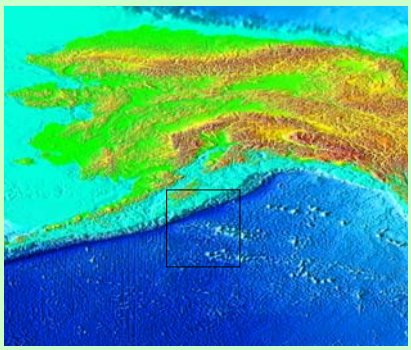
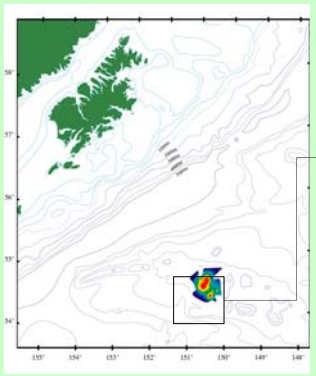
Ecology of Deepwater Crabs on a Gulf of Alaska Seamount studied with the DS/V Alvin

Bradley G. Stevens and
William E. Donaldson

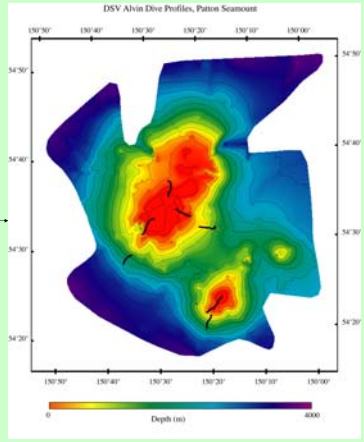


Seamount chains extend across the Gulf of Alaska from SE to NW, showing the direction of movement of the N. Pacific crustal plate. Patton Seamount is centered in the box (enlarged at right).

As commercial crab fisheries have declined in Alaska, **seamounts and other remote ecosystems have come under increasing scrutiny as locations for potential fisheries.** In July 1999, we made 8 dives on Patton Seamount (54.5° N, 150.5° W) in the Gulf of Alaska to investigate the depth distribution, habitat use, and general ecology of four commercial crab species in a **habitat which has remained essentially undisturbed by fishing activity.** Target species were golden and scarlet king crab (*Lithodes aequispina* and *L. couesi*), and grooved and triangle Tanner crabs (*Chionoecetes tanneri* and *C. angulatus*). Several other species were observed including two species of *Paralomis* and two galatheids. A big surprise was the presence of the giant spider crab, *Macororegonia macrochira*, previously reported only from the Emperor seamounts (42° N) and the Endeavor Ridge (48° N). This project was supported by a grant from the West Coast and Polar Regions Undersea Research Program, University of Alaska, Fairbanks, AK, and the Woods Hole Oceanographic Institute.



Patton Seamount is 450 km SE of Kodiak Island.



Patton seamount rises from depths of ~4000 m to ~150 m. The top is a broad plain, 10 x 20 km, with average depth of 600 m.

The giant large-clawed spider crab *Macroregonia macrochira*, had never been observed or captured in the Gulf of Alaska (54.5 ° N). It is the most abundant crab below 1000 meters, virtually the only crab below 2000 meters, and ranged to at least 3240 m.

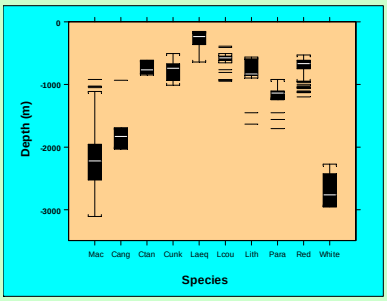
The grooved Tanner crab, *Chionoecetes tanneri*, and its congener *C. angulatus*, were uncommon on Patton Seamount, as were their preferred habitats of sand and gravel

Golden king crabs, *Lithodes aequispina*, were abundant on the upper surface and rocky pinnacles of Patton Seamount. They preferred rocky habitats. Several mating pairs were seen and captured, as above.

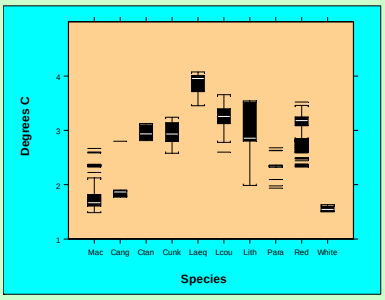
Scarlet king crab, *Lithodes couesi*, were also fairly common on rocky substrates, at greater depths than *L. aequispina*.

