United States Department of the Interior

FISH AND WILDLIFE SERVICE

International Affairs
5275 Leesburg Pike, MS: IA
Falls Church, VA 22041-3803

DEC 17 2019

MEMORANDUM

To: Chief, Branch of Permits, Division of Management Authority

From: Chief, Branch of Consultation and Monitoring, Division of Scientific Authority

Subject: General advice for the export of shortfin mako (*Isurus oxyrinchus*) harvested in the commercial fishery by U.S. fisherman throughout the species' range in the Pacific Ocean in the 2019 and 2020 harvest seasons.

Advice: *The Division of Scientific Authority (DSA) finds that the export of shortfin mako (Isurus oxyrinchus) harvested by U.S. fisherman in the 2019 and 2020 harvest seasons in species' entire range within the Pacific Oceans is not detrimental to the survival of the species, provided that the harvest is in compliance with all U.S. management plans in place for the species.*

We will review and re-issue a general advice for this shark species annually, in an effort to be responsive to new data and information that may become available. This finding only pertains to shortfin mako sharks caught within the species' range within the Pacific Ocean, and applications for the export of shortfin mako sharks caught in U.S. waters other than in the Pacific Ocean will be reviewed separately.

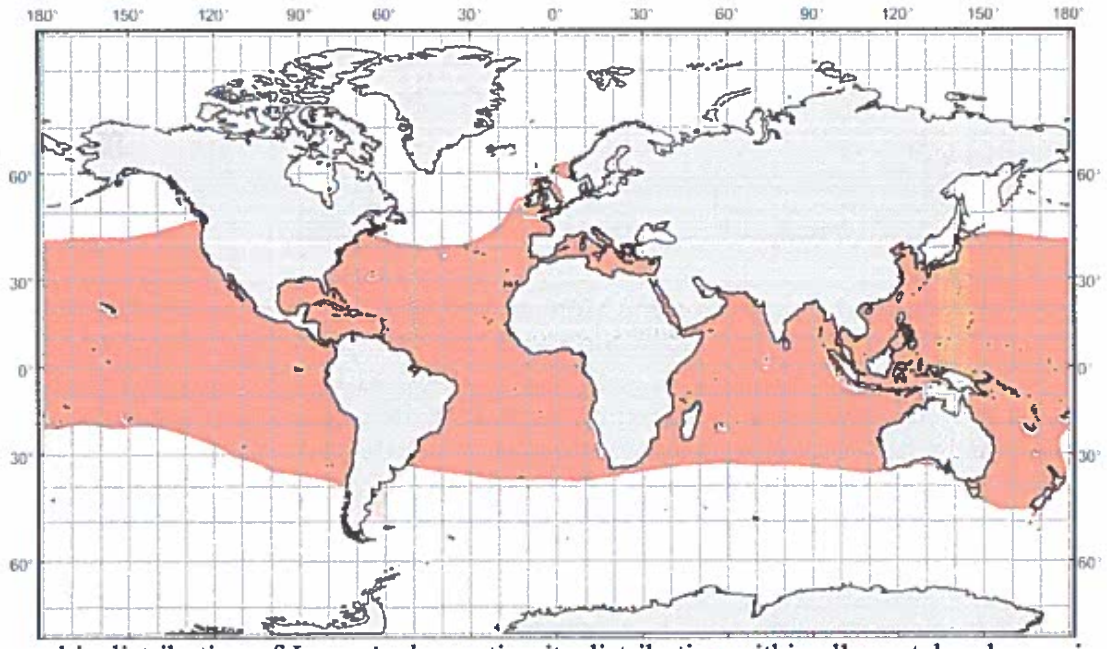
Basis for advice:

Species Distribution/Range in the United States

The shortfin mako *(Isurus oxyrinchus)*is a highly migratory, circumglobal species which moves regionally within all the world's tropical and warm-temperate and is seldom found in water temperatures below 16°C. The species is commonly found well offshore, where it occurs from the surface down to at least 500 meters, but also moves into inshore littoral habitats just offshore from the surf zone (Holts and Bedford 1992; Rigby et al. 2019). The species uses offshore continental shelf habitat as nursery areas where young sharks tend to remain in the upper 20 meters of the water column and mostly avoid the thermocline and cold deeper waters (Ebert et al. 2013; Holts and Bedford 1992).

