

Evidences of predation and scavenging by large predatory sharks upon specimens of striped dolphin (*Stenella coeruleoalba*) and short-beaked common dolphin (*Delphinus delphis*) stranded in the coast of Southern Sardinia.

LAGUNA di NORA 

Luca Zinzula, Andrea Orrù, Alberto Russo, Alessandra Sulis, Tiziano Storai, Giovanni Lenti, Daniela Fadda and Giuseppe Ollano*.

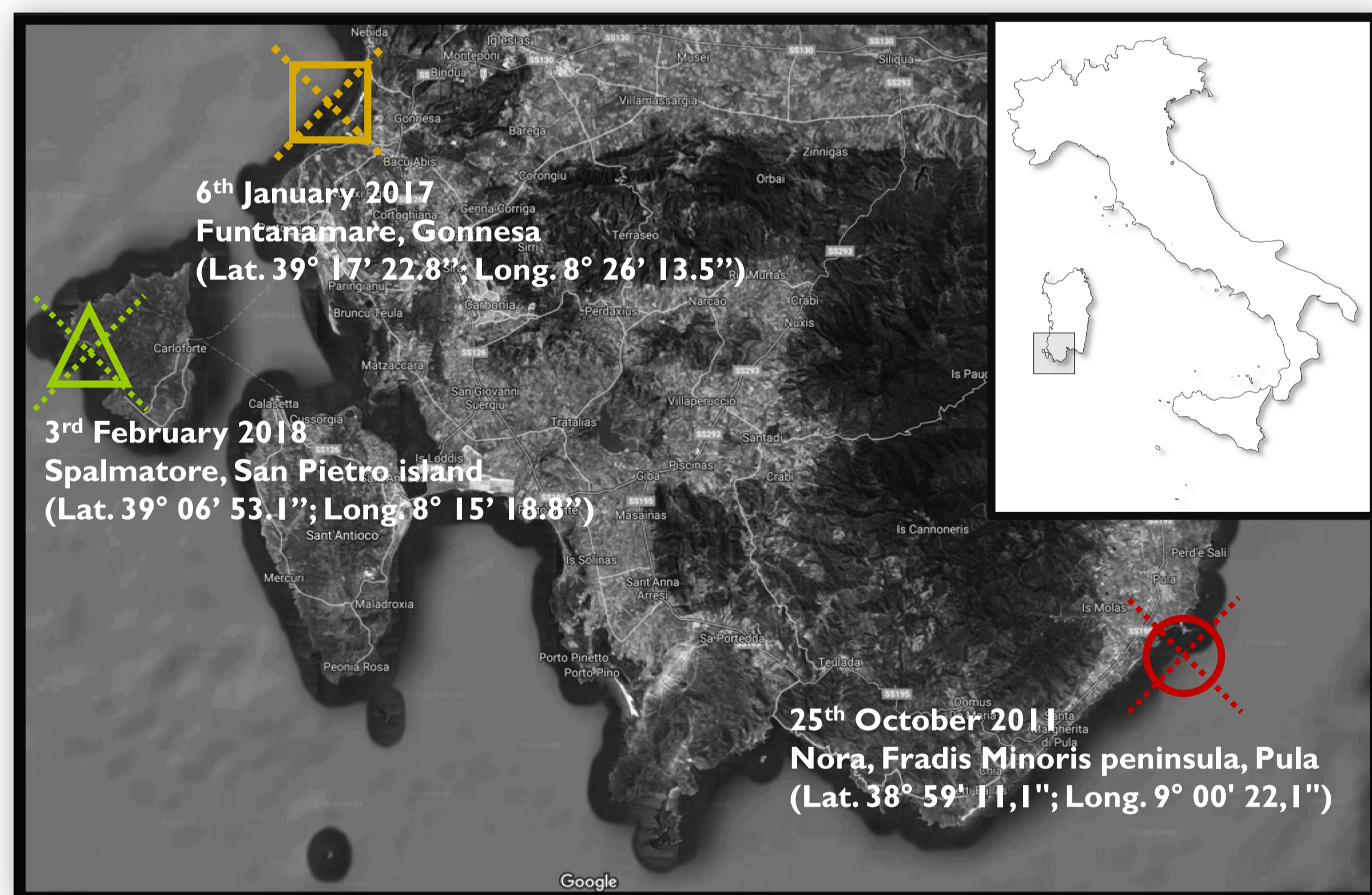
Centro Recupero Cetacei e Tartarughe Marine Laguna di Nora, Laguna di Nora 09010 Pula, Sardinia, Italy.

