ISC/19/SHARKWG-1/8

Estimation of blue shark catch by Korean tuna longline fishery in the North Pacific Ocean

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December 2019

Working document submitted to the ISC Shark Working Group, International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean (ISC), from 4 to 10 December 2019, Shimizu, Japan.

Abstract

The blue shark (BSH, *Prionace glauca*) catch by Korean distant water tuna longline fishery in the North Pacific Ocean was estimated using logbook data recorded by captain on board and observer data conducted by national scientific observer programs. In estimating blue shark catch, we divided the period into two parts that one is the period when shark catch by species has been collected and the other is the period when shark catch was collected as one group not separated. In the former case, blue shark catch was used without any processing, and in the latter case, it was estimated as the ratio of blue shark to total shark catch by observer data.

Introduction

Korean distant water tuna longline fishery in the Pacific Ocean commenced in 1958, and has caught tuna and tuna-like species, particularly bigeye and yellowfin tunas as target and sharks as bycatch. For that reason, there was a problem in collecting the data of shark catch and estimating the catch by shark species. Therefore, National Institute of Fisheries Science (NIFS) that is responsible for data collection and management separated logbook into two format that consisted of target for tuna and tuna-like species and bycatch for ERS (Ecologically Related Species) such as sharks, seabirds, sea turtles, etc. to record the information on catch and bycatch by species, and have collected shark catch by species since 2009.

Recently WCPFC adopted CMM 2014-05 (Conservation and Management Measure for Sharks, came into force on 1 July 2015), and Korean government and fishing companies have encouraged fishermen not to retain shark on board accordingly.

In this study, we estimated blue shark catch by Korean tuna longline fishery in the North Pacific Ocean to provide the information for assessing the stock status.

Data and Methods

Data used in this study for estimating blue shark catch come from logbook recorded by captain on board and observer data conducted by national scientific observer programs. Although there is the nominal shark catch collected by Statistics Korea, we did not directly

use the data in this study. Because they are aggregated shark data not separated into species or species groups, and data for the past would have been underestimated as well. Therefore, blue shark catch was estimated using logbook data.

For logbook data, however, as they have to be raised to represent the actual annual catch, the data coverage was calculated based on the amount of the main target species, bigeye and yellowfin tunas, of logbook and the annual nominal catch. Logbook data have been collected since 1971, but data prior to 1981 were not used in this study due to low data coverage. In addition, logbook data were plotted to explore the spatial and seasonal distributions of blue shark catch and CPUE through time.

In estimating blue shark catch, we divided the period into two parts that one is the period when shark catch by species has been collected and the other is the period when shark catch was collected as one aggregated group not separated. In the former case, blue shark data was used without any processing, and in the latter case, it was estimated by taking into account the ratio of blue shark to total shark catch by observer data.

Results and Discussion

Fig. 1 shows the unraised and raised total shark catch by Korean tuna longline fishery in the whole Pacific and North Pacific Ocean from 1982 to 2018. Catches from 2013 have no difference between the unraised, but catch prior to 2000 have a little difference between them. Since 2015 the shark catch has decreased steeply and is below 50 tons in the North Pacific Ocean in recent years.

As for the geographical distributions of shark CPUE, they showed a high density at the eastern area along with a high catch (Fig. 2).

Shark catch by species has been collected since 2009, and the data coverages prior to 2012 were too low to use as identified data by species (Fig. 3). However, for the data after 2013, the identified catch covered over 60% of total shark catch, and have been classified and reported up to 7 shark species so that we decided to use the blue shark catch without any processing. For the data prior to 2012, as there was no information on species composition, the scientific observer data were used to estimate blue shark catch.

From scientific observer data (Fig. 4), blue shark CPUE and shark species composition were available, but as shown in Fig. 4, the areas observed were very limited around 5°N-15°N and the number of sets observed were not enough to produce the blue shark CPUE.

Therefore, using the mean ratio (0.52) of blue shark to total shark catch from the scientific observer data, the blue shark catch was estimated and presented in Fig. 5 with previous results and total shark catch in the North Pacific Ocean.

In short, in this study the catch of blue shark caught by Korean tuna longline fishery in the North Pacific Ocean from 1982 to 2018 was estimated using logbook and scientific observer data. However, there are something to be considered and further investigated as follows. Firstly, it needed to found out how much the CPUE of blue shark from Korean tuna longline fishery is by region and by year. For that, we have to collect and analyze observer data more not only by national observer programs but also regional observer programs. Secondarily, the shark catch by species recorded by captain should be cross-checked with the scientific observer data. And finally, we have to collect and monitor the amount of shark discarded on board, because it is important information in conserving and managing a stock as the unaccounted mortality in recent years.

