Sharks in Costa Brava: evidence of an ongoing decline

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The bluntnose sixgill shark (Hexanchus griseus) is, together with the blue shark (Prionace glauca), the only medium-sized shark which is still relatively abundant in the Costa Brava and is returned to the sea. Credit: Ignasi Nuez /SUBMON

Some shark species, such as the basing shark and the spiny dogfish, are in populational decline in the Costa Brava, and even blackspotted smooth-

hounds can have disappeared due to the fishing pressure of this marine region in the Catalan coasts. The coincidence of fishing areas with the distributional natural habitat of the sharks worsens the risk of bycatches of sharks by the fisheries.

These conclusions result from an article on the state of the pelagic shark populations in Costa Brava published in the journal *Aquatic Conservation: Marine and Freshwater Ecosystems* by Ignasi Nuez and Manel Gazo, researchers at the Faculty of Biology, the Biodiversity Research Institute (IRBio) and the entity SUBMON, together with Lluís Cardona, from the Faculty of Biology and IRBio of the University of Barcelona.

Sharks, the great unknown of the Mediterranean

The Mediterranean is a marine region with a high biodiversity of sharks cataloged as vulnerable species by the IUCN, such as the case of the basing shark. The ongoing decline of sharks in the Mediterranean coasts has been described for years in the scientific bibliography.

The vital strategy of these cartilaginous fish (Chondrichthyes) is characterized by a late sexual maturity and low rates of growth and fecundity, "conditions that make it harder for them to tolerate an intense fishing activity, and which makes them more vulnerable than ray-finned fish (teleosteans)," says lecturer Lluís Cardona, member of the Department of Evolutionary Biology, Ecology and Environmental Sciences (BEECA) and IRBio.

The improvement of fishing technology "enabled us to understand fishing in more areas, deeper areas and for a longer time. This interaction with the fishing sector has limited the survival of shark populations, be it target species or bycatches," says Manel Gazo, lecturer at the Department of BEECA and IRBio and director of SUBMON.

Have smooth hounds disappeared in Costa Brava?

As part of the study, the team analyzed the recorded bycatches by trawlers and longline fishing boats in the fishing harbors of Costa Brava. In particular, they found information on five species of large-sized sharks (more than 200 centimeters): the common tresher (Alopias vulpinus), the basing shark (Cetorhinus maximus), the bluntnose sixgill shark (Hexanchus griseus), the shortfin mako shark (Isurus oxyrinchus), and the blue shark (Prionace glauca), apart from three medium-sized species (90-100 centimeters), like the school shark (Galeorhinus galeus), the spiny dogfish (Squalus acanthias), and the smooth-hounds (Mustelus spp).

The results of the study, which cover the period from October 2016 to July 2017, confirm the lack of smooth-hounds (Mustelus spp) captures, "which suggests that the disappearance of this genus in the Costa Brava, may be due to fishing pressure. In addition, the populations of species such as the basing shark and the spiny dogfish are in decline," says Ignasi Nuez, the first author of the article.

"If we consider all sampled fishing gears, the diversity of species that are accidentally captured is the highest in pair-trawling, followed by bottom longline fishing and last, by surface longline fishing. However, the incidence of each fishing gear is not the same for all species. Bycatches of basing sharks, for instance, take place almost exclusively with trawlers, while the great part of bycatches of blue sharks, shortfin mako sharks, or the common threshers take place in longline gears."

Although bycatches take place over the year with a similar frequency, the highest number of bycatches is correlated to the warm months of the year (from May to October), when the water column is stratified.

"According to the fishermen, the coincidence of the fishing areas with

those areas where the sharks are distributed, together with the belief that fishing attracts sharks, are the main responsible factors for bycatches," says Ignasi Nuez.

Science and fisheries: Collaboration to protect sharks

The study highlights the local ecological knowledge brought by the fishing sector as an essential element in the methodology of this work. "Counting on the fishing sector's will to collaborate has been key when carrying on with the study. The current knowledge –and the past one– of the presence of different species of sharks in our coasts, as well as the areas, periods and used gears to fish, can only come from the fishing sector," notes Manel Gazo.

"We have not found a good way to avoid shark bycatches, apart from the application of policies and modifications in fishing gears," he continues. "What is clear is that the solution—once we find it—has to come up bearing the fishing sector in mind."

Promoting training for fishermen on manipulation techniques and release of sharks that get trapped in fishing gears, or adding reduction mechanisms on bycatches can be options to mitigate the mortality of sharks caused by fisheries. The allocation of protected marine areas would also help to reduce the loss of biodiversity, "but nowadays, we do not have enough information on the space distribution of many shark species. Therefore, this strategy is at the risk of being ineffective," says Ignasi Nuez.

Sharks in the Mediterranean: More science, more protection

Sharks are apical predators in coastal and oceanic ecosystems. Their role

is decisive in the control of trophic networks, although there is a great diversity of species and not all of them have the same relevance. However, there is a lack of knowledge on the biology and ecology of sharks in the Mediterranean. "Populations of sharks decreased in the Mediterranean before there was a minimally developed scientific infrastructure to study them. Therefore, when we wanted to study them, there were none," says Lluís Corona. "Therefore, we do not know about their ecological role, but we must thank that, for now, a fish longer than 25cm has no predator in the western Mediterranean except for humans. This was not the case when sharks were more abundant, but we do not know to which extent this was important."

Now, a total of twenty-five species of elasmobranchii (sharks and rays) are protected by a recommendation of the General Fisheries Commission of the Mediterranean (GFCM), a mandatory regulation for all the EU Mediterranean countries by transposing the regulations to member states.

"The regulation framework exists. What we need to improve is its implementation in order to reach a proper application of the regulation. Therefore, it is necessary to improve the training of the fishing sector and the inspectors in matter of the current regulation and the protected species," says Manel Gazo. "In the Mediterranean region, there are not only fishing fleets of the EU countries, this is why we need to support the other countries that have no infrastructures or real control on the fishing activity."

More information: Ignasi Nuez et al, A closer look at the bycatch of medium-sized and large sharks in the northern Catalan coast (north-western Mediterranean Sea): Evidence of an ongoing decline?, *Aquatic Conservation: Marine and Freshwater Ecosystems* (2021). DOI: 10.1002/aqc.3651

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