



Oceanic Whitetip Shark Working Group Report **DRAFT**

Fall 2020

1. Membership and Meetings

The working group is composed of experts in oceanic whitetip biology, technical aspects of Hawaii's pelagic fishery operations, and fisheries stock assessments.

PIFSC: T. Todd Jones, Keith Bigelow (Chair), Rob Ahrens, Felipe Carvalho, Donald Kobayashi, Melanie Hutchinson

PIRO: David O'Brien, Joshua Lee, Brett Schumacher, Colby Brady, Valerie Post, Chelsey Young

State of Hawaii: Ryan Jenkinson

Fishery representatives: Clay Tam, Eric Kingma, John Myking, Sean Martin

Council Staff: Mark Fitchett, Asuka Ishizaki

Meetings held on: September 4, 2020, October 19, 2020, and November 17, 2020

2. Purpose and Intent

The purpose and of the Oceanic Whitetip Shark Working Group (OCS-WG) is to propose and prioritize a roadmap for necessary analyses and draft recommendations to the Pelagic Plan Team to address and recommend to the Council:

- 1) *Domestic regulatory and non-regulatory actions to address the relative impact of fishing vessels of the United States on the WCPO oceanic whitetip shark stock to satisfy requirements under Magnuson-Stevens Fisheries Conservation and Management Act (MSA) Section 304(i);*
- 2) *International recommendations to the Department of State or Congress; or actions that will lead to ending overfishing and rebuild the Western and Central Pacific Ocean*

(WCPO) oceanic whitetip shark stock, taking into account the relative impact of vessels of other nations and vessels of the United States on the stock per MSA Section 304(i)(2)(B); and

3) Any foreseeable or suggested reasonable and prudent measures (RPMs) proposed or required under Section 7 of the Endangered Species Act (ESA)

The information provided by the OCS-WG will assist the Council in fulfilling its role in providing recommendations regarding the status of oceanic whitetip sharks, and will contribute to development of a roadmap to generate new scientific knowledge to support management decisions.

3. Stock Assessment, Projections, and Recovery Outlook

Stock Assessment and Stock Projections

In 2019, a new benchmark stock assessment of the oceanic whitetip shark in the Western and Central Pacific Ocean (WCPO) was presented to the WCPFC. This stock assessment included participation by Felipe Carvalho, who presented the findings to the OCS-WG. The 2019 assessment improves upon the previous stock assessment by Rice and Harley (2012). The 2019 stock assessment includes seven years of additional data and a revised assessment model using the same modeling framework. In addition, the current assessment model includes new methodology to predict historical catches and updates key biological parameters of this species. The terminal year in the stock assessment was 2016, which included four years of data (catch, effort, and other inputs) since a WCPFC non-retention measure was fully effective beginning in 2013. The stock assessment considered the stock to be overfished and experiencing overfishing based on commonly used limit reference points. However, the WCPFC Science Committee did note some recovery in stock biomass in the four years following the 2013 measure. Since the species is late-maturing, the stock assessment modeling framework may not capture recovery of biomass due to the non-retention measure, therefore stock projections were needed to surmise biomass responses to future catch levels.

Stock projections under future catch scenarios (up to 2032) were conducted by Council contractor Joel Rice and presented by Felipe Carvalho with updates provided by Mark Fitchett on US fishery impacts. Stock projections consider a myriad of biological parameterizations - including natural mortality, steepness (recruitment response at low population size), and life history (age/growth and maturity). The projections also consider plausible catch histories and post-release mortality rates, with 43% of catch mortality being determined to be the most plausible per a 2019 study by Hutchinson and Bigelow. Future catch trajectories include 2016 ('status quo') catches, catches corresponding to 10% reduction from 2016, catches corresponding to 20% reduction from 2016, and no catch. Catch trajectories corresponding to 10% and 20% reductions from 2016 catch levels showed stock recovery and correspond to independent

estimates of catches for 2017 and 2018 (Peatman and Nicol, 2020). It was noted that data in the assessment includes all WCPFC sources, including US fishery data. US longline impacts on spawning potential in projections in the future to 2031 were about 1.2% with 0.8% attributed to the Hawaii Deep-Set fishery. Closing all US fisheries for 17 years may lead to a 4% increase in stock biomass by 2031. This underlines the small relative impact of the US compared to other fisheries and relative to the stock size.

