

# Newly documented consequence of dolphin depredation: larynx strangulation with gillnet parts

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## Introduction

Interactions of dolphins with fishing gear:

- occur because of the cetacean strategy to increase the rate of feeding while decreasing the energy expenditure associated with foraging
- regularly reported
- most frequently involve entanglement in fishing nets
- limited records of depredation resulting in fishing gear ingestion
- no documented cases of fishing gear ingestion resulting in larynx strangulation, till now

Bottlenose dolphin (*Tursiops truncatus*) in the Croatian part of the Adriatic Sea (Fig. 1):

- the only resident marine mammal species
- number of individuals: estimated at between 220 and 250
- endangered and legally protected in Croatia

Larynx in toothed whales:

- elongated into a tubular extension (laryngeal spout), which transveres the digestive tract into the nasal cavity (Fig. 2)
- remains erect during deglutition - vulnerable to foreign bodies during deglutition

Fishing in Croatia:

- long tradition of small-scale coastal fishing
- small-scale commercial and private fisheries use gillnets throughout the year
- level of exploitation is unknown (catches not recorded)
- total amount of small-scale, artisanal fishers estimated at around 18.000 (only 8.500 of them licensed)

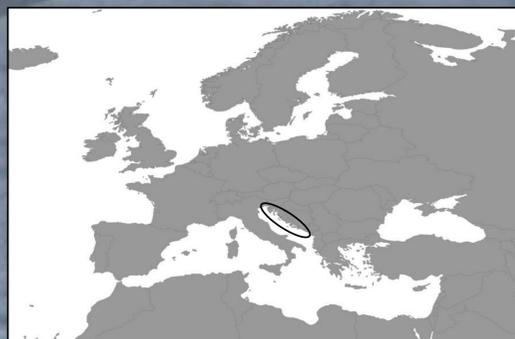


Fig. 1



Fig. 3

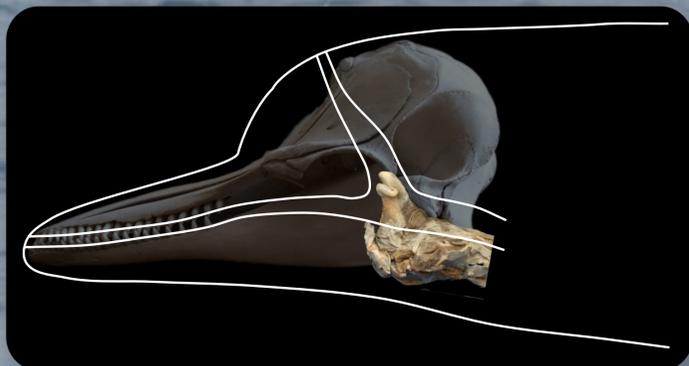


Fig. 2



Fig. 4

## Materials and Methods

- since 1990 - we examined 120 carcasses of bottlenose dolphins found in the Croatian part of the Adriatic Sea
- age estimation - annual growth layer groups (GLGs) from extracted teeth and based on modified methods described in Sooten (1991)

## Results and Discussion

- the first indication of larynx strangulation - a fishing net part protruding from the mouth (Fig. 3)
- 12 bottlenose dolphins (10%) had larynx strangulated with a gillnet part (Fig. 4)
- all affected animals - older than 7 years, majority older than 17 years
- the affected animals were found throughout the Croatian coast of the Adriatic Sea, during all seasons
- other cetacean species examined did not show signs of larynx strangulation

Most probable course of events leading to larynx strangulation:

- dolphins feed on entangled fish from gillnets and accidentally tear off a part of the fishing net
- the torn gillnet part might only partly pass into the esophagus during the swallowing of the prey and the rest of it hangs through the pharynx and the oral cavity out of the mouth
- partially swallowed gillnet part causes muscular actions of the pharynx advancing regurgitation
- this muscular action brings the swallowed part of gillnet out of the esophagus and into the pharynx
- if the swallowed part is directed into the opposite food channel of the food channel where the hanging part lies, it will encircle the laryngeal spout and larynx strangulation occurs

What should we do to mitigate the problem:

- different measures proposed to reduce dolphin interactions with gillnets (e.g. reducing fishing seasons or regions, establishing marine protected areas free of gillnet fishing and gear modifications)
- the legislative regulation that would ensure avoiding spatio-temporal overlap of dolphin foraging and human gillnet fishing activities along the Eastern Adriatic Sea would not be feasible since the affected animals were found throughout the Croatian coast of the Adriatic Sea during all seasons
- we propose assessing further impact of larynx strangulations on the population dynamics of bottlenose dolphin in the Adriatic Sea and considering net alterations that would improve stiffness properties of the gillnets