Within regional areas fished by the United States' flagged vessels, in the Western Atlantic the species is found from the Gulf of Maine in the north to as far south as northern Argentina; it is also found in the Gulf of Mexico and throughout the Caribbean islands. In the Western and Central Pacific the species could be harvested by the U.S. fleet from American Samoa, Guam, the Northern Mariana Islands, the United States Minor Outlying Islands (Howland-Baker Is., Johnston I., Midway Is., US Line Is., Wake Is.), and from the Aleutian Islands to Society Islands,

including the Hawaiian Islands. In the Eastern Pacific this species can be found along the coast and open oceans from Southern Canada south to Chile (Compagno 2001; Rigby et al. 2019).



Geographic distribution of *I. oxyrinchus* noting its distribution within all coastal and oceanic, temperate and tropical seas. (Source: Compagno 2001).

Biological characteristics

The shortfin mako shark is, like most shark species, a species with a slow growth rate, late age of maturity and small litter size. Females mature at between 265 and 312 cm total length and at an age of between 18 and 21 years; their maximum age is somewhere between 28 and 32 years. Males mature at between 166 and 204 cm total length. The species reaches a maximum length at between 315 and 445 cm total length and a total weight of approximately 500 kg, with females reaching a larger size than males. Reproduction is viviparous and oophagous and the gestation period is estimated to last from between 12 and 24 months. The species exhibits a two to three-year reproductive cycle, which includes about a year resting period between births. In the 2018 ISC species stock assessment, pup production per female, per reproductive cycle, was assumed to be 12 pups. Age and growth data is limited for this species since there is little data available for fully grown adult specimens harvested in the fisheries (ISC. 2018; Rigby et al. 2019; Takahashi et al. 2017; Weigmann 2016).

Population Status and Trends:

In 2019, the IUCN Red List assessed the shortfin mako shark (*Isurus oxyrinchus*) as globally Endangered and at the time the global population trend was declining. Previous Red List assessments indicated that this population was Lower Risk/Near Threatened in 2000, and in 2009 it was assessed as Vulnerable. There is no estimate of global population size, but genetic data indicates this species is comprised of one global population with some genetic structuring within ocean basins (Schrey and Heist 2003; Taguchi et al. 2015; Corrigan et al. 2018). The 2019 assessment as Endangered is based on the facts that there have been steep population declines in the North and South Atlantic, as well as smaller declines in the North Pacific and Indian Ocean;

it is believed there is a slight increase in the population in the South Pacific. This assessment is also based on the species' low biological productivity, relatively slow growth rate, late age of maturity and small litter size (Rigby et al. 2019).

In 2018, the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean produced the first stock assessment for the shortfin mako in this ocean basin (ISC 2018). The overall conclusion of this assessment was that, based on their estimate of maximum sustainable yield, computed from modelling multiple data sources from 1975 through 2016, this species is not overfished and overfishing is not currently occurring.

Globally there is a general lack of quantitative abundance data for shortfin mako sharks and therefore, there is a lack of population trend information throughout most of the species' ranges. The available information generally indicates stock declines in areas where the species are targeted for harvest, and declines are also indicated in some areas where the species is taken primarily as bycatch in fisheries targeting tuna and swordfish (Rigby et al. 2019). Overall harvest data, or even data on dead discards, is often either under reported or reporting may be totally absent. One notable exception to the general lack of consistent data however, is for shortfin mako sharks that are encountered, harvested, or discarded within the Exclusive Economic Zone (EEZ) of the continental United States, or generally by U.S. flagged vessels (ISC 2018). This data includes information on both incidental bycatch, which is harvested or discarded in commercial fisheries on the high-seas and within the EEZ, as well as commercial data on harvest from within state regulated waters inland of the EEZ. Recreational harvest data is also occasionally available, though this harvest is much smaller than that of the commercial fisheries, and recreationally harvested specimens cannot be sold commercially (PFMC 2018). In the Pacific, the U.S. data was one of the datasets used in the short fin mako shark stock assessment for the shark's population occurring in the waters of the North Pacific Ocean (ISC 2018). As previously mentioned, an assessment of this species was also recently completed by the IUCN Red List (Rigby et al. 2019).

According to data included in the Food and Agricultural Administration (FAO) of the United Nations Global Capture Production dataset, total reported global harvest of shortfin mako sharks (*Isurus oxyrinchus*) increased by 69% from the period 2004-2009 (total of 54,155 t during the period) to 2010-2016 (total of 45,956 t during the period). For the seven years between 2010 to 2016, harvests from the Atlantic contributed 50% of total catch (total of 45,956 t during the period) and harvests from the Pacific contributed 34% (a total of 31,838 t). However, FAO data is misleading as it is often incomplete due to harvesters not consistently reporting catch, bycatch, and discards at sea. FAO data is also limited due to lack of species specific reporting and the lack of a consistent data management and reporting system in some nations (CITES 2019; Young et al. 2016).