OCS-WG requested that the paper of stock projections be made available as soon as possible and for a timeline for availability to be shared as soon as possible. The paper will be reviewed by the WCPFC Science Committee in 2021.

*The OCS-WG noted that about 50% of observer data used in stock assessment and evaluation of the WCPO stock came from the US. OCS-WG members highlighted the disproportionate US observer coverage, while catch rates for the species is far higher in waters 10°S to 10°N. **Disproportionate reliance on US observer data on oceanic whitetip catch estimates lead to a concern that US impacts, while small, are still overestimated relative to WCPO fishing pressures due to overrepresentation of US data***

OCS-WG members requested a comparison of longline effort proportion from the last five years (up to 2018 as stated by another member) by the US longline fishery from 10°S to 10°N and in waters north of 10°N. It was mentioned that the US longline effort in recent years is approximately 6% of total longline effort and another member will provide these estimates soonest.

The OCS-WG noted the need for increased observer coverage in areas with high vulnerability of oceanic whitetips and in the WCPO in general. A 10% minimum observer coverage was previously recommended in another RFMO and may serve as a reasonable target in the WCPO.

Members of the OCS-WG discussed the efficacy of a recommended catch level or fishing mortality target for ending overfishing, which may be difficult given the non-target nature of the species and a lack of a future assessment. The outlook for another WCPO stock assessment is very unlikely. An assessment would or risk analyses would be needed to evaluate catch.

The Biology and Conservation State of Oceanic Whitetip and Future Directions for Recovery

Chelsey Young summarized a recent publication¹ providing a compendium of knowledge on the species' life history, stock definitions, population trajectories, and management measures to date. Young's paper and presentation emphasizes international issues leading to the declines of oceanic whitetip populations worldwide. Global fin trade and lack of enforcement measures were highlighted. The species is of global concern with non-retention measures already in place with

the major tuna RFMOs. The species was also recently elevated by the IUCN to critically endangered. The paper also provided insight on recommendations to mitigate global declines.

OCS-WG members asked once a recovery plan is in place, how NMFS would allocate funding/resources for international cooperation beyond working with RFMOs, and whether NMFS would prioritize additional work outside RFMOs to help recover the species. Young stated the agency may work through other international agreements (such as CITES, etc) and with the State Department. RFMOs are key, but there are other means. *OCS-WG members also inquired if the changing status under IUCN will impact CITES.* Young is not certain, but was a reviewer of the IUCN OCS status assessment and did not necessarily agree with the status change, noting the criteria under IUCN is different from the ESA.

The OCS-WG noted the stock assessments in the WCPO were the only formal stock assessments for the species, with the IOTC delaying an assessment until 2025. An assessment in the IOTC was expected in 2020 but postponed due to the COVID-19 pandemic.

The OCS-WG noted (and under other items in its meetings) the need for updated life history information on the species to lead to more accurate estimates of reproductive output and recovery potential.

Young addressed questions on the Oceanic Whitetip Recovery Plan Meetings, noting some differences between the meeting hosted in Miami and in Honolulu. The Miami meeting was more research-focused with the availability of the species in the Caribbean population.

¹Young, C and J. Carlson. 2020. The biology and conservation status of the oceanic whitetip shark (*Carcharhinus longimanus*) and future directions for recovery. Rev Fish Biol Fisher. 10.1007/s11160-020-09601-3

4. Ongoing Research Initiatives

The OCS-WG noted the priority of these ongoing research initiatives to provide information of critical importance for the Council to satisfy MSA 304(i) requirements.

A. Tagging and Post-Release Mortality

Melanie Hutchinson presented updates to prior work quantifying post-release mortality of oceanic whitetip sharks using pop-off satellite archival tags. This work was partnered with University of Florida scientists who estimated mortality through time using hazard models. The analyses include 62 tagged fish, which has doubled the sample size since last year. A report is coming very soon, which will be available for other analysis. Hutchinson received additional funds to do more tagging work with the shallow-set longline fishery and the Hawaii small-boat fishery. Informal ESA consultation has been done with PIRO on the new portion of the research with the shallow-set fishery. Since oceanic whitetip is covered under the shallow-set longline

BiOp, a separate consultation is not needed. *OCS-WG noted trailing gear impacts analyses from Hutchinson's previous work and noted the critical importance of reducing trailing gear in domestic and international fleets to increase survivability.*