*corresponding author: gollano@lagunadinora.it



Introduction

Predation by large predatory sharks represents a rare albeit documented natural mortality factor affecting marine mammals in the Mediterranean Sea. Moreover, opportunistic foraging by elasmobranchs on cetacean carcasses is occasionally reported in stranding records. Centro Recupero Cetacei e Tartarughe Marine (CRCTM) Laguna di Nora operates through the network Rete Regionale per la Conservazione della Fauna Marina under the Assessorato Difesa dell'Ambiente of the Regione Autonoma della Sardegna authority. Since 1993, CRCTM core mission consists in monitoring, rescue and conservation of cetaceans and sea turtles of South-western Sardinian coasts. During CRCTM activities, three events of striped dolphin (*Stenella coeruleoalba*) and short-beaked common dolphin (*Delphinus delphis*) interactions with large predatory sharks were investigated. Hypothesis for predation and/or scavenging and predator species putatively involved in the events are presented.

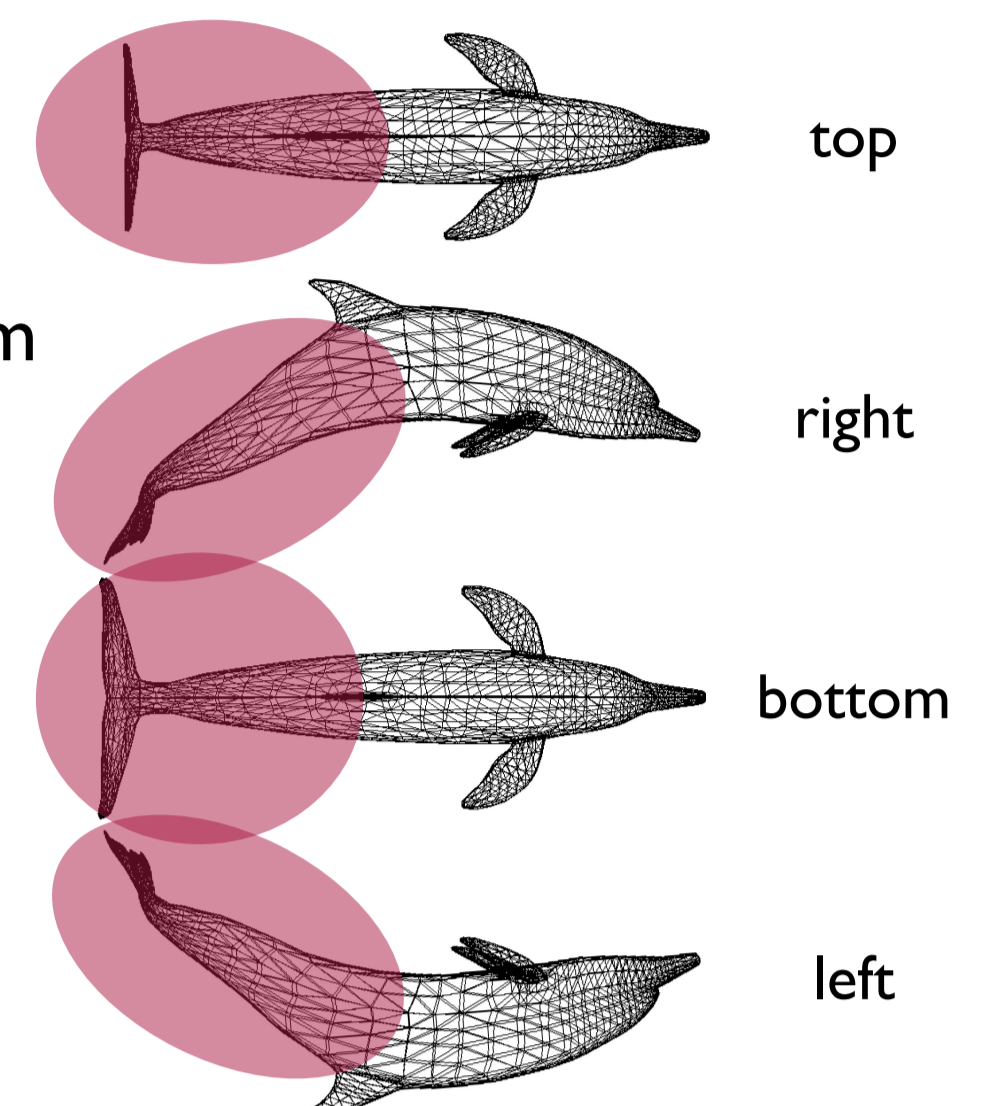
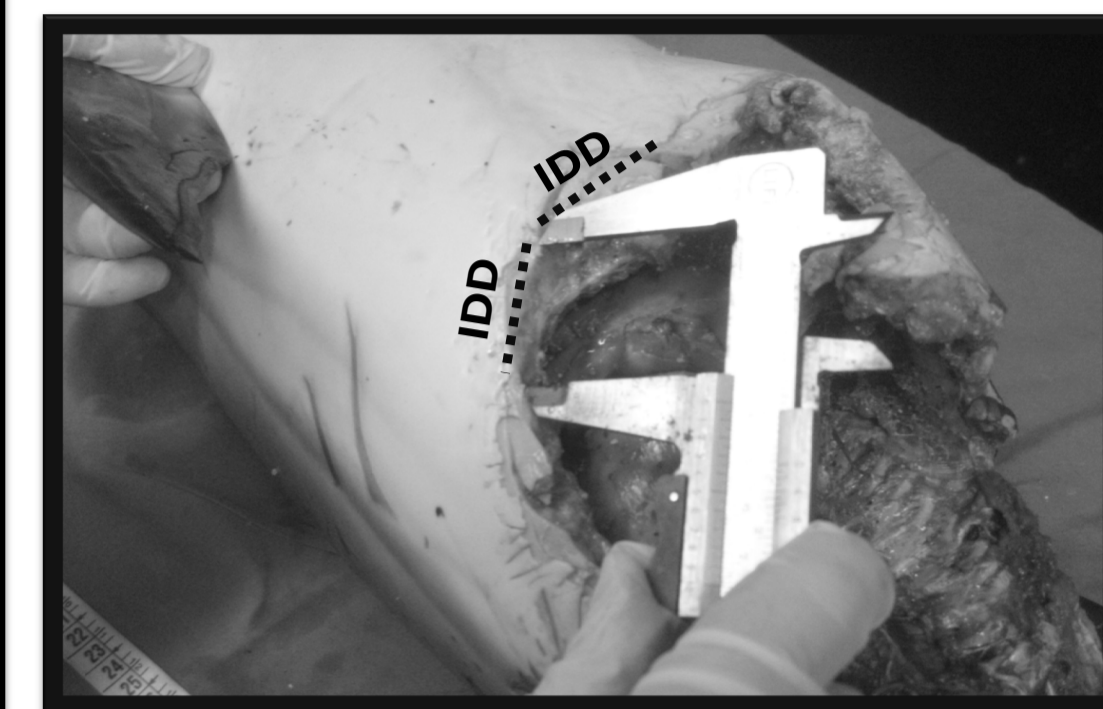