Paralomis verilli and *P. multispina* were present in moderate numbers, but difficult to distinguish from *Lithodes spp.* without capture.

The red galatheid *Chirostylus* sp., was the most abundant crab on the seamount, hiding among broken rock and perched atop soft corals.



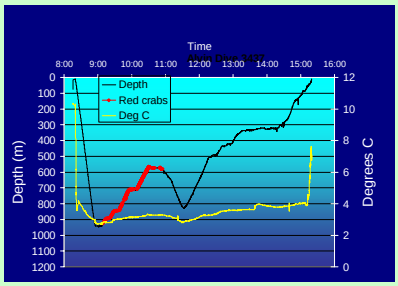
Depth distributions are narrowest for shallow water species and widest for deeper species. Outliers were verified by capture. Lith = unidentified *Lithodes*. Red and white are galatheids.



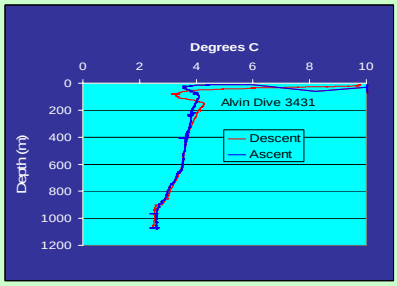
Conversely, temperature ranges are narrow for deep species and wider for shallow species, probably reflecting the variability at each depth.

Only 4 specimens of this galatheid crab were observed, all on rock near 2690 m.

A mature male *M. macrochira* in it's preferred sandy habitat, can be distinguished by their large claws, often exceeding 50 cm.



This dive profile shows that red galatheid crabs were abundant from 550 to 930 m on the rocky outer slopes of the seamount, but were absent from sandy-gravely slopes in the same depth range.

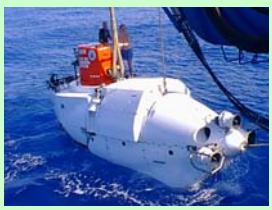


A steep thermocline and shallow temperature minimum occurred in the waters over Patton Seamount. Differences between descent and ascent recordings reflect the lag time of the sensors.

Mating pairs of *Paralomis* and *L. couesi* were observed only on the top or sides of large vase sponges.

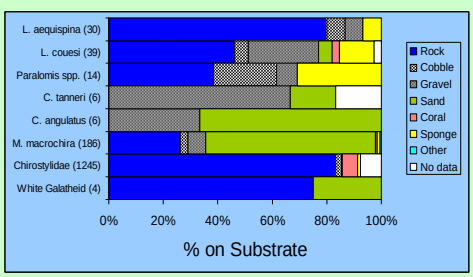
Mature female *M. macrochira*, (note her small claws), were observed preying on soft corals.

Golden king crabs were most abundant on the shallow rocky pinnacles and ridges.



Launching *Alvin* for another dive. Weather in Alaska usually requires more appropriate attire. Photo courtesy of WHOI.

Each crab species showed distinct preferences for certain habitats. *L. couesi* and *L. aequispina* differed by depth (above) as well as their preference for rocky habitat. *C. tanneri* and *C. angulatus* seemed to differ in their preference for gravel over sand, but few were observed. *M macrochira* preferred the deep sandy plains, or solid rock substrates. Red galatheids preferred broken rock, but many were observed perched atop large gorgonian corals. (*n* observed in parentheses).



Conclusions & Recommendations

Chionoecetes spp. are sparse on steep-sided seamounts due to the lack of sandy habitats at appropriate depths.
Lithodes spp. are common on rocky slopes and pinnacles, but their abundance may not support commercial fisheries.
M. macrochira may be endemic across the abyssal North Pacific, at depths that would prevent viable fisheries.
Many species of corals, sponges, and seastars were observed and collected for taxonomic studies.
N. Pacific seamounts harbor an incredible array of biological diversity and should be protected as a refuge/source for population production in coastal waters.

Dr. Bradley Stevens, holding a captured specimen of *M. macrochira*.

NMFS, Kodiak Fisheries Research Center
301 Research Ct., Kodiak, AK 99615
Bradley.g.stevens@noaa.gov