Fecundity of Shrimp and Sea Spiders Under Contrasting Conditions of Food Availability Along the West Antarctic Peninsula

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I certify that I have read this thesis and that, in my opinion, it is satisfactory in scope and quality as a thesis for the degree of Bachelor of Science in Global Environmental Science.

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ABSTRACT

Glacio-marine fjords in the West Antarctic Peninsula (WAP) experience intense seasonal pulses of phytoplankton production and organic carbon flux to the seafloor, and appear to be productivity hotspots compared to the open continental shelf. The amount of seasonal productivity supplies food to the benthos, potentially influencing the fecundity of various Antarctic brooding species. I investigated the trade-offs between fecundity and life-history traits (egg size and body size) of a pycnogonid (Nymphonidae sp. 1) and the decapod *Notocrangon antarcticus* in a relatively food-rich fjord compared to relatively food-poor shelf habitats along the WAP. Measurements of egg diameter, body size, and total egg volume were compared for each taxon in the fjord and on the open continental shelf. There were significantly larger mean egg size, body size, and individual egg volume for both species on the shelf compared to the fjord. Within a species, pycnogonids showed a strong positive relationship between body size and fecundity in the fjord and on the shelf, while decapods showed a strong positive relationship between body size and fecundity only on the shelf and a strong negative relationship between egg size and fecundity on the shelf. When looking at the relationship between total egg volume and body size (i.e. reproductive effort), pycnogonids showed a significant relationship in the fjord and on the shelf, with fjord egg volume being much larger at a given body size. Decapods show a significant relationship only on the shelf and total egg volume largely overlaps between fjord and shelf habitats. This suggests that pycnogonids are adapted to utilize the food-rich conditions in the fjord to enhance their overall fecundity, while decapods are not. Understanding energy allocation to reproductive

processes as along the WAP, is crucial because climate change is expected to alter the flux of food to the benthos in this region.