Spatial analysis of incidental mortality as a threat for Franciscana dolphins (*Pontoporia blainvillei)*

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Fisheries bycatch is considered one of the main threats for most large marine vertebrates, such as seabirds, marine mammals, turtles and sharks (review, among others, by Shaughnessy *et al.* 2003, Read *et al.* 2006, Zydelis *et al.* 2009). Incidental entanglement is a direct human threat with a straightforward effect on species mortality. Three problems arise when results from bycatch research are translated into wildlife managment actions. First, predictions of population trends are normally weak because large-scale estimates of demographic parameters are difficult to generate (*e.g.*, Moore and Read 2008). Second, bycatch impact is rarely compared to other threats, such as depletion of prey base, ecosystem changes, habitat degradation or disease. The effects of these stressors are not always as conspicuous as bycatch, and may be more difficult to evaluate (Taylor *et al.* 2007). Third, fisheries can offer short-term benefits to some marine vertebrates that overshadow the long-term costs of this threat.

An emerging method since the development of GIS and spatial statistics is the comparison between distributions of species and threats that are formalized in habitat suitability models or ecological-niche models. These models relate presence-absence or abundance observations based on random or stratified field sampling with stressors and other environmental variables (Guisan and Thuilier 2005, Sims *et al.* 2008).

Franciscana dolphins (*Pontoporia blainvillei*) are small cetaceans restricted to shallow waters of the South Atlantic Ocean, from southeastern Brazil (18º25'S) to northern Patagonia (42º10'S) (Crespo *et al.* 1998). It has been classified as 'vulnerable' by the IUCN (Reeves et al 2008). There is no current abundance estimate for the species as a whole.

Incidental entanglement or bycatch of Franciscana dolphins was reported repeatedly: Di Beneditto *et al.* (2001), Kinas (2002), Dans *et al.* (2003), Freitas Netto and Barbosa (2003), Secchi (2003), Bordino and Albareda (2005), Cappozzo *et al.* (in press). IUCN defines incidental mortality in gillnet fisheries as the main threats to this species (Reeves *et al.* 2008). Secchi *et al.* (2001) first estimated bycatch in the overall Franciscana population via population abundances based on aerial surveys. They calculated that removal by gillnets ranged between 1.1% and 3.5% per year. The Scientific Committee of the International Whaling Commission has noted that incidental mortality of 1% is sufficient for concern about the conservation future of coastal dolphins. However the various assumptions and parameters of these estimations are difficult to test. For example, Secchi *et al.* (2001) counted an average of 4.25