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Spatial trends in community richness, diversity, and evenness across rocky intertidal environmental stress gradients in eastern Canada

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ABSTRACT: An environmental stress model (ESM) developed by B. A. Merriam and colleagues predicts how local-scale richness and diversity (terms often used interchangeably) should vary with environmental stress. We tested model predictions by sampling across vertical (elevation) and horizontal (wave/ice exposure) stress gradients on the Gulf of St. Lawrence (which freezes in winter) and open Atlantic (which does not freeze in winter) winter conditions are harsher than on most temperate shores studied previously. Results matched predictions across vertical gradients (richness and diversity were lowest in high elevation, decreasing stress) and across horizontal gradients on the Gulf coast (richness and diversity showed an opposite trend). The spatial changes in evenness were not related to wave/ice exposure) but not entirely on the Atlantic coast (richness and diversity showed an opposite trend). The spatial changes in evenness were not related to wave/ice exposure. Richness and diversity were higher on the Atlantic than on the Gulf coast. Our study indicates that stronger physical stress (winter ice scour) on the Gulf coast. Our study indicates that such differences might occur, future ESM studies should investigate both vertical and horizontal gradients. Richness determines diversity.

KEY WORDS: Diversity · Elevation · Environmental stress gradient · Evenness · Ice scour · wave exposure

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