B. Ecosystem-Based Fishery Management (EBFM) Project

Rob Ahrens provided an overview and status of the EBFM Project, which aims to quantify fishery and resource responses to dynamic ecosystem and oceanographic features. Preliminary results include: distance of oceanic whitetips to sea surface temperature (SST) front, distance to chlorophyll front, and current speed have been found to be main drivers to the spatial interaction patterns. Current modeling outputs show the highest probabilities of encounters south of the Main Hawaiian Islands. Next phase of the project is to use only weekly data inputs to do predictions on a weekly scale. This work will look into mesoscale features (such as eddies). This is followed by simulation testing (early 2021) to determine the utility of the model to predict potential interactions if the Hawaii-based longline fishery distributions begin to shift. The EBFM project will result in a tool to evaluate how effort redistribution may affect catch rates. The effort distribution model is to be done by summer 2021. The time series of data currently used in the EBFM project is 2005 to 2019.

OCS-WG members discussed how electronic monitoring (EM) and logbook data will be useful in the EBFM project in the future, noting improvement to EM and electronic reporting (ER). It was noted that rare interaction species do not appear as expected in logbooks, but logbook data is considered for effort distribution analyses (effort redistribution will also use international effort from Global Fishing Watch). EM is not at the stage to be used in such analyses. Identification of sharks in EM is still somewhat problematic. EBFM project will have a multi-taxa approach and look at impacts to multiple species.

OCS-WG members noted that some of the areas inclusive of data from 2005 to 2019 are no longer available to fishing due to closures.

OCS-WG inquired if international fishing effort not captured by Global Fishing Watch will be captured in the analyses. These analyses may require scaling and addition of data from other fleets, with outside cooperation.

OCS-WG recognized the comprehensive analyses presented may not be completed by the one-year deadline to respond to MSA 304(i) requirements. However, the EBFM project should provide information on fleet dynamics to the best extent possible.

C. Monte Carlo Analysis of Longline Mitigation Measures

Keith Bigelow and Carvalho plan to re-evaluate longline mitigation measures to gear configurations in the first quarter of 2021 using a Monte Carlo analytical framework developed

by Harley et al. (2015). In 2015 there were analyses of longline mitigation measures, which pooled together not only the US observer data, but all international observer data, and looked at a series of 'what-if scenarios'. These included scenarios such as fleet and stock-wide impacts if fleets converted from Japanese tuna hooks to circle hooks. It's well known that oceanic whitetip sharks are rather shallowly-distributed in the water column. The analyses may quantify interaction rates if fleets didn't set shallowest hooks nearest to the float. Other analyses would be to estimate impacts of changing branchlines to monofilament and remove wire leaders/tracers. No progress has been made to date on this project, but PIFSC scientists have data and code available. These analyses will also include target and non-target species, including marlins.

OCS-WG members noted the importance of this study for timing of the Council's obligation under MSA 304(i). It was noted this study should be available in advance of the Council's March 2021 SSC and Council meeting.

Reduction of observed sharks when wire leaders removed is likely due to sharks biting through monofilament, but hooking rates are likely unchanged. One member noted the Hawaii fleet uses approximately 5% monofilament leaders in the deep-set sector. Longline fisheries targeting albacore usually do not use wire leaders.

OCS-WG members asked if the Council has discussed mono vs wire leaders. These discussions have been in the margins with concerns over the weights on mono lines as safety concerns (i.e., 'gear fly-back'). There is some input from the SSC on the wire leader issue in the June meeting report.

OCS-WG asked Council staff to make a collection of literature on longline mitigation measures as well as other papers of interest, available to the group. This was made available and shared at its second and third meetings.

D. CPUE Analyses and Fisher/Vessel Effects

Mark Fitchett provided an update on oceanic whitetip CPUE analyses. Previous analyses of catch information from the Pacific Islands Observer Program database identified drivers impacting CPUE of oceanic white tip sharks. Factors influencing CPUE are operational and due to spatial stratifications of catch and effort that shift through time due to fishery effects and spatial closures. However, this update accounts for variability due to time and spatial effects and identifies fishers with higher than normal probabilities of interacting with oceanic whitetip sharks, regardless of time fished or where they fished. These results can help strategize targeted outreach for the Hawaii longline fishery. However, no operational characteristics were identified among vessels that have a higher propensity to interact with the species after accounting for spatial effects.

