Invading crayfish success down to appetite and disease

February 24 2012, By Tamera Jones

Signal crayfish.

The North American signal crayfish could be driving the native white-clawed crayfish from British waterways, because it eats more and is much less fussy about its food than the native critter.

Not just that, but the invading crayfish is unharmed by a common parasite that drastically weakens and then kills its white-clawed cousin, giving it the upper hand.

That's the conclusion of a UK-led study looking at why the invader has decimated native populations in British rivers, canals and streams in recent years.

Researchers led by Dr. Alison Dunn from the University of Leeds found that the aggressive signal crayfish is a greedier and less picky eater

compared with the more docile native crayfish. In some cases, it ate 83 per cent more than its white-clawed cousin.

"The invaders eat much more compared with the native crayfish. But the situation is exacerbated by a parasite which essentially changes the native's behaviour – the native crayfish can't eat or handle as much food as the signal, because the parasite weakens its muscles," explains Dunn.

Ultimately, this means the indigenous species ends up eating easy-to-catch prey, which doesn't move around a lot.

The signal crayfish was introduced to Britain in the 1970s. Since then, it's spread rapidly across south and southeast England. Studies have revealed that it can spread at a rate of up to two kilometres (about one and a half miles) a year. Though they can move overland of their own accord and have in the past been deliberately moved around, Dunn says they often get transferred to new waterways in damp fishing gear.

"Thankfully, there's still a stronghold of our white-clawed crayfish rivers in Yorkshire," she adds.

Another problem is that the invaders carry crayfish plague – which along with the parasite also kills the native – compete with the white-clawed crayfish for shelter, and damage riverbanks by burrowing. The situation is so serious that the native species has been listed on the IUCN Red List as endangered since 2010. "They're a flagship species for conservation," says Dunn.

But scientists weren't sure if the newcomer's success was because there are more of them, or if it simply eats more than the native.

So Dunn and colleagues from the University of Leeds and the Environment Agency decided to find out by comparing how quickly the

two species can deal with food.

"We were also interested to know how the parasite affects the native crayfish, because we know it affects muscles and so probably also how much and which prey they can catch," Dunn says.

They found that the invader eats more not just because it handles prey more quickly, but also because the parasite slows its native rival down by harming its ability to catch prey.

"We found that white-clawed crayfish infected with the parasite eat about 30 per cent less than when they're not infected, and that can have a massive effect on the whole ecosystem," says Dunn.

"Our results show that you have to consider the effects of parasites when you look at biological invasions," she adds. "We hope our findings will help us make predictions about how the invader might spread and help with management strategies."

She explains that we need to be much more careful about how we move animals and plants around from habitat to habitat, and raise public awareness about this.

Another way to help protect the native white-clawed crayfish is to create so-called ark sites, where uninfected white-clawed crayfish are isolated from North American signal crayfish. This work on invasions and parasites is one of many projects of the Yorkshire Dales Environment Network, set up to care for and manage the Yorkshire Dales.

The study is published in *PLoS One*.

More information: Neal R. Haddaway, et al., Predatory Functional Response and Prey Choice Identify Predation Differences between

Native/Invasive and Parasitised/Unparasitised Crayfish, *PLoS One*, published February 16, 2012, doi:10.1371/journal.pone.0032229