Results

1. Pula, 2011; predation on *Stenella coeruleoalba*



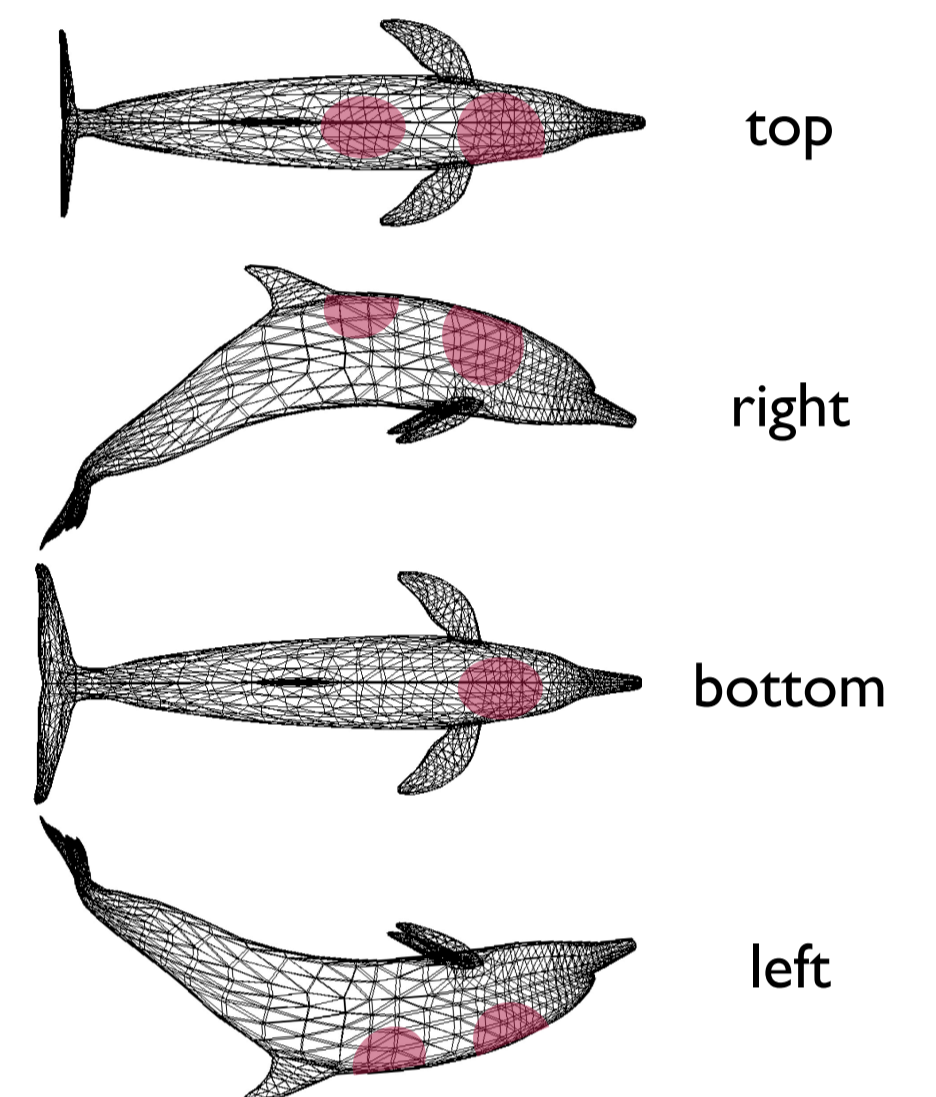
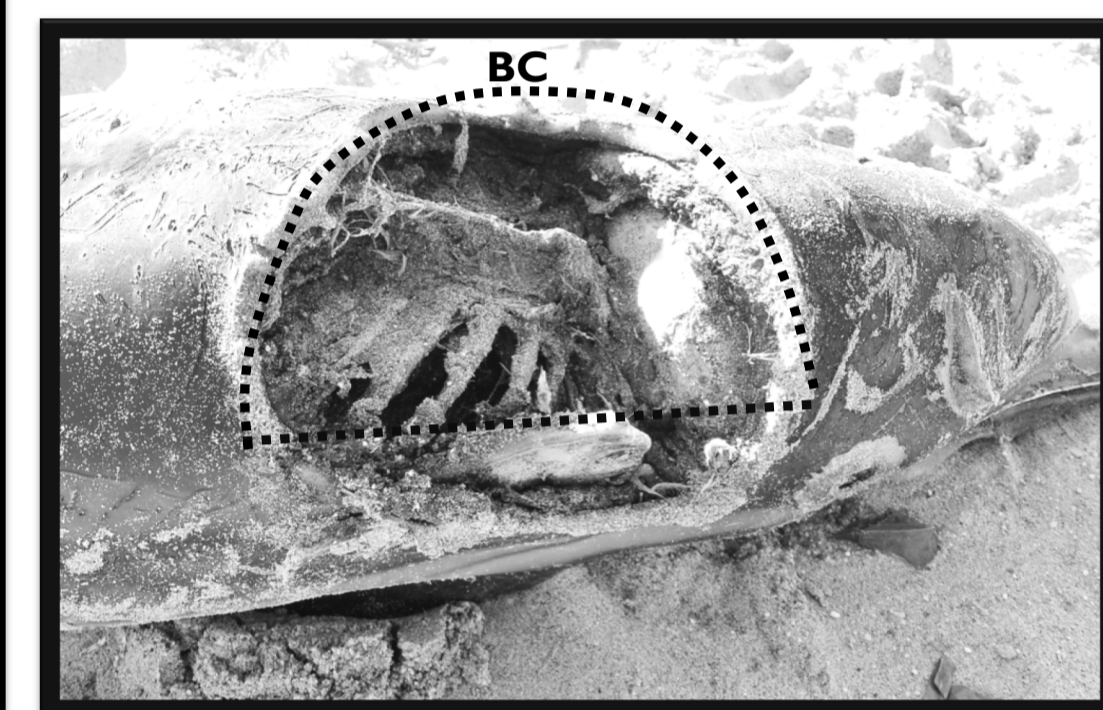
juvenile, n.d.
~ 550 mm (rostrum to mid-flank)
interdental distance (IDD) = 34 mm