An OCS-WG member noted if operational characteristics or vessel impacts are not significant, then the group should not belabor such possible impacts.

5. Addressing International Overfishing

Fitchett went over the Council's obligation to address international overfishing pursuant to MSA 304(i) (as referenced above in the Purpose section of this report). Given the relatively low impact of the US and its fisheries on the WCPO oceanic whitetip stock and pending information to take informative action on relative domestic impacts, the OCS-WG may opt to focus on guiding the Pelagic Plan Team to guide Council recommendations to help end international overfishing. Topics discussed included modifying shark conservation and management measures (CMM), augmenting observer coverages, and recommending target catch or fishing mortality levels into the future. As of November 2020, CMM 2019-04 replaces CMM 2010-07 (shark retention and 5% fins rule), 2011-04 (oceanic whitetip shark non retention), 2012-04 (whale sharks), 2013-08 (silky shark non-retention), and 2014-05 (shark line ban). CMM 2019-04 requires fins to be 'naturally attached' but then gives a list of exemptions for fins being physically attached. Chapman et al 2017 found that about 2% of fins sampled in Hong Kong were oceanic whitetip sharks.

OCS-WG members noted the adoption of CMM 2019-04 was not a trivial matter and additional revisions to the CMM (e.g., regarding exemptions to fin attachment) is unlikely to be adopted in the short-term and advised against changes at this time. However, another member noted that recommendations could still be made.

Members discussed how enforceable the provisions for shark fins attached or with the shark carcass (in a bag with the carcass or tied to the carcass) are to prevent oceanic whitetip shark fins purposefully coupled with another species' carcass. It was noted oceanic whitetip fins are very conspicuous and could be detected easily. It took several years to get any agreement on 'fins naturally attached' being included in the CMM.

OCS-WG members noted that increased observer coverage is a critical point and there is a reasonable argument to increase observer coverage to 10%. OCS-WG discussed EM and the potential for EM to augment or replace observer coverage. The WCPFC (and other RFMOs) are still weighing on when and how EM can count toward observer coverage or supplement monitoring catch. It was noted in earlier discussions there are some limitations with shark species identification.

OCS-WG members noted that many international fleets, including distant water fleets, also use wire leaders like the Hawaii deep-set fishery and may or may not use tuna hooks instead of circle hooks. Members requested from PIFSC that information on wire leader usage be made available at a future OCS-WG meeting. This data is still in the quality control stage and may be available by the working group's January 2020 meeting.

An OCS-WG member noted that fleets from three nations still use ‘shark lines’, as exempted in existing measures. Japan, Taiwan, and some other fleets also use wire leaders. Longline fisheries targeting albacore, such as the American Samoa fleet, do not use wire leaders.

OCS-WG members noted the lack of another WCPO stock assessment in the future, which could be difficult to assess catch levels in the future mortality rates, such as F-based targets. One member noted F-based targets provide a good benchmark, but OCS-WG encouraged the use of adaptive management tools such as EBFM. However, it was also noted that adaptive management tools are likely not applicable to most international fisheries.

6. Working Group Considerations

The OCS-WG will continue to guide priorities on research, many of which will be available in early 2021 to inform the Pelagic Plan Team, which will make recommendations to the Council. Several international priorities were identified, especially with respect to increasing observer coverage and monitoring of species of concern. Research is greatly needed, such as assessments or risk analyses to ensure management measures are effective. Life history and stock structure information is also important to better determine population growth, risks, and recovery potential.

7. Other Matters

A line-cutter project remains underway, funded through the Bycatch Reduction Engineering Program (BREP). This is critical to reducing trailing gear, as discussed by the OCS-WG as ‘low hanging fruit’ for increasing recovery. A new prototype has been underway and currently tested. This prototype is much more sophisticated, using a fiber-optics cable and mechanized system – in contrast to a simple machine with manually cutting action of an earlier prototype. However, it may be cost-prohibitive.

OCS-WG has noted the critical importance of reducing or removing trailing gear for increasing oceanic whitetip survival and the implementation of an effective line-cutter is important, if not urgent.

OCS-WG members noted that the BREP project was intended to be in collaboration with PIFSC. The Principal Investigator has not coordinated with PIFSC scientists, who have not seen nor advised on the current prototype. Members expressed some concern to the timeliness and cost.