Abstract

The queen conch Strombus gigas represents one of the most important fishery resources of the Caribbean but heavy fishing pressure has led to the depletion of stocks throughout the region, causing the inclusion of this species into CITES Appendix II and IUCN’s Red-List. In Mexico, the queen conch is managed through a minimum fishing size of 200mm shell length and a fishing quota which usually represents 50% of the adult biomass. The objectives of this study were to determine the intrinsic population growth rate of the queen conch population of Xel-Ha, Quintana Roo, Mexico, and to assess the effects of a regulated fishing impact, simulating the extraction of 50% adult biomass on the population density. We used three different minimum size criteria to demonstrate the effects of minimum catch size on the population density and discuss biological implications. Demographic data was obtained through capture-mark-recapture sampling, collecting all animals encountered during three hours, by three divers, at four different sampling sites of the Xel-Ha inlet. The conch population was sampled each month between 2005 and 2006, and bimonthly between 2006 and 2011, tagging a total of 8292 animals. Shell length and lip thickness were determined for each individual. The average shell length for conch with formed lip in Xel-Ha was 209.39±14.18mm and the median 210mm. Half of the sampled conch with lip ranged between 200mm and 219mm shell length. Assuming that the presence of the lip is an indicator for sexual maturity, it can be concluded that many animals may form their lip at greater shell lengths than 200mm and ought to be considered immature. Estimation of relative adult abundance and densities varied greatly depending on the criteria employed for adult classification. When using a minimum fishing size of 200mm shell length, between 26.2% and up to 54.8% of the population qualified as adults, which represented a simulated fishing impact of almost one third of the population. When conch extraction was simulated using a classification criteria based on lip thickness, it had a much smaller impact on the population density. We concluded that the best management strategy for S. gigas is a minimum fishing size based on a lip thickness, since it has lower impact on the population density, and given that selective fishing pressure based on size may lead to the appearance of small adult individuals with reduced fecundity. Furthermore, based on the reproductive biology and the results of the simulated fishing, we suggest a minimum lip thickness of 15mm, which ensures the protection of reproductive stages, reduces the risk of overfishing, leading to non-viable density reduction. Rev. Biol. Trop. 62 (4): 1343-1352. Epub 2014 December 01.
Keywords
Fishery management, fishing sustainability, overfishing, population simulation, population viability, sexual maturity.