IUCN

SSC
Species Survival Commission

Position Statement

On Shark Control Programs and Shark Culls

IUCN SSC
Shark Specialist Group

POSITION STATEMENT ON SHARK CONTROL PROGRAMS AND SHARK CULLS

The IUCN Species Survival Commission (SSC) is aware that lethal approaches to reducing the risk of human-shark interactions are increasingly being adopted around the world. Several governments either have active shark control programs (i.e., bather protection programs) or frequently implement shark culls in response to actual or perceived risk to humans. Hereby, the SSC outlines its position in relation to existing shark control programs and culls and provides context to allow managers and governments to make informed decisions when faced with delicate situations. We strongly encourage non-lethal approaches as a response and management option.

Context

There are around 535 species of sharks around the world [1]. Public perception of sharks varies from reverence to fear. Over the last decades, there has been a growth in positive human-shark interactions via shark tourism which can result in significant economic benefits to communities [e.g., 2, 3]. But for many species, perception has been shaped by negative media attention that has led to anxiety and fear about the risk they pose to humans [4, 5, 6, 7]. However, shark bites on humans undertaking activities in aquatic environments have been recorded from very few species, less than 5% of known species[8]. For example, in Australia, 75% of bites are attributed to three species: the Great White *Carcharodon carcharias*, Tiger Shark *Galeocerdo cuvier*, and Bull Shark *Carcharhinus leucas*[9]. Global annually reported interactions (unprovoked bites) and subsequent fatalities are few, numbering 57 and 5 in 2022, respectively[8].

Human-shark conflicts are diverse and complex. While shark bites are rare and unlikely, the occurrence and probability of such events have increased in several areas of the world (e.g., Australia, Brazil, Reunion Island, Egypt)[4, 9, 10, 11]. This has been attributed to factors such as growth in human population and associated increase in the number of people participating in water-based activities; changing shark behavior due to habitat loss and degradation; declining water quality; changes in environmental variables such as water temperature, rainfall, currents, and turbidity; variations in the distribution and abundance of prey from overexploitation or range shifts due to climate change; and sharks' behavioral patterns including movements and distribution[4, 9, 12, 13, 14]. There have also been suggestions that increased interactions are due to the expanding popularity of tourism activities that use feeding, baiting, or chumming[15]. While sharks respond to stimuli and can learn associations with food, this learnt behavior needs frequent

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rewards (e.g., through wildlife tourism or recreational fishing activities). However, sharks can also lose responsiveness to stimuli (e.g., smell of fish products) if not associated with sufficient food reward[16]. Therefore, learnt behaviors are less likely in migratory species that temporarily frequent tourism sites (e.g., White Shark, Tiger Shark). Importantly, even when behavioral change occurs, the extent to which it increases the risk or probability of shark bites is unknown.

The response to shark bites (one incident or a spate of incidents within an area) by some communities and governments has been the establishment of shark hazard mitigation strategies, including lethal and non-lethal control programs[4, 7, 17]. Lethal methods are usually a combination of gear placed in areas to reduce local populations of potentially dangerous species and include shark nets (sometimes referred to as beach meshing), drumlines (i.e., large, baited hooks), longlines, and/or targeted fishing (i.e., culls)[18, 19]. On the other hand, non-lethal alternatives rely on various technologies and early detection, monitoring, and warning systems. These mitigation measures have been deployed in various parts of the world and include, but are not limited to, physical barriers such as swimming enclosures, aerial surveillance (including fixed-wing, helicopter, and unmanned aircraft or drones), Shark-Management-Alert-in-Real-Time (SMART) drumlines, in-water and land-based detection with spotters, real-time detection of telemetry-tagged sharks via listening stations and public alerts through mobile technology, or changing human behavior by requesting water users to avoid times and locations with high probability of relatively higher shark abundance[9, 11, 12, 20, 21]. In some countries, personal deterrents are also used to mitigate risk. They include electric, magnetic, olfactory, and visual deterrents that aim to disorient an approaching shark and discourage it from biting by overwhelming its sensory organs[22, 23, 24]. Lastly, novel puncture- and tear-resistant fabrics and wetsuits are also being developed to reduce the severity of injuries when other mitigation measures cannot prevent shark bites[23, 25]. Each of these approaches come at varying economic costs to governments and/or individuals to ensure they are developed, operated, and maintained over long periods[19].

Shark culls have been the most controversial of these approaches, with those concerned about ensuring the safety of humans by removing animals from particular areas meeting resistance from those opposing the use of lethal methods. Some studies have suggested that lethal approaches are likely to have successfully reduced the incidences of interactions, injuries, and fatalities in certain locations, but not eliminated them[e.g., 18]. Other research highlights that is no change in bite rates after culling programs are implemented[26]. Overall, the efficacy of lethal approaches and any other shark control programs is still often debated, partly due to the low incidence of shark bites and resulting difficulty in showing any statistically significant effect of mitigation measures. Recent studies highlight a shift in public sentiment with surveys showing their increasing preference for non-lethal measures[7, 17, 27].

Worldwide, populations of many shark species have been declining over the last few decades. An estimated 31.2% of sharks are listed in a threatened category (Critically Endangered, Endangered, or Vulnerable) on the IUCN Red List of Threatened Species[28]. Reducing populations of top predators in aquatic environments can have broader ecological consequences[29]. Sharks play a critical role in regulating trophic webs and maintaining ecosystem balance and structure, controlling abundance and distribution of prey populations, and promoting ecosystem connectivity. Therefore, their removal from the environment may have unpredictable impacts on aquatic ecosystems. Lethal methods are often unselective and can substantially impact populations of already threatened and/or protected species of sharks and other non-target marine animals - impacts have been reported for rays, turtles, dugongs, dolphins, and whales[e.g., 11, 30]. Indeed, in instances where lethal methods are used, mortality rates for all animals, including sharks, are high (>60%). Furthermore, most sharks impacted by these shark control programs are species that do not pose a threat to human life, such as the Tawny Nurse Shark *Nebrius ferrugineus* or the Scalloped Hammerhead *Sphyrna lewini* (Vulnerable and Critically Endangered on the IUCN Red List, respectively) [11, 28].

Generally, the applicability of human-shark mitigation measures will vary depending on environmental and socio-economic considerations as well as their ability to reduce the risk of interactions with sharks. However, education and outreach are essential for stakeholders to understand risks, possible responses (i.e., applying suitable first aid), and to develop pro-conservation attitudes[31]. In fact, surveys of ocean users in Australia highlight that developing effective strategies to improve and enhance public perceptions, attitudes, and behaviors towards sharks in areas with high incident rates, should be a priority[31, 32].

Conclusion

Human-wildlife conflict is one of the greatest challenges to the effective conservation of wildlife species and resolution and management actions need to consider coexistence[33]. The available evidence and expert opinion

suggest human-shark interactions are likely to continue increasing due to growing coastal populations and the use of aquatic environments, as well as shifting shark habitat and prey availability. Before considering implementing human-shark mitigation measures that involve lethal approaches as a response to a shark bite, it is essential to thoroughly examine the situation and potential causes of interactions in an area. The use of lethal approaches for managing the risk of shark bites is a poor solution given their considerable environmental impacts and economic costs compared to the alternative non-lethal methods now available[19]. Encouraging safer behaviors among individuals who engage with the ocean is likely to be more impactful when dealing with human wildlife conflicts[10]. Based on existing evidence, the use of non-lethal approaches in shark bite mitigation is the preferred management option.

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