

Most studies of animal responses to CO<sub>2</sub>-induced ocean acidification focus on isolated individuals or uniformly aged and conditioned cohorts that lack the complexities typical of wild populations. These studies have become the primary data source for meta-analytic predictions about higher level ecological responses in populations and ecosystems. We assessed whether cohort responses were predictive of population responses in the mysid *Americamysis bahia* to increased CO<sub>2</sub> by bubbling CO<sub>2</sub>-enriched and un-enriched air into the seawater supply in flow-through aquariums. The seawater supply was a continuous tempered input from lower Narragansett Bay (Rhode Island, USA), so effects of diurnal photosynthesis/respiration cycles on carbonate chemistry were conserved in the experiments. The cohort study was initiated with 1-day old groups of individuals, whereas the 5-month population study consisted of intact, stage-structured populations. The CO<sub>2</sub> treatment reduced neonate abundance in the cohort experiment but not in the longer term population experiment. This difference suggests that, although standard cohort tests provide critical insight into biological responses, they should be complimented by studies of intact populations where biological responses may be reshaped by competition, acclimation, and evolution.