North Pacific Fisheries Commission

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Catch size composition of North Pacific Armorhead (*Pentaceros wheeleri*) in the Emperor Seamounts by the Korean trawl fishery up to 2019

Kyum Joon PARK, Doo Nam KIM and Eunjung KIM

National Institute of Fisheries Science, the Republic of Korea

Abstract

The North Pacific Fisheries Commission revised the CMM to expand the mesh size of the bottom trawls operating in the Convention Area to 130mm or above from 2019. Korean bottom trawlers have operated from 2013 to 2019. Observer was on board during vessel operation, and the observers randomly measured the total length and weight of North Pacific Armorhead. The catch-length composition of 2019 in which the revised CMM was applied was compared to the catch-length composition in 2018 and that of years prior to 2019. The catch composition in 2019 was larger in size than the other years. The weight over total length of the North Pacific Armorhead was also higher in 2019 than in 2018.

Introduction

The North Pacific Armorhead (*Pentaceros wheeleri*) is distributed in the 150-1,500m water column of the central subarctic and eastern part of the North Pacific, and the adults are mainly distributed in the Emperor Seamounts and North Hawaiian Ridge (Kyota et al., 2016). NPA has been fished by Korean, Japanese, and Russian bottom trawlers operating in the North Pacific Emperor Seamounts. Korea started operating bottom trawlers in the Emperor Seamounts since 2004 with the most caught fish being the North Pacific Armorhead, and the largest catch made in 2012 (i.e., 4,487 tons; Fig. 1). However, the catch has decreased significantly since then. The area is managed by North Pacific Fisheries Commission (NPFC). Up to date, stock assessment for the sustainable use of the stocks has not been conducted for North Pacific Armorhead. However, the Conservation and Management Measure(CMM) for the bottom fisheries in the NW Pacific adopted in 2018 requests the expansion of the trawl vessels' mesh size to 130mm or above from 2019 (NPFC 2018). This working paper compared the size composition of the North Pacific Armorhead caught in 2019 and of those caught before 2019 to evaluate preliminarily the effect of the amendment of the measure.

Method

The size composition data of the North Pacific Armorhead was collected by observers on board Korean trawl fishing vessels who operated in the Emperor Seamounts from 2013 to 2019. An observer randomly sampled around 30 NPA samples per haul to measure the total length up to 50mm and weight up to 50g. A box plot illustrating the total length(TL) of samples by year is presented to show changes in the size composition of North Pacific Armorhead. Comparisons were made of the total length and length-weight relationship in 2018 and those in 2019 to see if there were changes in the length composition after the implement of the CMM. A comparison was also made between the TL from 2013 to 2018 and TL in 2019.

Results and Discussion

From 2013 to 2019, a total of 8,644 TL data was collected, of which 270 were collected in 2019 and 1,602 were collected in 2018. The annual length composition of the North Pacific Armorhead caught by the Korean bottom trawlers is presented in Fig. 2. The length distribution was the narrowest in 2013, and the mean TL was the smallest at 30.58cm in 2013 and the largest at 35.0cm in 2016. The mean TL of NPA was 34.1cm in 2019, the year in which the latest fishing took place, and the mean TL was 32.0cm in 2018, the year prior to the application of the amended conservation measure.

The monthly length distribution of the North Pacific Armorhead caught in the Emperor Seamounts from 2013 to 2019 is presented in Fig. 3. The TL of North Pacific Armorhead caught in April and May of 2019, with the exception of March, were larger than the TL in the same period in 2018. A t-test was conducted to determine the significant differences, and the result showed a significant difference between the two groups ($P<0.01$).

The ANOVA test estimated a significant difference in the yearly TL of North Pacific Armorhead ($P<0.01$). Therefore, we aggregated the data prior to 2019 to compare it with the data in 2019. The mean TL of NPA caught prior to 2019 was 32.9cm, which was smaller than the mean length of NPA caught in 2019 (34.1cm). The difference between the two groups was smaller in April and May, compared to that of the whole 2018 data (Fig. 4). A t-test was conducted to determine the significant differences between the two groups, and the result showed a significant difference between the two groups, as was with the whole 2018 data ($P<0.01$).

The length-weight distribution of the samples collected in 2018 and 2019 is presented in Fig. 5. The North Pacific Armorhead caught in 2019 showed larger TL and weight, which could be the result of higher fatness index of the NPA in 2019 or larger NPA individuals being captured due to larger

mesh size.

