

**Predation of adult freshwater turtles in
a protected area in southernmost
Brazil**

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Predation has a major influence on population dynamics and distribution (Heithaus et al., 2002). In chelonia predation is particularly critical in the early stages of life, when eggs and hatchlings are consumed by birds, mammals and reptiles (Gonçalves et al., 2007). Adult females are also vulnerable to terrestrial predators while seeking and digging nests and laying eggs (Spencer, 2002).

Adult freshwater turtles are preyed by jaguars *P. onca*, cougars *Puma concolor* and black caimans *Melanosuchus niger* (Salera Junior et al., 2009a; 2009b). In addition, there are records of Brazilian radiolated swamp turtle *Acanthochelys radiolata* and Brazilian giant tortoise *Chelonoidis denticulata* predation by *P. onca* (Garla et al., 2001). This study provides data regarding predation on specific adult limnic species of chelonia, *Trachemis dorbigni*, *Phrynops hilarii* and *Hydromedusa tectifera*, in a protected federal area in southernmost Brazil.

The Taim Ecological Station (ESEC Taim) and the Mangueira Lake are located within the Coastal Plain, in southernmost Rio Grande do Sul State. It is a low-lying, flat land and predominantly wetland area, composed of swamps, dunes, sand and peat restinga forests (Waechter & Jarenkow, 1998).

In two different situations we observed the predation of *T. dorbigni* adults by small rodents and hawks, while *H. tectifera* and *P. hilarii* were exclusively preyed by hawks.

The first predation events occurred in the Caçapava Farm, located on the shores of the Mangueira Lake (32°50' S, 52°38' W), in September

1997 and 1998. Gravid females of *T. dorbigni*, *P. hilarii*, and *H. tectifera* were preyed by *Caracara plancus* hawks and other unidentified species. The hawks captured female turtles as they left the water to excavate nests. The hawks immobilized the turtles with attacks to the head, turned them over, putting their plastron face up, and pierced the epithelial tissue between the carapace and hind limbs, consuming only the eggs (Fig. 1). There are records of hawk predation on chelonian eggs (Ferreira et al., 2003; Gonçalves et al., 2007), but none in which the eggs were still inside the females.

The second situation occurred during August 2002 in the Taim wetland (32°32' S, 52°32' W). During the winter *T. dorbigni* becomes inactive, remaining buried in silt and organic matter at the bottom of lakes and swamps. In this month the average temperature was 14°C and rainfall was unusually heavy. Strong winds increased water turbulence and wave formation. Hundreds of *T. dorbigni* were carried by waves to the shoreline where they remained static, making them an easy prey for unidentified small rodents. The attacks resulted in forelimb injuries (Fig. 2) and several died. During a single day, 221 individuals were gathered and 33 died due to predation. There are records of hatchling and juvenile chelonia predation (Draud et al., 2004; Caut et al., 2008), but we have no knowledge of mass predation of adult freshwater turtles by small rodents.

Most chelonia predation studies focus on nests and hatchlings (e.g. Gonçalves et al., 2007). The early life stages do not determine a population's survival rate, although the low recruitment of juveniles may alter population sizes in the long term (Course et al., 1987). Likewise, the predation of adults may affect population conservation status due to low replacement rates and increasing extinction risks (Pough et al., 1993).

We believe that the predation by small rodents that we observed was an isolated and opportunistic event. Predation by hawks may be more common, providing predators with a protein-rich food resource (Ferreira et al., 2003; Gonçalves et al., 2007). Both types of predation provide important information towards conservation efforts and population management, especially when reflecting



Figure 1. *Trachemys dorbigni*, *Phrynops hilarii* and *Hydromedusa tectifera* females predated by hawks.



Figure 2. *Trachemys dorbigni* individuals with forelimb injuries due to predation by small rodents.

alterations in food habits.

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Low survivorship of *Rana dalmatina* embryos during pond surface freezing

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In western France one of the earliest breeding anurans is the agile frog (*Rana dalmatina*), which arrives at ponds during the first weeks of February depositing spawn soon after. The spawn may be laid on the bottom of ponds or attached to the stems of water plants or fallen twigs although most clumps gradually float to the surface and remain there until the tadpoles emerge (Fig 1a). This takes advantage of the warmer surface temperatures for increased speed of embryo development (Anaconda & Capietti, 1996) but during February freezing conditions are not uncommon and spawn may be at least partially enclosed in ice. A mild local climate (46°27'N) inevitably results in the ice melting the following day and hence the impact is usually minimal. The present note was prompted by the occurrence of abnormally low temperatures beginning February 2nd 2012 that lasted for around 10 days when daily air temperatures of around -9°C were experienced. This resulted in spawn clumps already present on the surface of ditches being encased in ice (Fig 1b).

To examine if the prolonged freezing impacted on embryo survivorship, two of three spawn clumps that were deposited previous to the cold spell were cut out of the ice on 9th February. These had been deposited in a ditch at a distance