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MARINE MATTERS

Biology and conservation of the giant marine snail *Adelomelon beckii* in Argentina

By Florencia Arrighetti & Pablo E. Penchaszadeh

The giant volutid snail *Adelomelon beckii* (Broderip, 1836) (Fig. 1) is endemic to the western south Atlantic shelf and is distributed from Espiritu Santo (Brasil) to Tierra del Fuego (Argentina) (Weaver & du Pont, 1970). This species inhabits sandy bottoms in water depths of 40-70 m (Weaver & du Pont 1970). It often exceeds 40 cm and sometimes reaches up to 50 cm in shell length (Rios, 1994). This species preys on another carnivorous snail, *Zidona dufresnei* (see Arrighetti, 2009), and on other gastropods and bivalves (Weaver & du Pont, 1970), positioning it among the top benthic predators in the food web. Population densities of *A. beckii* have always been reported as very low (e.g. Carranza *et al*., 2008). This species is harvested as part of the bycatch by fishing trawlers exploiting shrimp and commercial fish, and its muscular foot is used for human consumption and its large attractive shell is sold in local and international markets as an ornament (Fig. 2).

Fig. 1. Pablo E. Penchaszadeh (left) and Florencia Arrighetti (right) holding shells of mature *Adelomelon beckii.* On the table, a shell of a juvenile specimen.

The age at which 50 % of the population reaches gonadic maturity is around 14 years for females (25.6 cm shell length) and 11 years for males (21.9 cm shell length) (Arrighetti & Penchaszedeh, 2010a). The reproductive cycle in the Mar del Plata area (38ºS) involves two spawning periods, one during the austral spring (September-November) and the other during autumn (March-April) (Arrighetti & Penchaszedeh, 2010b). The semi-annual pattern shows a clear seasonality that could be related to variation in seawater temperature, an important environmental factor that regulates gonadal development and spawning in many gastropod species (Giese & Pearse, 1977). Males showed a continued gametic emission indicating that

Fig. 2. *Adelomelon beckii* shells for sale at a shop in Mar del Plata harbor, Argentina. In front, shells of individuals at reproductive size; behind in the right-hand basket, small shells of non- reproductive individuals, and in the left-hand basket, shells of *Zidona dufresnei*.

there is no relationship with variation in seawater temperature, an unusual pattern for a species from a temperate region. During copulation, the penis deposits the sperm into the bursa copulatrix of the female, where the sperm can be stored for a short period before fertilisation and spawning takes place. Thus this long period of maturity could allow males to increase the number of copulations and fertilise more females during a breeding season. The spawn consists of isolated egg capsules attached to a hard substrate, usually the external surface of an empty scallop shell, with 7-9 embryos per capsule (Penchaszadeh *et al*., 1999). Hatching snails crawl away from the egg capsule as juveniles of 17.2 ± 1.0 mm shell length. Imposex was reported in *A. beckii* in 2009 (Arrighetti, 2009). This genital abnormality is a widespread phenomenon caused by tributyltin (TBT), a compound used in antifouling paints (Gibbs *et al*., 1988), and was reported in 2001 for the first time in the South American Atlantic in coastal areas of Mar del Plata, also being found in gastropods associated with harbor waters (Penchaszadeh *et al*., 2001; Bigatti *et al*., 2009). *Adelomelon beckii* is the first offshore species in which imposex has been reported in Argentina.

Arrighetti *et al*. (2011) reported that *A. beckii* can reach 28 years of age at 380 mm shell length in the Mar del Plata region, being one of the most long-lived gastropods studied to date. The estimated fishing mortality of 0.129 y^{-1} appears to be fairly high for such a long lived species, and consequently the current exploitation rate of 0.614 is much beyond the optimum rate of 0.427. These findings indicate that the current exploitation regime exerts far too high a fishing pressure and will be unsustainable in the long run. Overexploitation is potentially more severe in a species lacking a planktonic opportunity for dispersal and that is affected by imposex, given that this phenomena is known to affect the reproductive activity of the population. Besides, *A. beckii* is important ecologically in the Mar del Plata upper shelf ecosystem because of its trophic position. Taking these factors into account, the current exploitation level may cause irrevocable changes in *A. beckii* populations and in the associated food web. We fear that without a proper management approach – including minimum size, no-catch periods and no-catch areas – this economically valuable and ecologically important species will be reduced to insignificant levels in the Mar del Plata area within a short period of time. According to the present data, we proposed a minimum catch size of 28 cm shell length for both sexes, allowing each female to spawn over at least two reproductive seasons, and to establish a closed season from September to November, when the most intense spawning events occur. This fishing measure should discourage their landing and in consequence the trade will disappear.

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