Reproductive Characteristics of the A’ama Crab Grapsus tenuicrustatus.
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Abstract
The purpose of this study was to describe reproductive periodicity, size at first reproduction and fecundity in the A’ama Rock Crab, Grapsus tenuicrustatus, commonly found in Hawaii. Crabs were collected at Clissold’s Beach (N21°13’22.56” W157°55’05.56”) in Laie, Hawaii and were measured using calipers. The appearance of the eggs was noted. Gravid females were preserved and eggs were extracted and weighed to determine total fecundity. Gravid females were present from December through April. The average carapace width for gravid females was 38.44mm (8.48SD). The smallest carapace width of a gravid female was 32cm. Fecundity measurements ranged from 7,375 to 99,000 with an average of 35,583 eggs per individual (27,287.97SD). A linear regression showed a significant relationship (p<0.001) between carapace width and fecundity, with a R² value of 0.93.

Introduction
Intertidal crabs in the family Grapsidae commonly occur throughout the world. These crabs demonstrate great diversity in reproductive periodicity, size at first reproduction and fecundity. The Rock Crab (Grapsus tenuicrustatus) commonly known in Hawaii as the A’ama, is also a member of the Grapsidae family and has been used as bait as well as a food source in the islands for many years (Edmondson 1959). Due to its use as a food source, the A’ama has become a commercial item whose local fishery is monitored by the State of Hawaii Department of Land and Natural Resources. There is no published information on the life history or reproductive characteristics of this particular species and very little published on other species within the genus, Grapsus adscensionis on Ascension Island in the South Atlantic becomes reproductively mature at 43 mm carapace width (Hartnoll 2009). Grapsus albolineatus, which occurs along the shores of Hong Kong, has a reproductive season from April to November, with 90% of the population peaking in June (Kennish 1997).

Materials and Methods

Reproductive Periodicity
Crabs were collected monthly from Clissold’s Beach in Laie, Hawaii (N21°13’22.56” W157°55’05.56”) from March 2010 to September 2011. Samples were collected by hand, at night, using a flashlight. Presence or absence of eggs in female crabs was recorded.

Size at First Reproduction
The carapace size of each crab was measured to the nearest mm using calipers.

Fecundity
All gravid females were preserved in formalin. The telson and eggs of each female were carefully removed and placed in separate containers. Counting the total number of eggs in each mass was impractical due to high numbers. Five subsamples of 25 eggs were removed using a dissecting microscope. Each subsample was blotted off and weighed using an Analytical Balance after which a mean was calculated. Total weight of the egg mass was then determined after blotting and weighing on the same balance. Total fecundity of each gravid female was extrapolated.

Results

Reproductive Periodicity
Gravid females were found from December through April, with the exception of February (Figure 1). Of the 77 females captured, only 13 were gravid.

Size at First Reproduction
The average carapace width for these gravid females was 38.44mm (8.48SD). The smallest carapace width of gravid females was 32cm.

Fecundity
Fecundity measurements ranged from 7,375 to 99,000 with an average of 35,583 eggs per individual (27,287.97SD) (Figure 2). A linear regression showed a significant relationship (p<0.001) between carapace width and fecundity, with a R² value of 0.93.

Conclusions

Reproductive Periodicity
Gravid females were found from December to April, indicating a reproductive periodicity of five months. There were no gravid females found during February probably due to the small sample size of females. These findings are different from Kennish’s 1997 findings, that crabs in Hong Kong reproduce from April till November. Despite the fact that both species (in Hawaii and Hong Kong) live in subtropical environments at almost the same latitude in the Northern Hemisphere there is almost no overlap in reproductive periodicity. This may indicate that day length is not the main environmental cue for grapsid reproduction or that environmental cues may differ with site.

Size at First Reproduction
The smallest gravid female was 32mm, indicating this may be the size at first reproduction. This size is smaller than Grapsus adscensionis studied by Hartnoll (2009).

Fecundity
During the reproductive season, female A’ama’s can brood between 7,000-99,000 eggs at a time. There was a direct correlation between CW and fecundity indicating that the larger the crab the higher the fecundity. These data make predictions about expected fecundity possible based on carapace width. Based on the data reported in this study, State of Hawaii Department of Land and Natural Resources should consider limiting collecting during the reproductive months of December through April. Special attention should also be paid to size limits.

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References