ABSTRACT:

Grear, Jason, Doranne Borsay Horowitz and Ruth Gutjahr-Gobell. 2010. Complex population responses to food resources in the marine crustacean *Americamysis bahia*. Oral Presentation. 2010 NEAEB Conference. 34th Annual Meeting of the New England Association of Environmental Biologists, March 17-19, 2010. Newport, Rhode Island.

Most observations of stressor effects on marine crustaceans are made on individuals or even-aged cohorts. Results of these studies are difficult to translate into ecological predictions, either because life cycle models are incomplete, or because stressor effects on mixed age populations may differ from those observed in cohort studies. This problem is evident in several important environmental applications of population ecology, including ecological risk assessment of chemicals and futures analyses of ocean acidification. In particular, investigators have acknowledged the need for life cycle approaches in predicting adaptive responses to changing environments. To address this need, we developed an observational scheme that allows estimation of stage-specific vital rates (e.g., juvenile survival, adult survival, fecundity) from observations of mixed age *Americamysis bahia* populations. We used this system to examine life cycle responses to resource limitation (i.e., feeding rates), which is an oft-cited complication in applied population ecology. Population responses to resource limitation were driven primarily by changes in adult survival rather than early life stage survival or fecundity. However, we also observed complex compensatory responses, where impairments in one part of the life cycle were partially offset by improvements in other vital rates. This contrasts with cohort-based results, where resource effects on each vital rate were always positive. Our study suggests that emphasis in stressor-response studies on early life stages and even-aged cohorts may miss important demographic responses and should be augmented by observations of intact populations, especially as methods such as ours become more available.

KEYWORDS: ecological risk assessment; population model; crustacean; mysid; *Americamysis bahia*; demography; matrix model; inverse demographic estimation; experiment; survival; fecundity; population growth rate; cohort; dose-response