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Global Warming Has Uneven Effect On Coastal Animals

Although it is expected that populations of many organisms will move away from the equator and toward the poles to stay cool during global warming, researchers have found that the intertidal zone does not exactly fit this pattern. A study published in this week's Science Magazine indicates that there may be "hot spots" at northern shoreline sites within the next three to five years. This is partly due to the timing of the tides.

"Because they are assumed to live very close to their thermal tolerance limits, organisms inhabiting the rocky intertidal zone have emerged in recent years as potential harbingers of the effects of climate change on species distribution," explain the authors, three of whom are from the University of California, Santa Barbara.

Coauthor Carol Blanchette, a researcher with the Marine Science Institute at the University of California, Santa Barbara, says that neither air nor water temperatures alone are good proxies for body temperatures in intertidal organisms. Multiple climatic factors drive body temperature and the pattern of exposure to these conditions is influenced by shifts in the tidal cycle with latitude.

The researchers put temperature loggers, modified to thermally match living mussels, in mussel beds at eight sites spanning 14 degrees of latitude ranging from northern Washington to Point Conception, Calif. and measured temperatures over the course of a year.

They found that Lompoc Landing, Calif., one of the more southern sites, was thermally very similar to Tatoosh Island, Wash.--the northernmost site where instruments were deployed.

In several cases the animals in southern sites are submerged in the afternoon. "As a result, even if terrestrial climatic conditions become progressively hotter as one moves south along the West Coast, as they likely do, animals at southern sites may be afforded considerable protection by being submerged during the hottest parts of the day," explain the authors.

The article states that "an examination of tidal height predicts that maximum exposure at many northern Washington sites will occur in 2003. Indeed, large mussel mortality events occurred in the summer of 2002 in both Washington and Oregon. These results suggest that, all other factors being equal, the relative level of thermal stress observed between these sites will vary markedly over time."

Patricia M. Halpin and Gretchen E. Hofmann, both from UCSB, were also coauthors on the article. The first author is Brian Helmuth of the University of South Carolina. Christopher D. G. Harley and Michael O'Donnell, both of Stanford University were also coauthors.

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