ABSTRACT:

Grear, Jason, Dodi Borsay-Horowitz and Ruth Gutjahr-Gobell. 2009. Effects of seawater acidification on the life cycle and fitness of opossum shrimp populations. Oral Presentation. December 4, 2009. University of Maine. Orono, Maine.

Much of the current concern about ecological effects of ocean acidification focuses on molluscs and coccolithophores because of their importance in the global calcium cycle. However, many other marine organisms are likely to be affected by acidification because of their known physiological sensitivity to changes in acid-base balance. Predicting effects of this organismal sensitivity on marine populations would be improved by study systems that possess population-level attributes such as age structure and competition. In addition, evolutionary adaptation to reduced pH is an oft-cited ameliorating factor, but is untestable without a population-level approach. Thus, there is a need to integrate formal methods of experimental population ecology into studies of ocean acidification. To that end, we developed an observational scheme for *Americamysis bahia* that allows estimation of vital rates for specific life stages, but within the context of functioning populations. We are using this system in factorial experiments with four food resource levels and two seawater pH levels, which we manipulate using gaseous carbon dioxide. Results thus far show that, for food resource treatments, population fitness is more strongly affected by reductions in adult survival than by changes in neonate survival, juvenile survival or fecundity, whereas for pH treatments, population fitness is more strongly affected by reductions in neonate survival than by changes in juvenile survival, adult survival or fecundity. The difference between our low pH and seawater control treatments is at the upper extreme of changes predicted to occur in surface waters in the next several centuries, so future work will focus on the pH control system as well as extension of our estimation methods to field settings and other species.

KEYWORDS: ecological risk assessment; population model; crustacea; mysid; Americamysis bahia; demography; matrix model; inverse demographic estimation; experiment; pH; seawater acidification; ocean acidification; survival; fecundity; population growth rate; carbon dioxide; CO2