredding leaf matter for food. Not only was this bad for the native shrimp (they ate less and expended more energy avoiding the cage) but the by-product of their shredding activity is food for smaller invertebrates who, deprived of nourishment, started to die. It is effectively death by associated association.

The research really does crank up the dangers of the killer shrimp because by changing behaviour it is changing the ecology, disrupting the food chain on the one hand and the nature of the riverbed on the other as the rotting leaf matter builds up in the absence of the busy natives. And this is unusual, at least in British rivers, where inhabitants usually become habituated to local predators. Think, for instance, of pike, where you'll often see fish of all types living out their lives in close proximity to their nemesis with no apparent concern that they might become its next meal. In the case of native shrimps versus killer shrimps the situation becomes worse the longer the two are in proximity.

"By changing behaviour it is changing the ecology, disrupting the food chain"

What is the answer? For the moment, nobody knows, but ultimately a way will have to be found of eradicating the killer shrimp as it continues its 30-year spread across Europe. Some have suggested the introduction of another non-native that is higher up the food chain but most ecologists shudder at the thought, citing the cane toad, an Australian menace. It was introduced from Hawaii in 1935 to control the native grey-backed cane beetle. Eighty-four years on from a broodstock of 102 toads, there are now more than 200 million on the continent while the cane beetle remains the pest it always was.

The only crumb of comfort is that the killer shrimp requires a water temperature of more than 13 deg C (55 deg F) to breed all year round, which leaves it less adapted to chalkstreams, which are more normally 10 deg C (51 deg F). However, that is faint comfort for our nation's other lakes and rivers. **T&S**

■ Simon Cooper is managing director of Fishing Breaks (fishingbreaks.co.uk), the leading chalkstream fishing specialists. He is also author of the best-selling books *Life of a Chalkstream* and *The Otters' Tale* published by William Collins.