In the Eastern Pacific Ocean, shark catch data is compiled by the Inter-American Tropical Tuna Commission (IATTC), the Regional Fisheries Management Organization (RFMO) operating in this region. Their data includes information on shortfin mako shark which are caught as bycatch in the fisheries targeting tunas and swordfish, primarily using longline and purse-seine gears. Prior to 2005 most shark data consisted of aggregated data where all sharks caught as bycatch were lumped into one category. Harvest of shortfin mako was reported to IATTC as early as

1993 and data indicates that catches increased sharply after 2008. According to catch reported to IATTC, mako shark harvest peaked in 2014 at about 2,500 tons and in 2017, partial reporting of mako harvest was 1,606 tons; data for the 2018 harvest by large purse-seine vessels amounted to approximately 2 tons (IATTC 2019).

In the Western and Central Pacific Ocean, shark catch data is compiled by the Western and Central Pacific Fisheries Commission (WCPFC) which is the RFMO operating in this region. Like with the IATTC there has been a lack of consistent reporting of shark bycatch data and when such data is available, it is often reported simply as "shark". In 2011, WCPFC instituted a shark reporting requirement which required sharks to be reported by species; yet, several fishing fleets still do not report this data (Miller et al. 2014). Mako sharks were rarely caught in the longline fisheries in the WCPFC area, and they were harvested even less often in this regions' purse-seine fisheries (Clarke et al. 2011).

In 2018, a stock assessment was conducted on the North Pacific Ocean stock of the shortfin mako. This assessment used data from multiple fisheries for the period of 1975 through 2016. Catch data from the early period, 1975 through 1993, was highly uncertain because of a lack of species specific data. After 1993 however, species specific data became widely available for all major fisheries. Using the entire dataset, the estimated total catch of shortfin mako in the North Pacific peaked at 7,068 metric tons (mt) in 1981 and then declined in the early 1990s; since the early 1990s the catches have fluctuated between about 1,948 mt and 2,395 mt. Harvest of the species has predominately occurred in longline fisheries since 1993, but the early period catch was mainly from the drift gill net fishery. The 2018 shortfin mako stock assessment for the North Pacific Ocean stock included data elements from the Western, Central and Eastern Pacific. Modeling the fishery to account for known uncertainties in the data, the assessment determined that this stock is neither overfished nor is overfishing occurring (ISC 2018).

Threats

Globally, overharvest in both directed and bycatch fisheries is the primary threat to the shortfin mako (Rigby et al. 2019). Also, there is a general lack of species specific data available to reliably estimate populations and often, when data is available, it is not provided at the species level, thus precluding its use for species specific population estimates. In some areas, species are known to represent a specific proportion of the overall population, thus allowing a relative population estimate to be determined. Unfortunately, even when species specific reporting of shark harvest is required by an RFMO, data is often not available due to non-compliance with reporting requirements (IATTC 2019). Without reliable population data, populations cannot be accurately assessed. This species is highly valued for not only its fins but also its meat. Both meat and fins are harvested from directed and bycatch fisheries globally, but in the United States several states ban the possession and sale of fins (Rigby et al. 2019). At this time we are unsure of what proportion of harvested shortfin mako shark in the United States is used domestically versus how much enters international trade, however, there is some evidence that most meat is used domestically. Shortfin mako shark fins are believed to be primarily consumed in the Asian market, but it is unclear how much of the fin trade originates from shortfin mako sharks harvested in U.S. waters.

Species Management:
At the global level, the shortfin mako (*Isurus oxyrinchus*) is listed among the Highly Migratory Species (Annex 1) in the United Nations (UN) Convention on the Law of the Sea (UNCLOS). The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea, of 10 December 1982, Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, which builds on UNCLOS and has been in force since 2001, encourages States to cooperate on these multijurisdictional stocks through regional and sub-regional management bodies. Since the Agreement's inception there have been regional agreements aimed at conserving these migratory stocks but while the Agreement's aim is conservation, there are relatively few enforcement measures specific to mako sharks.

Also globally, in 2008 the shortfin mako (*Isurus oxyrinchus*), was listed under Appendix II of the Convention on Migratory Species of Wild Animals (CMS or Bonn Convention). The CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. A CMS Appendix II listing acknowledges that these species need, or would greatly benefit from, international cooperation on management and encourages Parties to take cooperative actions on management, including establishing global or regional measures to conserve the species. CMS decisions may also trigger management responses nationally. It should be noted that the United States is not a Party to CMS.

