eDNA sampling during breeding could control invasive crayfish

It is easier to detect the presence of a species of invasive crayfish from eDNA in water samples during breeding season, new research at Imperial College has found.

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This research could not only be used to detect and control invasive crayfish, but should also apply to frogs and newts.

Scientists can measure population numbers by monitoring environmental DNA (eDNA) released into the environment and in this way, detect early signs of invasive species.

In collaboration with Thomson Ecology, Nick Dunn, a Masters' student from the Department of Life Sciences has been sampling crayfish eDNA in water. The project explored the effect of the invasive American signal crayfish, Pacifastacus leniusculus, on the decline of the UK's only native crayfish species, Austropotamobius pallipes.

When monitoring P. leniusculus in tanks, Dunn found that when the female crayfish were bearing eggs, the levels of eDNA dramatically increased in proportion with numbers of this crayfish species.

In contrast, when the animals did not bear eggs, the correlation between eDNA and numbers of the invasive crayfish was lost. This indicated that estimating crayfish abundance using eDNA would be more effective during the breeding season.

Crayfish carry their eggs on the outside of their bodies. It is this direct connection between the egg and the water that is thought to increase eDNA levels in the water. This research could therefore also apply to frogs and newts, as their eggs are also spawned directly into water.

If this research is successful in the field, this method of detecting eDNA during egg-bearing phases could change how organism populations are measured.

This method could identify invasive species at low abundances, detecting the problem early, and eradicating the invasive species before any harm is caused to native species.

Dunn, the lead author on the research paper, said: "I hope that my work will be able to help with the management of invasive species so that our native species stand the best chance of survival.

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