2. Gonnesa, 2017; predation/scavenging on *Stenella coeruleoalba*



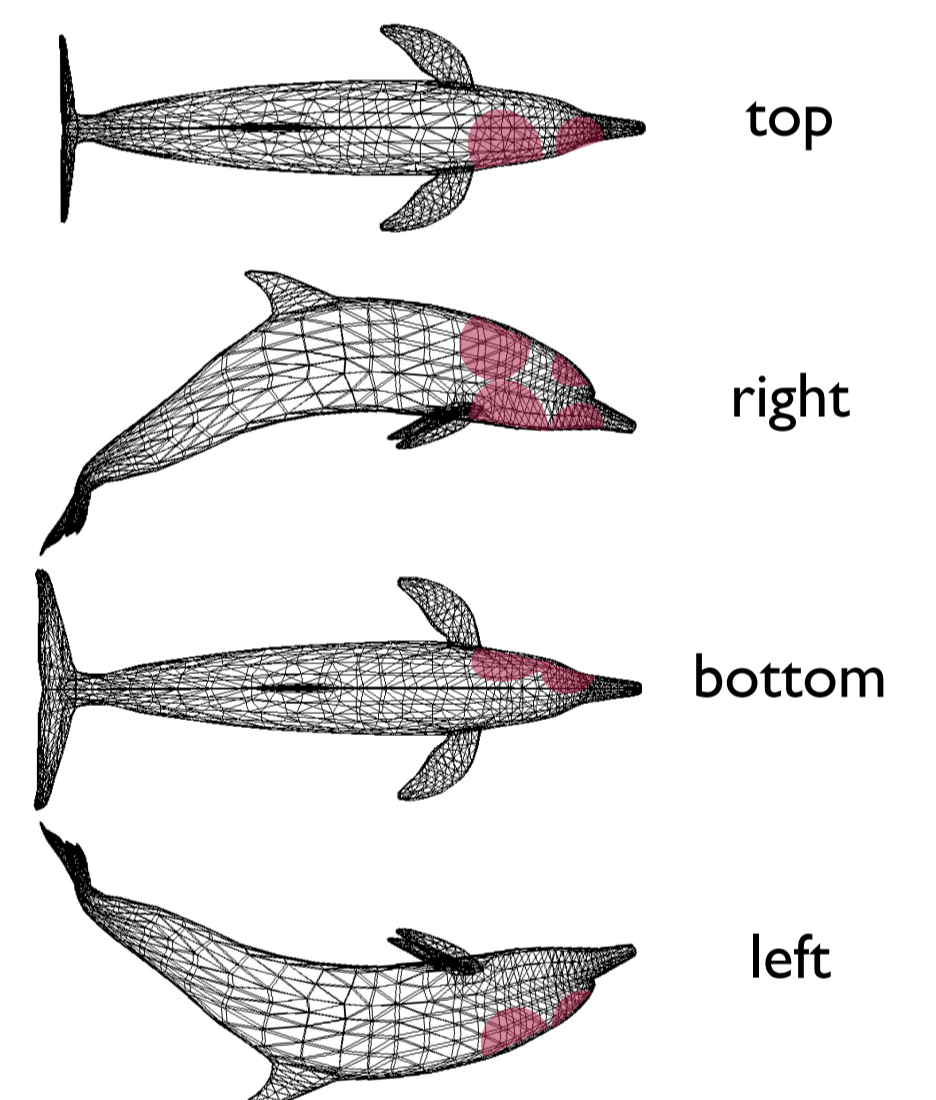
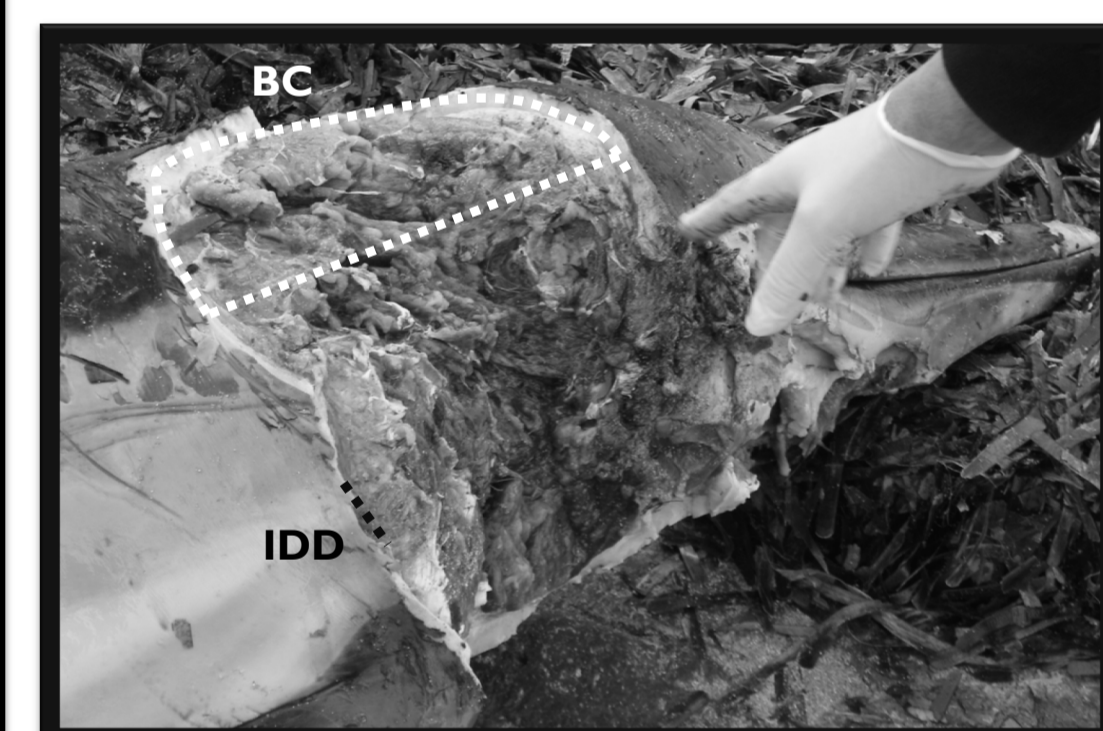
juvenile, female
TL = 1420 mm
bite circumference (BC) = 408 mm