As previously noted, in the Eastern Pacific Ocean, shark catch data is compiled by the Inter-American Tropical Tuna Commission (IATTC), and in the Western and Central Pacific Ocean the catch is compiled by WCPFC. Their datasets include information on shortfin mako shark which are caught as bycatch in fisheries targeting other species such as tunas and swordfish, primarily using longline and purse-seine gears. Members of these RFMOs have agreed upon recommendations related to the harvest of shark species and to their reporting of harvest and discards. However, there has been a lack of consistent reporting of shark bycatch and discard data and, when such data is available, it is often not reported to species level. Reporting is vastly improved however, on all vessels where observer coverage is required as a condition of obtaining a permit to fish on a particular fish species.

Within the United States' EEZs in the Pacific, regulations are promulgated by both individual States and, under the coordination of NOAA's NMFS, in State groups known as Fisheries Councils. The States of Washington, Idaho, Oregon and California jointly manage their fish stocks in coordination with the NOAA Pacific Fisheries Management Council (PFMC) under the Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species. Management of this fishery is based on permits which are required to fish for highly migratory species in both the commercial and recreational sectors. Permit regulations mandate that all fishermen must maintain logbooks documenting their catch. In the commercial fishery, while there is no quota for the shortfin mako, there is an annual commercial harvest guidelines of 150 metric tonnes (mt). To help enforce this guideline, there is a mandatory placement of at-sea observers on about 20% of all commercial drift gillnet vessels to monitor catch, bycatch, and fishing effort and, in order to help reduce live-release mortality, fishermen in both the recreational and commercial sectors are required to take a training course on safe handling and release of protected species. Time and areas closures are also implemented to reduce the risk of

catching protected species such as sea turtles, whales, and dolphins (PFMC 2018). Due to regulations passed by each of the coastal States (Washington, Oregon and California), upon landing a shark the fins must be removed and destroyed; no shark fins can be sold commercially.

National management of the shortfin mako in Hawaii and the U.S. Pacific Islands is coordinated by the Western Pacific Fisheries Management Council (WPFMC) under the Fishery Ecosystem Plan for the Pelagic Fisheries of the Western Pacific. Entry into this fishery is limited to a maximum of 164 vessels and vessel logbooks are required. All longline vessels are required to be equipped with a satellite transponder that provides real-time vessel position updates and tracks vessel movements and have an observer on board. Longline vessels are prohibited from operating in certain areas to protect endangered Hawaiian monk seals and vessels operating under longline general permits must carry special gear to release incidentally hooked or entangled sea turtles. There are no management measures specific to Pacific shortfin mako shark because in the Western Pacific they're only harvested incidentally in the longline fishery for swordfish (WPFMC 2018). In 2011 Hawaii banned the possession and sale of shark fins so all sharks that are landed in the State must have their fins removed and destroyed; there is no commercial sale of shark fins in this state (HI Rev Stat § 188-40.7 (2013)). Sale or possession of shark fins is prohibited in the three U.S. territories American Samoa, Guam, and the Northern Mariana Islands.

Summary

The shortfin mako shark fisheries on the high seas and in the EEZ of U.S. waters of the Pacific Ocean are managed under a system which allows harvest from directed, bycatch and recreational fisheries. Anyone participating in these fisheries is required to be licensed, either by the NMFS or in the state where they are fishing. The system under which this fishery is managed is determined based on the best available data which includes numerous studies related to pelagic species' population dynamics and historical harvest records from the directed, bycatch and recreational fisheries. The annual harvest is followed yearly by collecting and analyzing each years' harvest and periodically assessing the status of the stock, related to historical trends. Currently, the Pacific Ocean population of shortfin mako shark is not overfished and current fishing pressure appears sustainable.

Conclusion

The Division of Scientific Authority (DSA), based on the information and data available, and management measures currently in place, finds that the export of wild shortfin mako sharks harvested by U.S. fishermen in the Pacific Ocean in the 2019 and 2020 harvest season is not detrimental to the survival of the species, provided the harvest is in compliance with U.S. management plans in place for the species.

Literature cited

CITES. 2019. Proposal to include the shortfin mako shark (*Isurus oxyrinchus*) and the longfin mako shark (*Isurus paucus*) in CITES Appendix II, in accordance with criteria set forth in CITES Resolution Conf. 9.24 (Rev. CoP17). CoP18 Prop. 42, available online at: https://cites.org/sites/default/files/eng/cop/18/prop/060319/E-CoP18-Prop-42.pdf. Accessed 25 November 2019.

