

SPRING AWARD Report 2016, December

Name:	Daniel Warren
Thesis Title:	The Ecological Impact of Invasive Freshwater Amphipods upon Native Amphibians
Supervisor, School and Faculty:	Dr Alison Dunn and Dr Chris Hassall School of Biology, Faculty of Biological Sciences



Invasive *D. villosus* consuming a tadpole of the native common frog (*Rana temporaria*)

The general aim of the project:

Dikerogammarus villosus is a high-impact invasive amphipod species, renowned for predated intensely upon a wide range of freshwater organisms, including fish eggs and fry. Excessive predation by *D. villosus* upon a diverse array of organisms has significantly altered the structure of invaded freshwater communities. To-date there have been no studies assessing the impact of *D. villosus* upon amphibian populations, which have suffered significant losses across Continental Europe because of other invaders (e.g. crayfish) consuming considerable numbers of amphibian eggs and larvae.

Thanks to the SPRING award, I was able to conduct an experiment designed to measure the predation rates of invasive *D. villosus*, compared to the native amphipod *Gammarus pulex*, towards the eggs and larvae of commercially sourced (*Xenopus laevis*) and also wild-caught native (*Rana temporaria*) amphibian species. This study will advance our knowledge regarding the extent to which invasive predators impact upon aquatic species, as well as predict the potential ecological impact that *D. villosus* may have upon the stability of amphibian populations.

The main challenges:

The focus challenge that you are addressing (the smaller bit from the grand challenge):

To determine whether early stage amphibians are susceptible to predation by amphipod predators and to predict the potential ecological impact of invasive *D. villosus* upon native amphibian population.

What tools you have used and will use:

I applied the functional response approach, which assesses the predation rates of predators in relation to prey abundance (i.e. functional response).

What the expected outcomes are:

Invasive *D. villosus* will consume significantly more eggs and larvae, compared to native *G. pulex*, with predation rates increasing as a function of invader body size.

What the actual outcomes were:

Predation upon amphibian eggs and larvae was confirmed, with *D. villosus* consuming significantly more *X. laevis* eggs compared to *G. pulex*. Although native *R. temporaria* eggs were invulnerable to predation by both *G. pulex* and *D. villosus*, *R. temporaria* larvae were susceptible to predation, with significantly larger *D. villosus* consuming three times as many tadpoles as large *G. pulex*.

How the SPRING award funds assisted you in reaching your goal for this particular project?

I was able to purchase *X. laevis* eggs (£180) from the European *Xenopus* Resource Centre (University of Portsmouth). I was able to travel repeatedly to freshwater sites to collect invasive *D. villosus* (£160), and native *G. pulex* (£10), as well as investigate sites colonised by another recent invader; *D. haemobaphes* (£130). I also monitored populations of *R. temporaria* throughout Leeds, during the spawning season (£20).

Why you will recommend PGRs at the water@leeds DRTC to apply to the SPRING funds

The SPRING award is a fantastic source of funding which can be used to subsidise large studies, or even to fund smaller studies outright.

Please send the water@leeds DRTC your report 6th months from the time you were awarded with the SPRING funding.