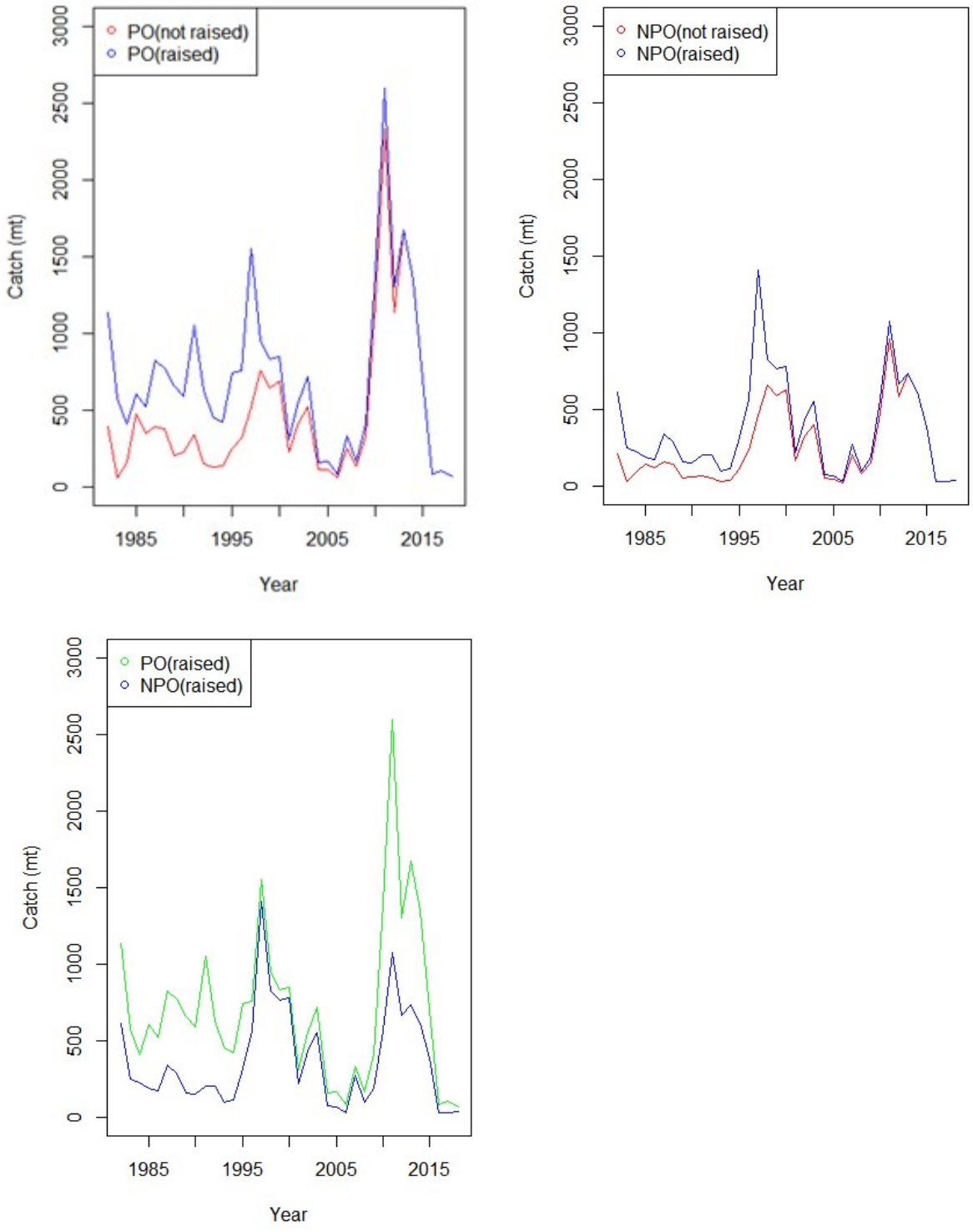

Fig. 1. Unraised and raised total shark catch by Korean tuna longline fishery in the whole Pacific and North Pacific Ocean, from 1982-2018.