References

Kiyota, M. Nishida, K., Murakami, C., and Yonezaki, S. 2016. History, Biology, and Conservation of Pacific Endemics 2. The North Pacific Armorhead, *Pentacerous wheeleri* (Hardy,1983) (perciformes, pentacerotidae). Pacific Science, 70(1), 1-20.

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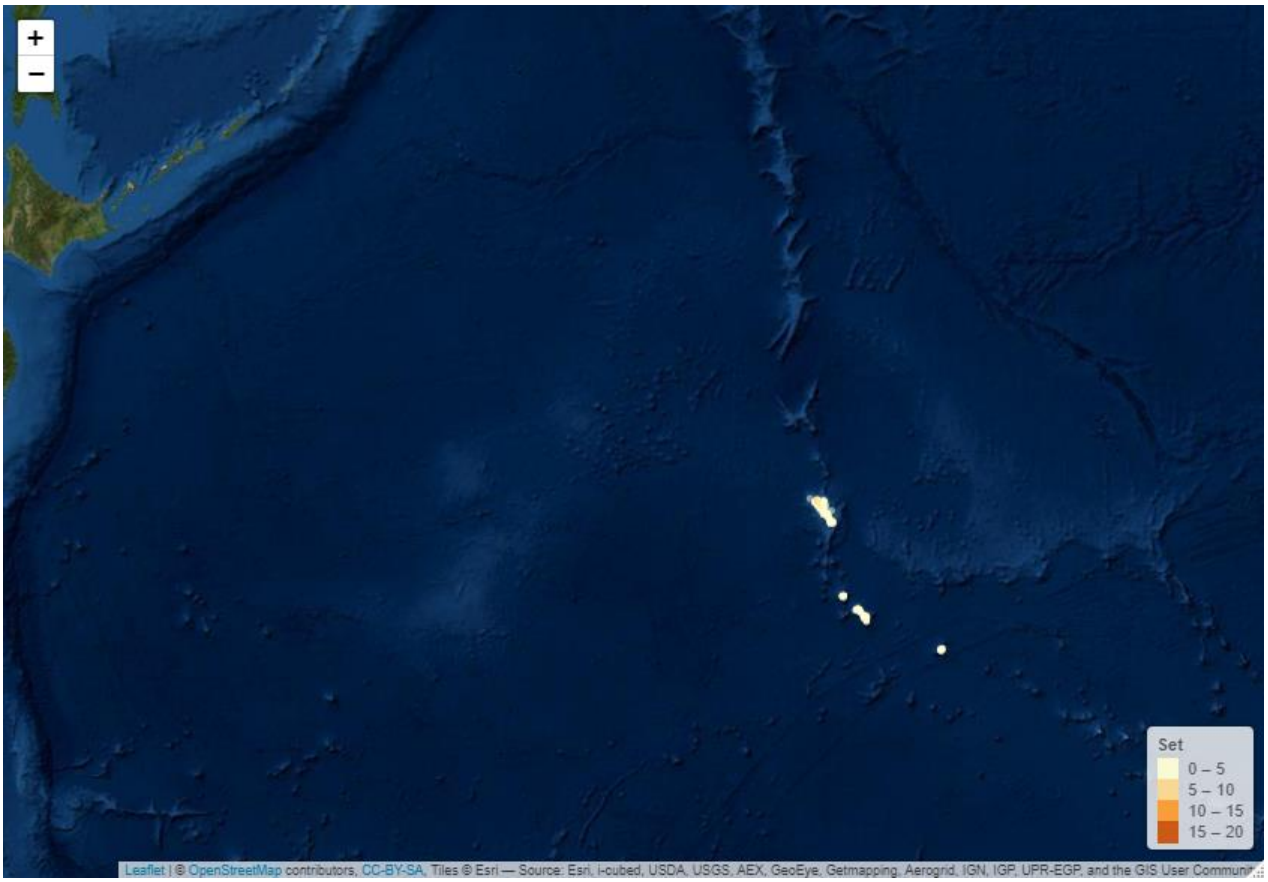

Figure 1. Historical trawl footprint by Korean trawler in Emperor Seamounts from 2013 to 2019.

