

Effects of littoral habitat and fish predation on the distribution of an exotic crayfish, *Orconectes rusticus*

MARK W. KERSHNER¹ AND DAVID M. LODGE

Department of Biological Sciences, University of Notre Dame, Notre Dame, Indiana 46556 USA

Abstract. In northern Wisconsin lakes, patterns of spatial distribution of an exotic crayfish, *Orconectes rusticus* (Girard), were related to differences in four littoral zone habitats: cobble, sand, macrophyte/firm (vegetated firm sediments), and macrophyte/muck (vegetated soft sediments) in northern Wisconsin lakes. Field surveys of crayfish abundance and mortality rates of tethered crayfish were used to determine the relationship of habitat-specific predation risk to cross-habitat patterns of crayfish distribution. Predation risk differed significantly across habitat types; crayfish on sand (particularly small crayfish, 15–18 mm carapace length) experienced significantly higher predation than crayfish in either cobble or macrophyte habitats, which were not significantly different. Crayfish use of cobble and sand habitats was inversely related to habitat-specific predation risk, whereas use of macrophyte/firm and macrophyte/muck habitats was not related to predation risk. Crayfish use of these latter habitats may be related to physical attributes of substrate (e.g., physical impediment to crayfish movement). An additional survey of crayfish habitat use and fish predator density in seven lakes was consistent with these results. Crayfish were overrepresented in cobble relative to its availability, used sand in proportion to its availability, and were underrepresented in macrophytes. Among the seven lakes, crayfish use of cobble was significantly and positively correlated with lakewide predator density, suggesting the potential importance of predation risk in structuring patterns of crayfish distribution. The combination of the crayfish's association with cobble habitat and the low predation risk associated with cobble suggests that cobble availability may significantly influence the success of *O. rusticus* invasions.

Key words: *Orconectes rusticus*, crayfish, predation, littoral zone habitats.