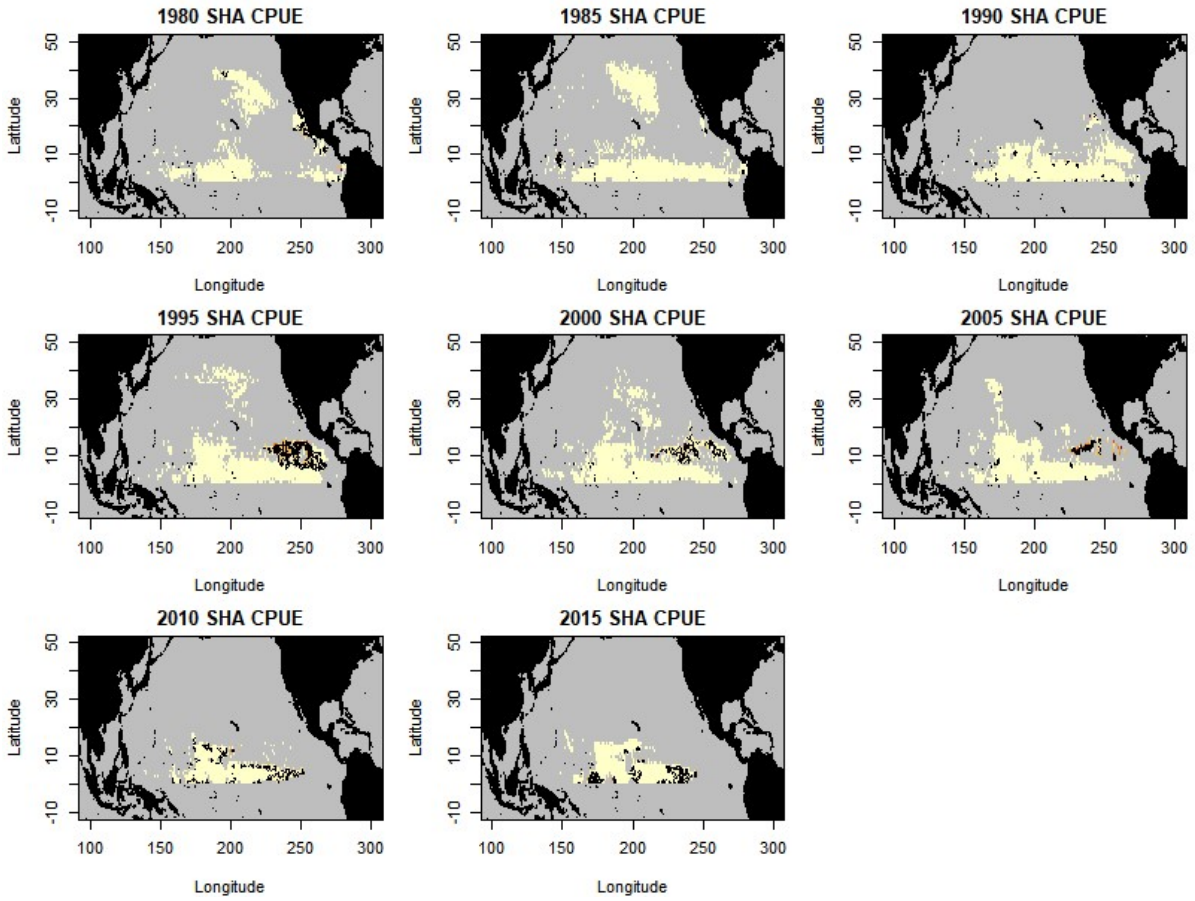

Fig. 2. Map showing the fishing areas of shark of Korean tuna longline fishery in the North Pacific Ocean, aggregated by 5-year period. Red color indicates higher CPUE.