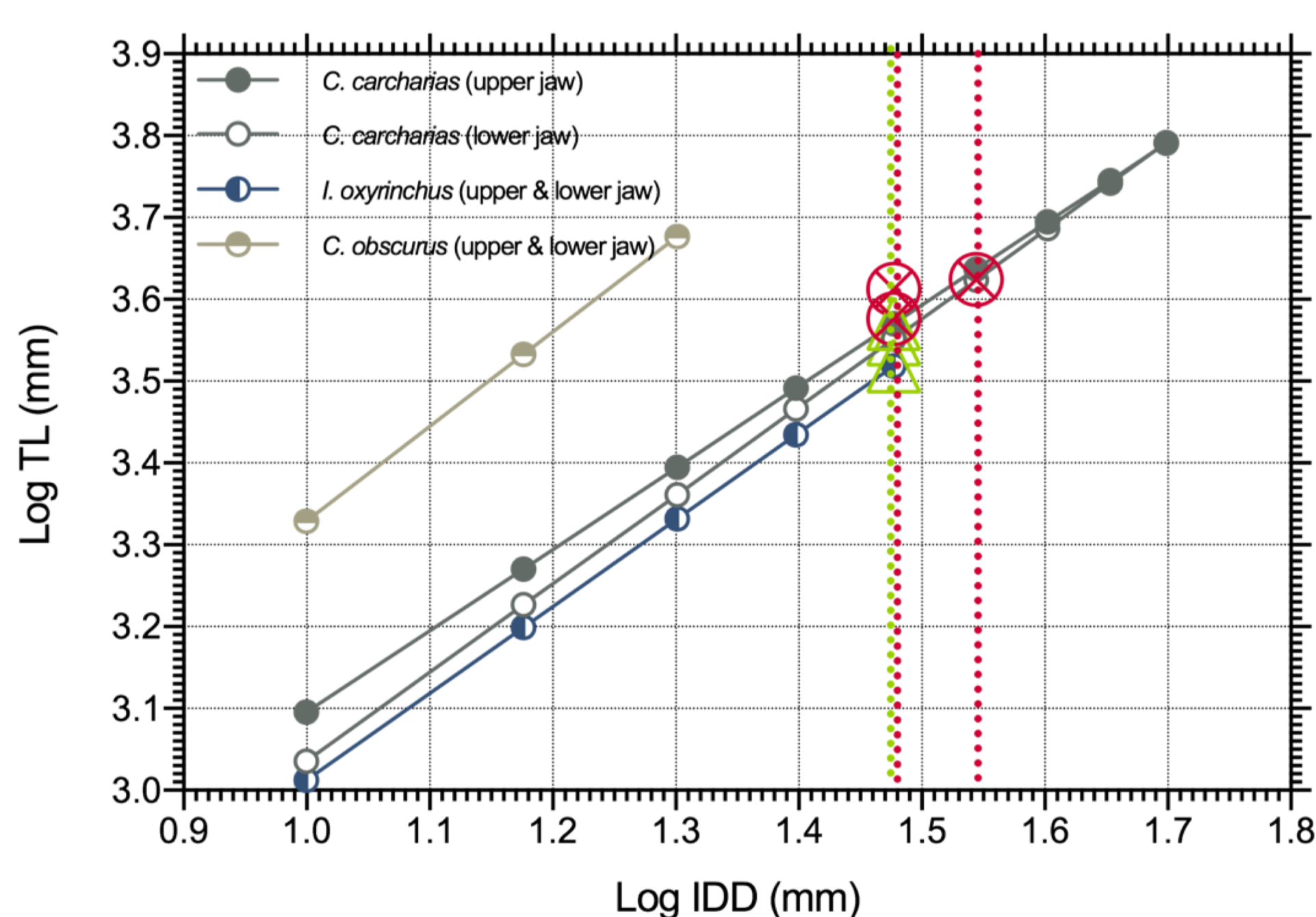
3. San Pietro island, 2018; predation on *Delphinus delphis*