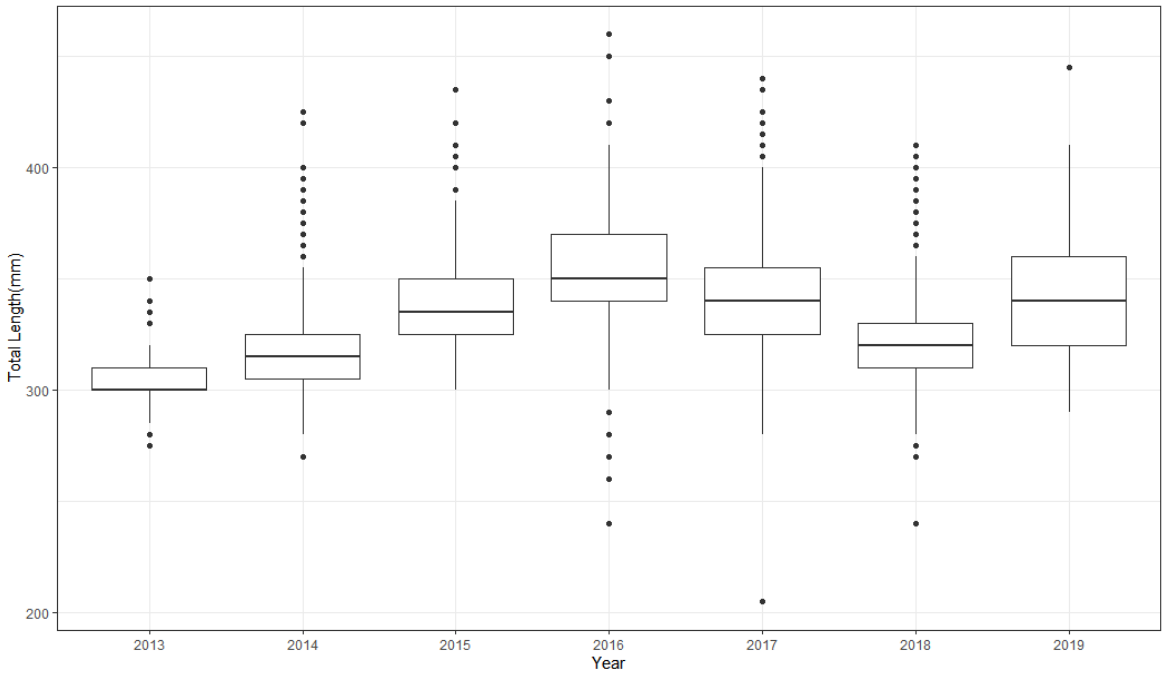

Figure 2. Boxplot of catch size composition of North Pacific Armorheads in the Emperor Seamounts by a Korean trawler.

