

Comparing physiological disturbances of bycaught sea turtles in two types of fisheries, in Southern Brazil

Daphne W. Goldberg, Marcelo Pires Nogueira de Carvalho, Karina Flabian, Caiame Nascimento, Luiz Maçaneiro, Mariana Britto, Gilberto Salles, Juçara Wanderlinde, Bruno Giffoni

Sea turtle bycatch in different types of fishing gear may cause high rates of post-release mortality, contributing for the rapid decline of endangered populations. Turtles that survive incidental capture may present sublethal effects such as physical injuries, physiological disturbance as well as behavioral and reflex impairment. This study is an initiative of Projeto Tamar to reduce late mortality in fisheries and aims to evaluate the physical and physiological conditions of sea turtles immediately after being caught in two different types of gear: longline and trawling. In order to increase our knowledge on the sub-lethal effects of bycatch, blood samples were withdrawn from the dorsal cervical sinus of 18 turtles, from which 15 were *Caretta caretta*, two were *Chelonia mydas* and one was *Lepidochelys olivacea*. Thirteen loggerheads were captured in longline and two in trawling; two green turtles were captured in trawling and the only olive ridley was captured in longline. All turtles captured were immature, with CCL between 40 and 81 cm (67.53 ± 10.66), except for one adult loggerhead (CCL: 84.5 cm), considering the minimum values for nesting females in Brazil (CCL: 82 cm). The three individuals captured in trawling (two loggerheads and one green turtle) showed symptoms of drowning (lethargy, respiratory deficiency and foam in nares and mouth) and two of them died on board. Blood chemistry analyses revealed higher serum lactate (mean = 29.8 ± 4.26 mmol/L; N = 4), glucose (mean = 211.5 ± 53.97 mg/dL; N = 4) and corticosterone (mean = 36.61 ± 3.6 ng/mL; N = 4) levels for drowned turtles, captured in trawling, especially for the ones that died on board. This might be explained by the fact that capture by trawling leads to forced submergence, which requires increased anaerobic metabolism, producing higher levels of lactate (for gluconeogenesis). Moreover, bycaught turtles struggle to get back to the surface to breathe and both, physical and physiological stress may prompt an increase in corticosterone and blood sugar levels. On the other hand, longline-captured individuals exhibited lower serum lactate (mean = 16.73 ± 5.03 mmol/L; N = 14), glucose (mean = 106.71 ± 18.42 mg/dL; N = 14) and corticosterone (mean = 13.56 ± 7.19 ng/mL; N = 13) levels if compared to trawling-captured turtles. Turtles captured by shallow-set longline also struggle to escape, however, sometimes they are capable of surfacing to breathe, while hooked. No significant differences in serum ion levels were observed among bycaught turtles. The results presented here suggest that lactate and glucose serum levels might be used as biochemical predictors of delayed mortality of captured sea turtles. Additionally, under trawl conditions, the turtle must recover from any physiological disturbance before it is released back into the water, reducing late mortality rates for these animals.