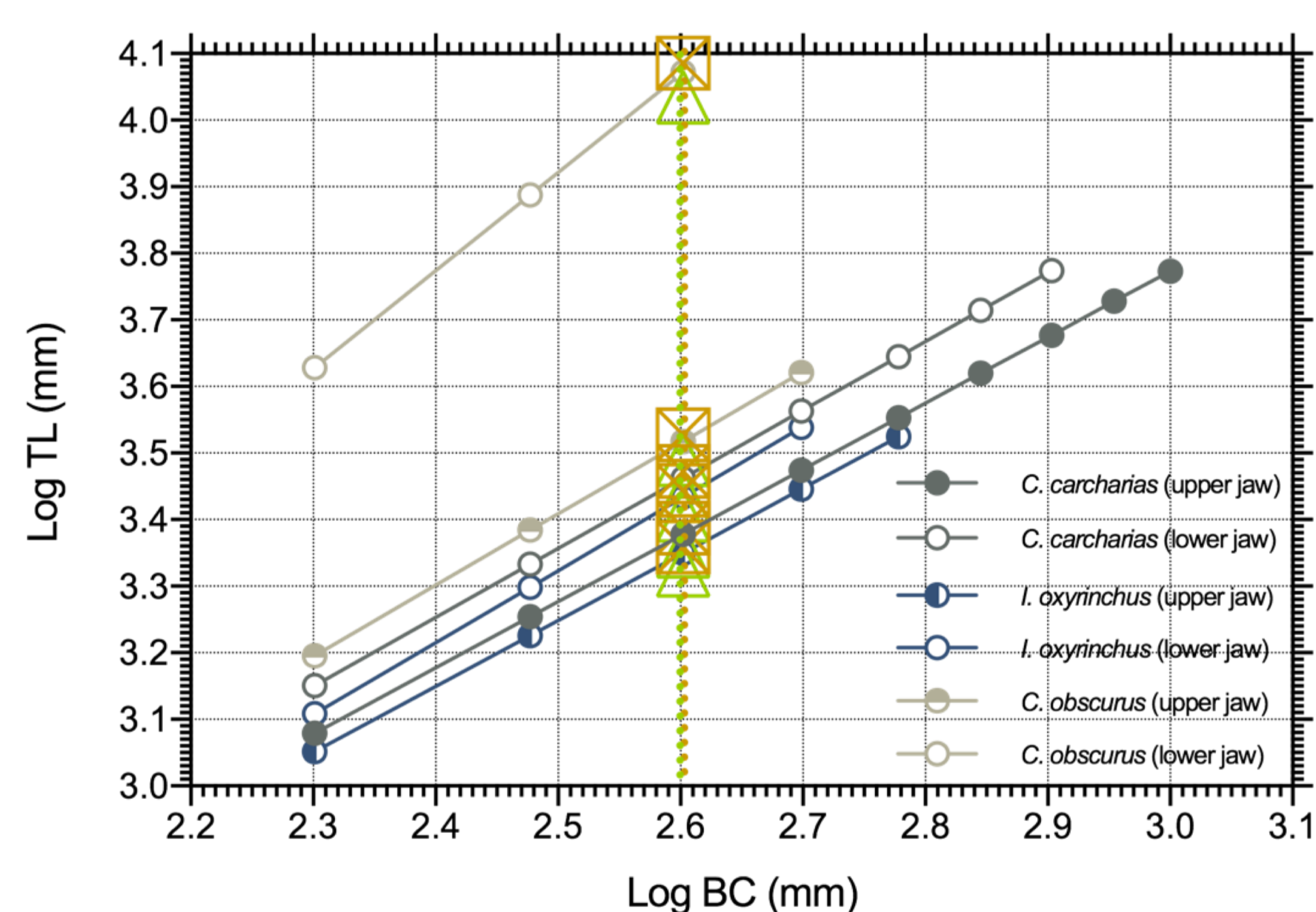
adult, male
TL = 1930 mm;
IDD = 30 mm; BC = 377 mm



