Implications of Hybridization between Introduced and Resident Orconectes Crayfishes

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Abstract: One of the most imperiled taxonomic groups in North American freshwaters is that of crayfish (Decapoda: Astacoidea): over 30% of the 390 species are threatend or endangered. This situation is globally significant because 80% of the world's crayfish species are North American. Few studies have examined the environmental changes that most threaten crayfish biodiversity, but competition and hybridization with non-native crayfishes appear to be among the most important threats to native crayfishes. The rusty crayfish, Orconectes rusticus, native to southwestern Ohio has been introduced widely throughout the United States and is displacing two resident taxa, O. propinquus and O. virilis, in northern Wisconsin. Using morphological and allozyme comparisons of crayfish from allopatric and sympatric populations, we tested whether O. rusticus is hybridizing with the resident crayfishes in northern Wisconsin. We found no evidence of hybridization between O. virilis and either O. rusticus or O. propinquus. In contrast, numerous morphologically intermediate crayfish between O. rusticus and O. propinquus occurred at sympatric sites, and many of these individuals possessed allozymes diagnostic for both species in allopatry. Over 6% of the crayfish at one sympatric site were putative F₁ hybrids, 4% were putative F₂ individuals (hybrid × hybrid origin), and 13% were putative backcrosses (product of hybrid × parental matings). This is the first genetic documentation of hybridization between a resident and invading crayfish. Our results suggest that genetic mechanisms play a role in the extirpation of O. propinquus by O. rusticus and are consistent with observations of other researchers suggesting that hybridization with non-native species is common among crayfishes at many other locations. High rates of endemism and widespread introductions of non-native crayfish suggest that invasions and hybridization are a major threat to crayfish biodiversity.