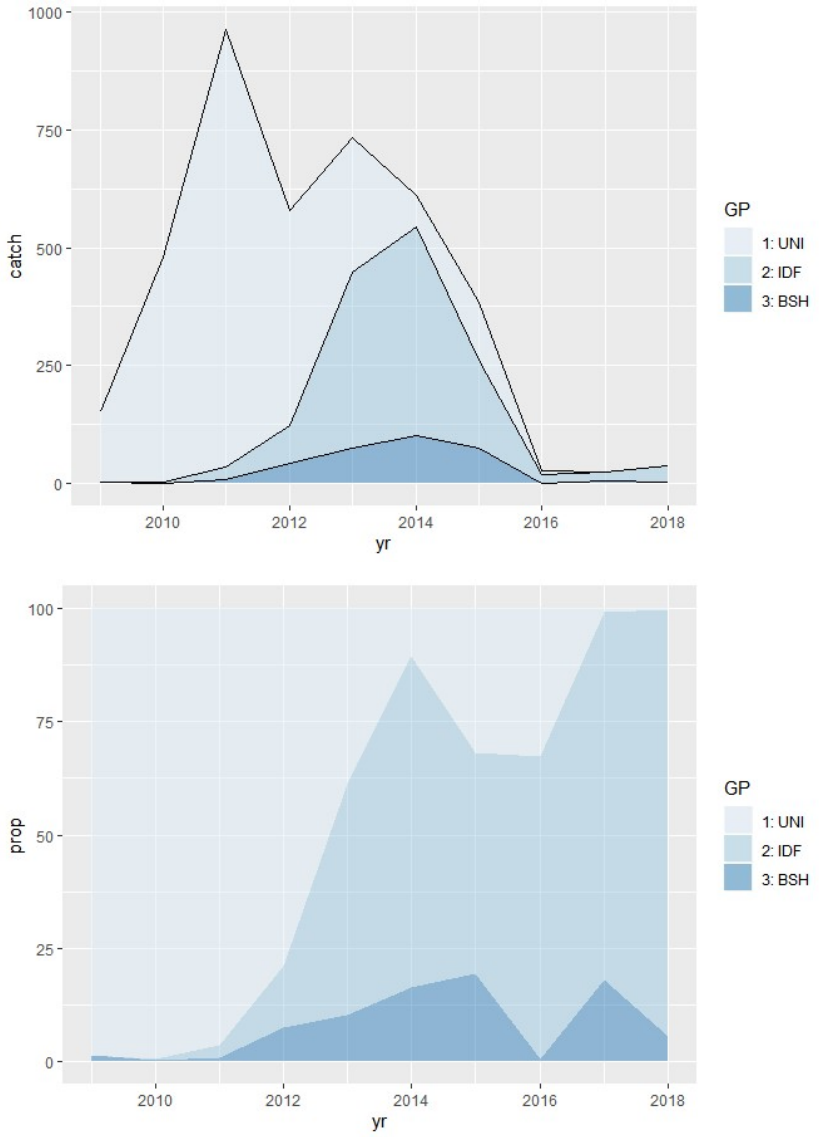

Fig. 3. Shark catch by species (upper) and its proportion (lower) caught by Korean tuna longline fishery in the North Pacific Ocean, from 2009-2018 (UNI: unidentified and aggregated shark group, IDF: identified shark by species but blue shark, BSH: blue shark).

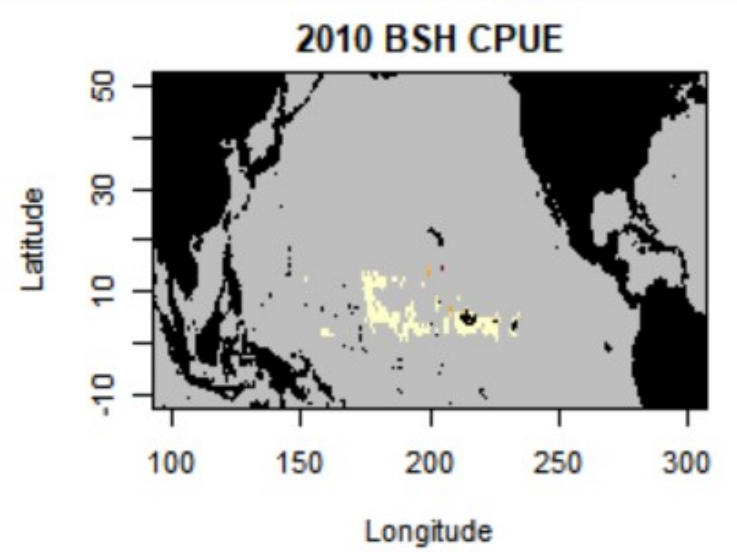

Fig. 4. Map showing the distributions of blue shark CPUE and fishing positions observed by the scientific observer programs in 2013, 2016, 2017 and 2018.

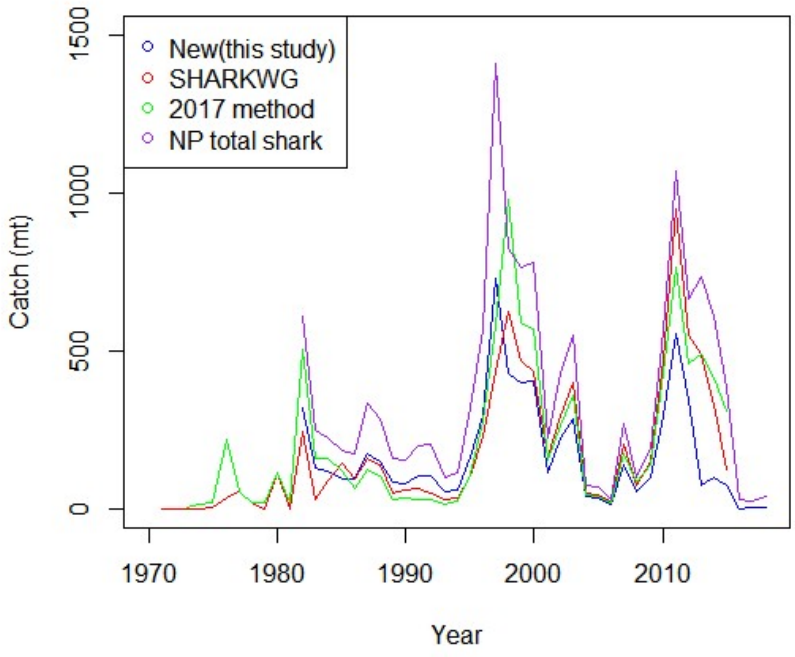

Fig. 5. Comparison of the estimates of blue shark catch.