

## Western Ecological Research Center

# Publication Brief for Resource Managers

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## Introduced Species and Their Missing Parasites

Invasive species are second only to habitat destruction in threatening biodiversity. The amount of damage they cause is a function of how well they can perform. In a recent study published in *Nature*, USGS scientist Dr. Kevin D. Lafferty and colleagues from the University of California, Santa Barbara, and Princeton set out to determine why invasive species are so successful. The research points to parasites, or, more specifically, a lack of them. The researchers used data on 26 invasive animal species, from snails to rats, that they or other parasitologists had studied. They then compared the diversity, total prevalence, and average prevalence of parasites in introduced and native regions, controlling for potentially confounding effects such as sample size.

In all cases, animals were less parasitized where they invaded compared to where they were native. On average, an animal has 16 parasites at home, but brings less than 3 of these to new areas that it invades. In the new region, parasites are not well matched to novel hosts, and only about 4 parasites successfully attack an invading species. The same pattern holds true for pathogens of invasive plants, according to a separate study jointly published in *Nature*.

By leaving parasites behind, introduced species may have an advantage over less fit native competitors, which remain fettered by their own full complement of parasites. Among the species studied was the European green crab. A more detailed study by Lafferty and colleagues published in *Bioinvasions* found that in Europe, the green crab's native home, parasitic barnacles "castrated" the crabs, making them unable to reproduce for life. Instead, the parasites took over the crabs, which then served the barnacles in producing generations of the parasites' own offspring. Where the barnacles

### Management Implications:

- Lost parasites are the widespread "Achilles' heel" of invasive species. In some cases, bringing in parasites from a pest's native range can hinder super pests.
- The benefits of biological control of pests are sustainability, low cost, and reduced dependency on pesticides.
- Biological control of pests is risky if the parasites are not specific to the target pest.

were common, the crabs were small and rare. Conversely, the scientists found that crabs were big and abundant where barnacles were uncommon.

Green crabs have been introduced around the world (the west and east coasts of the United States, South Africa, Australia, Tasmania and Japan), but barnacles have never made the transfer with them. Green crabs are common and big where they are introduced, evidently because they lack parasitic castrators. In these introduced areas, green crabs are pests that decimate shellfish.

*Torchin, M. E., K. D. Lafferty, A. P. Dobson, V. J. McKenzie and A. M. Kuris. 2003. Introduced species and their missing parasites. Nature 421:628-630.*

*Torchin, M. E., K. D. Lafferty and A. M. Kuris. 2001. Release from parasites as natural enemies: increased performance of a globally introduced marine crab. Biological Invasions 3:333-345.*