

Mapping a Super-Invader in a Biodiversity Hotspot, an eDNA-Based Success Story [†]

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[†] Presented at the 1st International Electronic Conference on Biological Diversity, Ecology and Evolution, 15–31 March 2021; Available online: <https://bdee2021.sciforum.net/>.

Abstract: The lesser Antilles archipelago in the Caribbean is known as a biodiversity hotspot, hosting many endemic species. However, recent introduction of a highly invasive species, the Australian Red Claw Crayfish (*Cherax quadricarinatus*), has led to significant threats to this fragile ecosystem. In our study, we developed, validated, and optimized a species-specific eDNA-based detection protocol targeting the 16S region of the mitochondrial gene of *C. quadricarinatus*. Our aim was to assess the crayfish distribution across Martinique Island. Our developed assay was found to be species-specific and showed a high sensitivity in laboratory, mesocosm and field conditions. We showed a significant and positive correlation between species biomass, detection probability and efficiency through mesocosm experiments. Moreover, we found that eDNA persisted up to 23 days in tropical freshwaters. We investigated a total of 83 locations spread over 53 rivers and two closed water basins using our novel eDNA assay and traditional trapping. The latter undertaken to confirm the reliability of the molecular-based detection method. Overall, we were able to detect *C. quadricarinatus* at 47 locations using eDNA detection and 28 using traditional trapping methods, all positive trapping sites were positive for eDNA. We found that eDNA-based monitoring was less time-consuming and less influenced by the crayfishes often patchy distributions, proving a more reliable tool for future large-scale surveys. The clear threat and worrying distribution of this invasive species is particularly alarming as the archipelago belongs to one of the 25 identified biodiversity hotspots on Earth.

Keywords: biodiversity hotspot; *Cherax quadricarinatus*; Environmental DNA; invasive species

Citation: Thomas Baudry ^{*}, Quentin Mauvisseau, Jean-Pierre Gout, Alexandre Arqué, Carine Delaunay, Juliette Smith-Ravin, Michael Sweet, Frédéric Grandjean. *Proceedings* **2021**, *68*, x. <https://doi.org/10.3390/xxxxx>

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