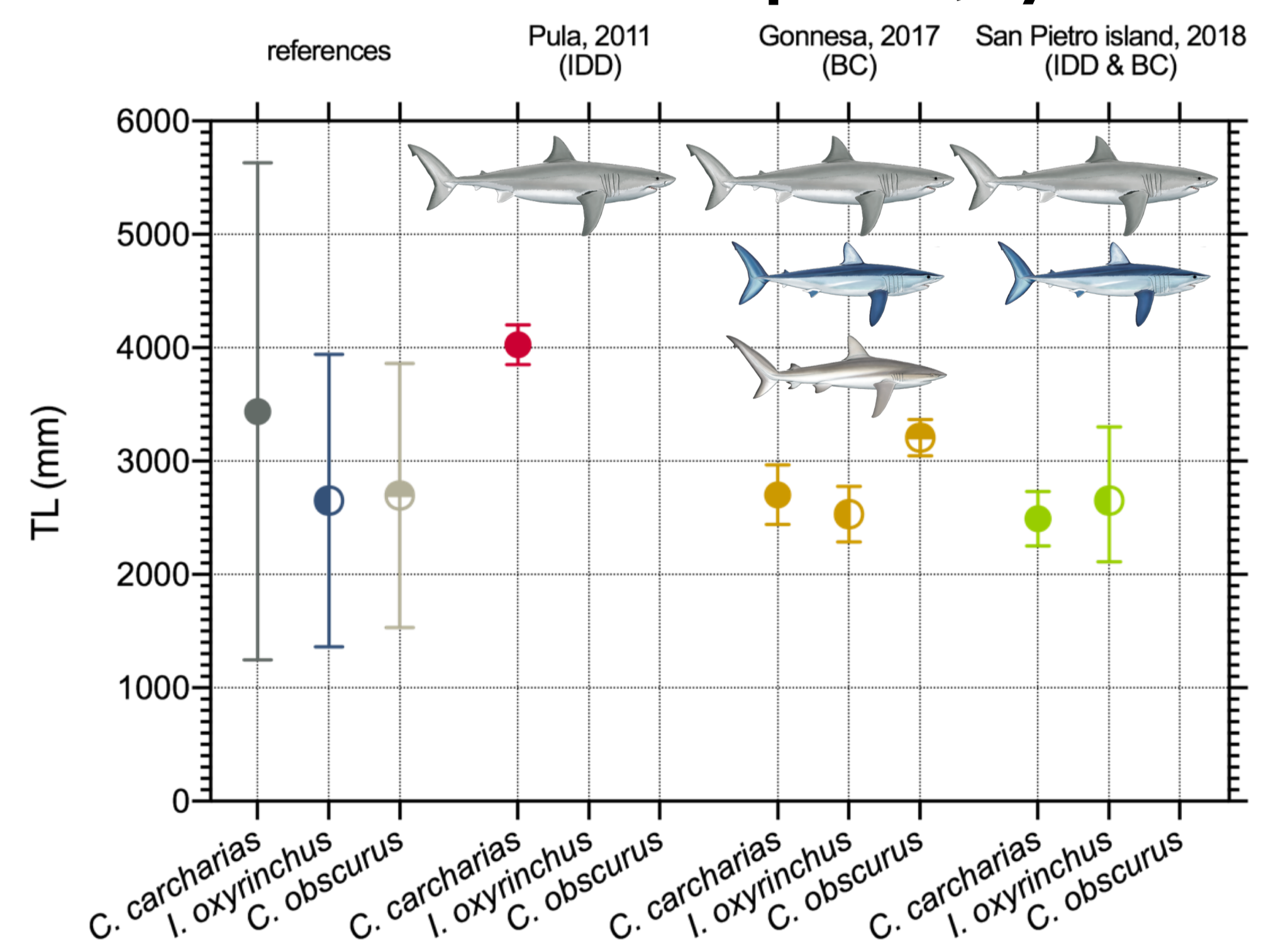
Estimated shark TL by measured IDD



Estimated shark TL by measured BC



Predicted shark size & species, by case



Discussion

Three candidate shark species - two lamniforms (great white shark *Carcharodon carcharias* and shortfin mako *Isurus oxyrinchus*) and one carcharhiniform (dusky shark *Carcharhinus obscurus*) - were selected based on: i) documented presence in the area; ii) IDD and BC range spanning experimentally measured values; iii) known propensity to prey cetaceans. IDD value from specimen 1 is compatible with *C. carcharias* of 4200 mm maximum estimated TL. BC value from specimen 2 matches *C. carcharias*, *I. oxyrinchus* and *C. obscurus* of 2966, 2779 and 3368 mm maximum estimated TL, respectively. IDD and BC values from specimen 3 match *C. carcharias* and *I. oxyrinchus* of 2730 and 3301 mm maximum estimated TL, respectively.

Material & Methods

Data collection was part of CRCTM survey in South-western Sardinian coast, Italy. Morphometric measurements of stranded specimens were taken by using Vernier calipers and metric tape. Interdental distance (IDD) and bite circumference (BC) values were measured as in Lowry et al., (2009). Average IDD and BC values were log-transformed and fitted as independent variable on linear regression equations for the upper and lower jaw of selected shark species. Shark total length (TL) values were estimated by the antilog of fitted dependent variable, and size estimates for putative involved predators in each case were plotted against TL range references for selected species.

References

Storai et al., 2011 *Fish. Res.*
Lowry et al., 2009 *Mar. Biol.*
Serena, 2005 *FAO*
Dhermain et al., 2002 *ACCOBAMS*

Acknowledgements

Authors want to thank the Guardia Costiera di Cagliari, Carloforte and Portoscuso, the Corpo Forestale e di Vigilanza Ambientale Regione Autonoma della Sardegna and Simone Repetto for assistance in data collection and photography acquisition. Sharks icons were adapted and modified from Marc Dando's original illustrations ©