WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

Overview of Shark Depredation Research and Needs in Western Pacific Region

1. What is Shark Depredation and How Prevalent is it?

Shark depredation — sharks removing or damaging hooked/harvested fish before they're landed — is widely reported across U.S. fisheries (recreational and commercial) and is perceived by many anglers to be stable or increasing. Research in the U.S. spans social science (angler perceptions and behavior), field studies quantifying occurrence and species involved, new forensic methods to ID depredators, and trials of mitigation strategies and management responses.

Surveys, interviews, and angler-led reporting (ie. 'citizen-science') projects are used to quantify frequency, perceptions, and economic/social impacts. Recent multi-method citizen science projects in Florida have improved spatial and temporal coverage and found that probability of experiencing depredation ranged from 10-60% with average depredation rates ranging from 31-47% depending on area and season (McCallister et al 2025). These findings are consistent with findings in the Western Pacific Region based on Council staff analyses of Hawaii Division of Aquatic Resources which found at least 25% of fishing trips experience depredation among license holders that fully report on depredation. Since 2004, the Council identified shark depredation as a major concern in the Mariana Islands with fishermen reporting 60% losses and 55% of fishermen reporting shark interactions. Iwane (2021) indicated fishermen in Hawaii have a variety of perceptions towards shark species and expressed concern over an increasing problem with limited by trust in research and management.

2. Cooperative Research to Date: Identification of Shark Species

Webb et al (2022) trained fishermen in Guam and Saipan who used DNA swab kits on depredated fish and fishing gear to identify shark species. The swab kits were shipped to the University of Hawaii Institute of Marine Biology for species identification. Five depredating shark species were identified from DNA swabs: Silvertip Shark, Silky Shark, Grey Reef Shark, Whitetip Reef Shark (not Oceanic Whitetip), and Tiger Shark. This project was supported by the Council beginning January 2020 to June 2021. The use of DNA swab techniques has been a commonly used cost-effective method to identify shark species in depredation through cooperative research with fishermen in the United States (Drymon et al, 2019, McCallister et al, 2025) and Australia (Fotedar et al, 2019). Based on surveys, camera studies, tagging, and reports from Hawaii non-longline fisheries – Galapagos sharks and sandbar sharks are leading depredators in bottomfish fisheries (Meyer et al, 2019). Tiger and Oceanic whitetip sharks are less frequent but significant in pelagic fisheries (Hutchinson).

3. Deterrent Research

At the SSC's 157th Meeting, researchers from HIMB provided an overview of shark deterrent work anticipated through a multi-year project. Stimuli that impede shark behavior are species-specific, thus effective mitigation measures are dependent on what species of sharks are involved in depredation events. HIMB scientists are developing mitigation strategies that requires intensive lab and field studies with three components: improving human safety, reducing shark depredation and reducing shark bycatch. The basic approach is to test existing commercially available devices and then

transition to prototypes designed in house or by colleagues. The research involves both at-sea and in controlled laboratory experiments. Emphasis will be placed on electromagnetic stimuli (electricity, magnetism, light) with publication of results in the peer reviewed literature. The SSC and FIAC noted that there is a need to consider how deterrents can be employed in practical fishing scenarios in addition to any gear modifications in order to directly address depredation mitigation needs. The Hawaii Community Tagging Program (HCTP) began trials on shark deterrent devices in Hawaii hook and line fisheries in late December 2025.

Devices like hookshields or 'shark guards' in hook and line fisheries have yielded promising early results but may be limited in costs and durability. Humphries et al. (2023) found that some deterrents (shark guard / electric field device) significantly reduced shark bycatch relative to control lines, although not completely eliminating it. Their findings were that target catch rates of commercially desirable fish were not significantly impaired, but noted other fisheries may find variable results.

4. Gear and Operational Modifications

Fishing operational changes—altering bait type/position, using different hooks, changing soak/haul times, or moving fishing spots when sharks are present—can reduce risk in some fisheries, but effectiveness is context specific and often only reduces (not eliminates) losses. Studies also examine bait reuse and bait positioning to reduce attraction or improve catch of target gear (such as in experiments using drumlines). However, experiments using drumline gear may be limited in their applicability to fishing methods used in the Western Pacific.
Most studies on operational modifications to reduce shark depredation on fishing gears has been focused on tuna fisheries (Gilman et al, 2021; Rabearisoa et al, 2015) or on demersal longline gears not used in the Western Pacific Region (Mitchell et al, 2020). Increasing speed of hauling or retrieving gear and shorter soak times have reduced probability of shark depredation events, but also may reduce overall fishing efficiency.

5. What Remains for Shark Depredation Mitigation for Our Region?

The severity and prevalence of shark depredation in the region is known and has been overstated. Species involved in shark depredation in non-longline fisheries have been identified, particularly in Hawaii and the Marianas. Verified species identification in American Samoa may be limited. Shark retention and bycatch in longline fisheries are assumed to have declined due to prohibition of wire leaders in Hawaii longline fisheries since 2021.

To date, research on both deterrents and operational characteristics to reduce shark depredation have not been finalized on non-longline gears in the Western Pacific Region, with anticipated results by the HCTP. The ongoing work by HIMB may have utility in identifying potential deterrents for reducing depredation. Iwane (2021) also concluded based on interviews with fishermen in Hawaii that collaborative work with fishermen is needed to address the problem. Following its September 2025 meeting, the Council recommended that shark depredation mitigation be made a top priority for future Cooperative Research Programs. In addition to utilizing deterrents, work that could be completed may entail structured experimental fishing with bait types, palu (chum bag) types and deployment, soak time, and strategies on the water to avoid and reduce depredation. This would need Cooperate Research with fishermen and fishing communities.