

## ABSTRACT

The Biology and Impact of the Introduced Redclaw Crayfish *Cherax quadricarinatus* (von Martens 1868) in Jamaican Rivers

Sacha-Renée Latoya Todd

The redclaw crayfish *Cherax quadricarinatus*, an Australian native, a globally important aquaculture species, along with its congeners, since the late 1980's, was introduced to Jamaica for cultivation in 1993. This dissertation examines its distribution in the Black River and Rio Cobre systems, and the physicochemical parameters influencing this; the morphometrics, diet and reproduction of the species; its impact on indigenous shrimp (*Macrobrachium* spp.), native snails (F. Physidae) and invasive snails (F. Thiaridae); and general socioeconomic impacts.

Using species distribution models (Maxent, GLM) to predict other suitable habitats for the redclaw, all Jamaican rivers were found to be vulnerable to invasion by *Cherax quadricarinatus*. The principal causal factors for distribution were hydrogeology and substrate, water velocity, elevation. The general habitat preferences of the species were low elevation sites with corresponding low velocities and dissolved oxygen levels, high temperatures, and fine substrate.

Carapace and chela lengths, chela width and fecundity (number of pleopodally attached eggs) were measured. Relationships between size and chela length/width and between size and fecundity were established using regression equations. Sexual dimorphism is exhibited by the species with significant variation in carapace and chela lengths, and chela width between males and females. Fecundity is size-dependent.

Although omnivorous, the crayfish are unlikely to structure freshwater gastropod communities through predation. However, their preference for macrophytes may indirectly

affect the benthic invertebrate communities in rivers by reducing the available food and vegetative substrate.

The range expansion by the redclaw throughout the Black River, largely by reducing the indigenous shrimp population by 60 to 90%, is probably the combined result of competition for shelters between *Cherax quadricarinatus* and *Macrobrachium spp.* and human-aided competitive displacement.

*C. quadricarinatus* is economically important, comprising an estimated 23% of the total catch volume and 37% (US\$867,000) of the total income (US\$2.6 million) generated annually from freshwater species in Black River.

Keywords: Sacha-Renée Todd, *Cherax quadricarinatus*, redclaw, crayfish, shrimp, introduced species, invasive, Black River, Rio Cobre, Jamaica