Clarke, S., Harley, S., Hoyle, S., Rice, J. (2011) An indicator-based analysis of key shark species based on data held by SPC-OFP. Western and Central Pacific Fisheries Commission Scientific Committee Seventh Regular Session. WCPFC-SC7-2011/EB-WP-01. 1-88.

Compagno, L.J.V. 2001. Sharks of the world. An annotated and illustrated catalogue of shark species known to date. Volume 2. Bullhead, mackerel and carpet sharks (Heterodontiformes, Lamniformes and Orectolobiformes). In: *FAO Species Catalogue for Fishery Purposes* FAO, Rome.

Corrigan, S., Lowther, A.D., Beheregaray, L.B., Bruce, B.D., Cliff, G., Duffy, C.A., Foulis, A., Francis, M.P., Goldsworthy, S.D., Hyde, J.R., Jabado, R.W., Kacev, D., Marshall, L., Mucientes, G.R., Naylor, G.J.P., Pepperell, J.G., Queiroz, N., White, W.T., Wintner, S.P. and Rogers, P.J. 2018. Population connectivity of the highly migratory Shortfin Mako (*Isurus oxyrinchus* Rafinesque 1810) and implications for management in the southern hemisphere. *Frontiers in Ecology and Evolution* 6(187): doi:10.3389/fevo.2018.00187.

Ebert, D.A., Fowler, S. and Compagno, L. 2013. *Sharks of the World. A Fully Illustrated Guide.* Wild Nature Press, Plymouth, United Kingdom.

Holts, D.B. & D.W. Bedford. 1992. Horizontal and vertical movements of the shortfin mako shark, *Isurus oxyrinchus*, in the Southern California Bight. Australian J. Mar. FreshW. Res., 44: 901-909, figs 1-3.

IATTC. 2019. Report on the Tuna Fishery, Stocks, and Ecosystem in the Eastern Pacific Ocean in 2018 — Inter-American Tropical Tuna Commission 94th Meeting. Bilbao, Spain. 22-26 July 2019. Document IATTC-94-01.

ISC. 2018. Stock Assessment of Shortfin Mako Shark in the North Pacific Ocean Through 2016. WCPFC NC14-2018/IP-06. Western and Central Pacific Fisheries Commission. Northern Committee Fourteenth Regular Session, Fukuoka, Japan 4-7 September, 2018.

Miller, M.H., Carlson, J., Hogan, L., Kobayashi, D. 2014. Final Report to National Marine Fisheries Service, Office of Protected Resources. June 2014. 116.

PFMC. 2018. Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species as Amended. Available online at: https://www.pcouncil.org/wp-content/uploads/2018/04/HMS_FMP_thru_A5_Apr18.pdf. Accessed 25 November 2019.

Rigby, C.L., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Francis, M.P., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. & Winker, H. 2019. *Isurus oxyrinchus. The IUCN Red List of Threatened Species* 2019: e.T39341A2903170. http://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T39341A2903170.en. Downloaded on 30 October 2019.

Schrey, A. and Heist, E. 2003. Microsatellite analysis of population structure in the shortfin mako (*Isurus oxyrinchus*). *Canadian Journal of Fisheries and Aquatic Science* 60: 670-675.

Taguchi, M., Ohshimo, S. and Yokawa, K. 2015. Genetic stock structure of shortfin mako (*Isurus oxyrinchus*) in the Pacific Ocean. ISC/15/SHARKWG-1/. National Research Institute of Far Seas Fisheries, Shimizu, Shizuoka, Japan.

Takahashi, N., Kai, M., Semba, Y., Kanaiwa, M., Liu, K.M., Rodríguez-Madrigal, J.A., Ávila, J.T., Kinney, M.J., Taylor, J.N. 2017. Meta-analysis of growth curve for shortfin mako shark in the North Pacific. ISC/17/SHARKWG-3/05.

Young, C.N., Carlson, J., Hutchinson, M., Kobayashi, D., McCandless, C., Miller, M.H., Teo, S., and T. Warren. 2016. Status review report: common thresher shark (*Alopias vulpinus*) and bigeye thresher shark (*Alopias superciliosus*). Final Report to National Marine Fisheries Service, Office of Protected Resources. March 2016. 199 pp.

Weigmann, S. 2016. Annotated checklist of the living sharks, batoids and chimaeras (Chondrichthyes) of the world, with a focus on biogeographical diversity. *Journal of Fish Biology* 88(3): 837–1037.

WPFMC. 2018. Ecosystem-Based Fisheries Management in the U.S. Pacific Islands. Available online at: https://www.fisheries.noaa.gov/management-plan/fishery-ecosystem-plan-pelagic-fisheries-western-pacific. Accessed 25 November 2019.