

Mortality in female horseshoe crabs (*Limulus polyphemus*)  
from biomedical bleeding and handling: implications for  
fisheries management

A.S. Leschen\* and S.J. Correia

Massachusetts Division of Marine Fisheries, New Bedford, MA, USA  
(Received 26 October 2009; final version received 25 February 2010)

Horseshoe crabs (*Limulus polyphemus*) are bled for biomedical purposes to produce Limulus Amebocyte Lysate (LAL), a valuable material used to detect endotoxins in medical devices and implants. Previous studies generally found mortality from the bleeding process of 5–15% with one study reporting 29% for females; the 15% value is now used for management purposes. However, most of these studies looked only at males, did not mimic handling practices typical of the biomedical facility in Massachusetts, or harvested females after the spawning season when much of the actual biomedical harvest occurs. Female mortality is of particular concern because they have greater importance than males for population dynamics, are preferentially harvested, and are more likely to be physiologically stressed than males because of energy outlay for egg production. We examined the mortality of unbled female horseshoe crabs versus that of crabs bled by the local biomedical company and either returned directly to water, or held overnight as is the current practice. Mortality of Control (unbled) crabs was low (3%) and differed significantly ( $p < 0.001$ ) from that of either bled group (22.5% and 29.8% mortality, respectively); the two bled groups did not differ significantly from each other ( $p = 0.31$ ). Mortality rates in bled treatment groups were double those used in current management of the biomedical fishery. The bait and biomedical fisheries are managed differently because biomedical is considered a low-mortality ‘‘catch and release’’ fishery. States and interstate management agencies may want to re-examine policies surrounding biomedical horseshoe crab harvest based on these results.

Keywords: horseshoe crab; *Limulus polyphemus*; biomedical bleeding; lysate; sex ratio; Pleasant Bay; harvest