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Growth of the California spider crab, Loxorhynchus grandis.

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by

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ABSTRACT

Growth of the California spider crab, Loxorhynchus grandis.

by

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The sheep crab, Loxorhynchus grandis, supports a small but stable fishery along the south-central California coast. As with other majid crabs, growth patterns differ from those of other economically important crabs found in California. This study examined relative, determinate, and absolute growth in L. grandis; that information was used to discuss possible management strategies that may be needed if further expansion of the fishery occurs.

Adult male carapace lengths (CL) ranged from 110 mm - 238 mm, with adult female crabs overlapping the smaller adult male sizes (CL = 110 mm - 170 mm). Juvenile male crabs measured up to 170 mm CL, with juvenile females obtaining an approximate maximum size of 125 mm. Relative growth analysis detected a molt of puberty (morphometric puberty) in both sexes. This critical molt occurs over a

size range of 110 mm - 170 mm for male sheep crabs and from 100 mm - 125 mm for females. A relative change in chela length is used to distinguish the molt of puberty in male crabs. Males with large claws also have a diastema in the serrated gape of the claw. Adult females may be distinguished from juvenile females by allometric changes in abdomen width. In addition to the molt of puberty, a prepubertal molt in the males was apparent at approximately 79 mm CL.

Studies on determinate growth indicated that both male and female sheep crabs cease molting after attaining the morphometric molt of puberty. Evidence supporting the existence of a terminal molt in L. grandis includes: 1) Relative growth analyses identify three distinct groups of males: small and large juveniles and morphometrically adult animals. The very wide adult size range can be explained by variations in juvenile size range and associated molt increments; 2) Experimental autotomy induced molting in large juvenile animals but not in adults; 3) Development of a second carapace has only been seen in juvenile crabs, never in adult crabs, regardless of size or carapace condition; 4) The breakage plane of autotomized limbs becomes calcified in adults, not permitting regeneration. Contrarily, juveniles develop a soft, leathery membrane

in the coxal stump associated with regeneration; 5) Only adults undergo substantial carapace abrasion; and 6) Only adults become encrusted with large individuals of various fouling species.

Absolute growth studies of animals held for varying periods of time in flow-through aquaria revealed that size and holding time impact growth of *L. grandis*, while parasitism, limb loss, and limb regeneration do not. For both sexes, juvenile molt increments decreased with increased body size. An average increase of 30% per molt occurred at smaller sizes, decreasing at larger sizes to an average of 25% for males and 27% for females. Just prior to maturity, the percent increase in size decreased significantly. Males exhibited a 21% increase in size associated with the molt of puberty and females a 23% increase at this critical molt. No significant difference in molt increment was detected between sexes; however, the effect of maturity was different for males and females. Females experience a significant decrease in molt increment, whereas males do not. Holding time was associated with the pattern observed for females molting to maturity; increments increased with holding time, and the smallest adult females underwent the molt of puberty several months after collection. Molt intervals increased with increased body size for both males and females. Studies of molting frequency for females

indicate a monthly molt in small sizes (< 25 mm). Intermolt intervals increase to bimonthly for crabs 25 mm - 60 mm and to intervals of up to 3 months for juveniles larger than 60 mm. An instar duration of approximately 5 months was obtained for one female molt of puberty. Using growth diagram techniques, a 10 mm female is estimated to take at least 2 years to reach maturity.

From this information on growth, the applicability of commonly used management schemes are analyzed. However, recommendations for a potential management strategy are limited because further research on reproductive aspects is needed.

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