



Press Release

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King crabs threaten seafloor life near Antarctica

Honolulu, HI – King crabs and other crushing predators are thought to have been absent from cold Antarctic shelf waters for millions of years. Scientists speculate that the long absence of crushing predators has allowed the evolution of a unique Antarctic seafloor fauna with little resistance to predatory crabs. A recent study by researchers from the University of Hawaii, Duke University, Ghent University, Lamont-Doherty Earth Observatory, and Hamilton College, indicates that one species of king crab has moved 120 km across the continental shelf in West Antarctica and established a large, reproductive population in the Palmer Deep along the west Antarctic Peninsula.



An invasive king crab (*Neolithodes yaldwyni*) from the Antarctic shelf waters.

Image courtesy Craig Smith, SOEST/UHM

“This is a very interesting discovery for several reasons,” said Craig Smith, Professor of

Oceanography at the University of Hawaii - Manoa. “First, it provides evidence that king crabs can now disperse across the Antarctic shelf, and reproduce in at least some Antarctic shelf waters. It also suggests that these predatory king crabs will cause a major reduction on seafloor biodiversity as they invade Antarctic habitats because they appear to be eating all the echinoderms in the Palmer Deep.”

The researchers used a remotely operated vehicle (or ROV) to explore the seafloor around Antarctica, and to evaluate the abundance and foraging behavior of king crabs in the Palmer Deep. They found that the king crab, a species known as *Neolithodes yaldwyni*, is acting as a major “ecosystem engineer,” digging in soft sediments, preying on seafloor animals and altering basic habitat structure at the ocean bottom. Echinoderms, such as sea lilies, brittle stars, asteroids and sea urchin, which generally are common and diverse in Antarctic waters, were wholly absent in the crab zone in Palmer Deep. The crab population in Palmer Deep was also both reproducing and surprisingly large; the researchers estimate that more than 1 million crabs live in the area of 146 km² in water deeper than 950 m in Palmer. Smith and co-workers also found that the Palmer Deep and Antarctic shelf waters are warming rapidly enough that the king crabs may be able to colonize the vast west Antarctic Peninsula shelf at depths of 400-600 within 1-2 decades; such colonization could have devastating ecological effects for the major components of the unique Antarctic fauna.

In the future, Smith and colleagues hope to conduct population genetic studies of the Palmer Deep king crab to reconstruct its colonization history, and to see whether this population is connected to populations of the same species in deep-water on the other side of Antarctica. These studies could help to predict how king crabs may disperse and colonize new habitats in Antarctic waters in the coming decades.

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Proceedings of the Royal Society B: A large population of king crabs in Palmer Deep on the West Antarctic Peninsula shelf and potential invasive impacts; Craig R. Smith, Laura Grange, David L. Honig, Lieven Naudts, Bruce Huber, Lionel Guidi and Eugene Domack
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