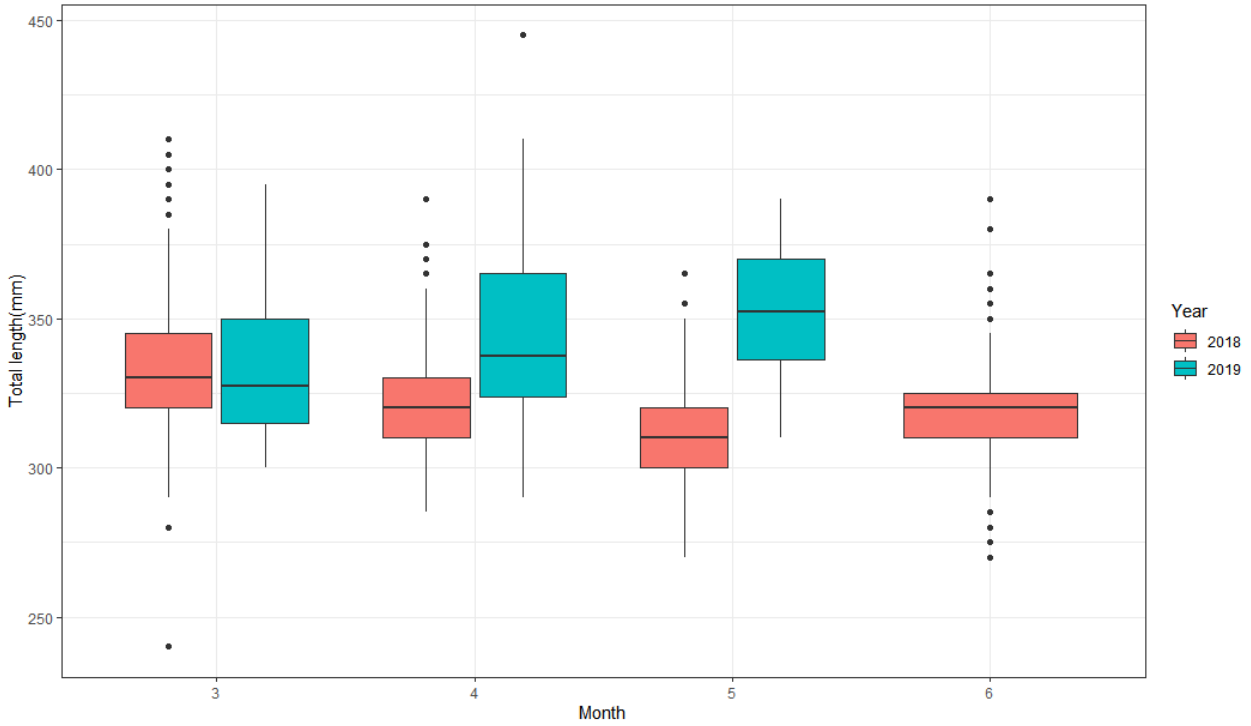

Figure 3. Comparison of catch size composition of North Pacific Armorheads between 2018 and 2019.

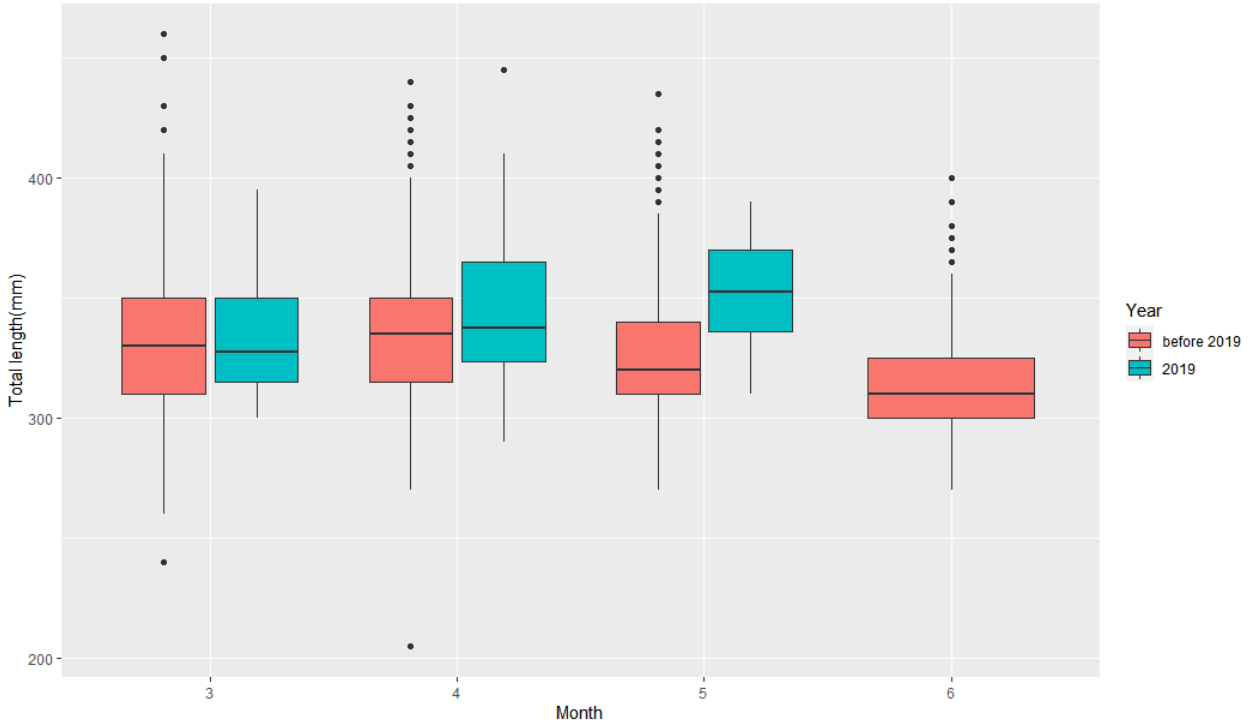

Figure 4. Comparison of catch size composition of North Pacific Armorheads between aggregated catch from 2013 to 2018(before 2019) and 2019.

Figure 5. Total length and weight relationships of 2018 and 2019 Armorhead samples.