North Pacific Fisheries Commission

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Age-determination and age-length keys for Pacific saury, *Cololabisa saira*, in 2019 and 2020

Satoshi SUYAMA, Hiroomi MIYAMOTO, Taiki FUJI and Midori Hashimoto

Fisheries Resources Institute, Japan Fisheries Research and Education Agency

Summary

The age determination by the observations of otolith annual ring of Pacific saury, *Cololabisa saira*, collected in 2019 and 2020 was conducted. Annual, seasonal and monthly proportions of ages 0 and 1 fish were calculated at each 1-cm body length class. Although the body length distributions for 2019 showed obvious bimodal shape corresponding to ages 0 and 1 fish, the distribution for August to December 2020 could not be visually separated due to the smaller difference in the body lengths at peaks among the ages than the previous year. These results strongly suggest that the age determination technique using otolith is effective to estimate the accurate catch number at age of Pacific saury for years like 2020, when no clear difference is observed in the body lengths among the age.

1. Introduction

The Small Scientific Committee on Pacific Saury (SSC PS) noted the need to share biological data, such as catch-at-size (CAS) and catch-at-age (CAA), for work towards the use of age-structured stock assessment models (NPFC-2019-SSC PS04-FinalReport). Although conventional method to convert from CAS to CAA is to apply age-length keys (ALK) to CAS, some members have not obtained ALK from their catch. Japan has conducted the age determination of Pacific saury (PS) with otoliths since the 1980s (Suyama et al. 2006).

Monthly ALKs from 2000 to 2018 have already posted on the NPFC Collaboration site last year (https://collaboration.npfc.int/node/56). Japan updated the seasonal and monthly ALKs for 2019 and 2020.

2. Materials and methods

The age determination methods using otolith from the previous working paper (Suyama et al., 2020) were followed. Samples were collected from commercial fishing vessels and research vessels from May to December. However, we could not collect samples in May and July in 2020, because commercial fishing operation was not conducted from May to July. A total of 5,896 and 2,901 PS were collected in 2019 and 2020, respectively. The number of fish analyzed in each month and sampling positions were shown in Table 1 and Fig. 1, respectively.

3. Results and discussion (see also Fig. 2)

In 2019, a total of 2,634 (44.7%) and 3,143 (53.3%) of 5,896 individuals were determined as age-0 and age-1, respectively. The age of the remaining individuals (119 (2.0%)) could not be determined due to unclear annual ring or abnormal otolith whose aragonite was replaced with vaterite. In 2020, a total of 1,432 (49.4%) and 1,408 (48.5%) of 2,901 individuals were determined as ages 0 and 1, respectively. The age of the remaining individuals (61 (2.1%)) could not be determined.

The body length distributions in 2019 showed bi-modal shape except in May, and the smaller and larger body lengths at peak mostly corresponded to ages 0 and 1 fish, respectively. However, the body length distribution from August to December in 2020 showed almost a single mode, and the ranges of body length of ages 0 and 1 were largely overlapped, so it was considered to be difficult to estimate the percentage of each age fish in each size classes. The results of 2020 showed that the age determinations by otolith is effective for accurate estimation of CAA of PS.

Detailed results of this reports such as the monthly proportion of age-1 fish in each size classes from 2000 to 2020 were posted on the collaboration site.

https://collaboration.npfc.int/user/72/stream

4. References

NPFC-PS. (2019) Report of the 4th Meeting of the Technical Working Group on Pacific Saury Stock Assessment, NPFC-2019-TWG PSSA04-Final Report.

Suyama S, Kurita Y, Ueno Y. (2006) Age structure of Pacific saury *Cololabis saira* based on observations of the hyaline zones in the otolith and length frequency distributions. *Fish. Sci.* 72:742–749.

Suyama Satoshi, Hajime Matsui, Taiki Fuji, Shin-Ichiro Nakayama, Midori Hashimoto and Kazuhiro Oshima. (2020) Age-determination and age-length keys for Pacific saury, *Cololabisa saira,* from 2000 to 2018. NPFC-2020-SSC PS06-WP16

Table 1　Number of the individuals of Pacific saury that were provided for age determinations in each month.

	2019	2020
May	160	0
Jun	2,639	60
Jul	1,420	0
Aug	0	159
Sep	477	225
Oct	560	1097
Nov	480	880
Dec	160	480
Total	5,896	2,901

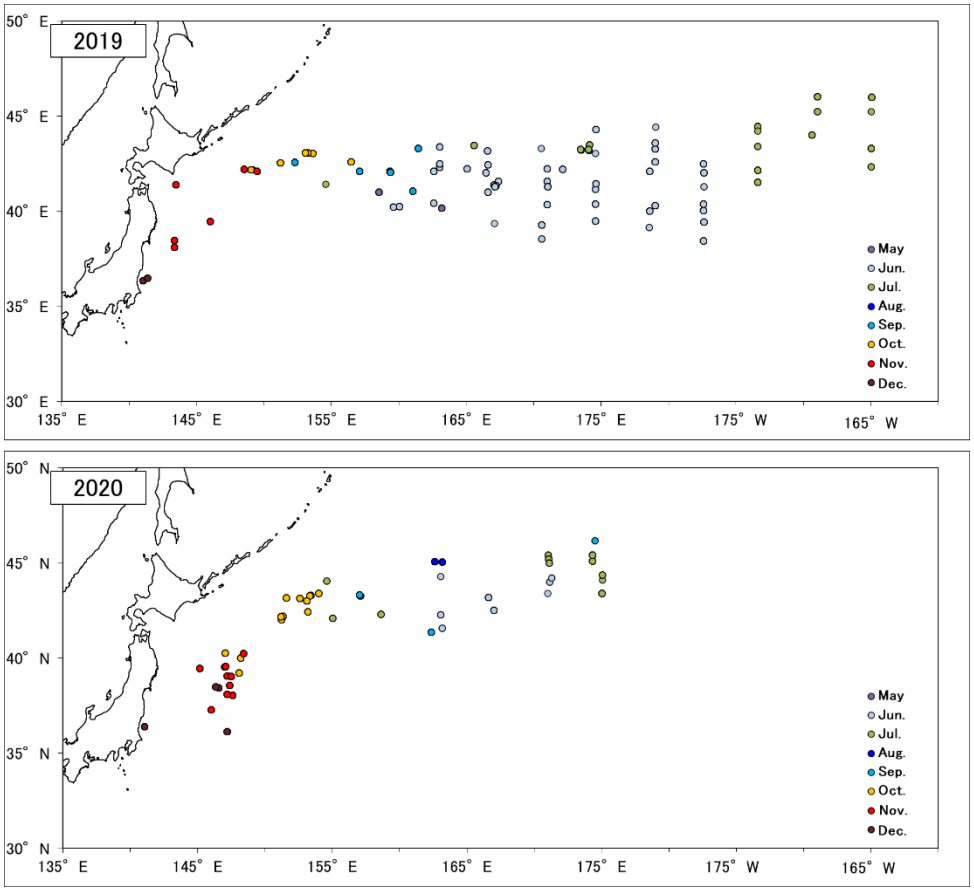

Fig.1　Location of sampling stations in each month in the North Pacific off Japan in 2019 (upper panel) and 2020 (lower panel).

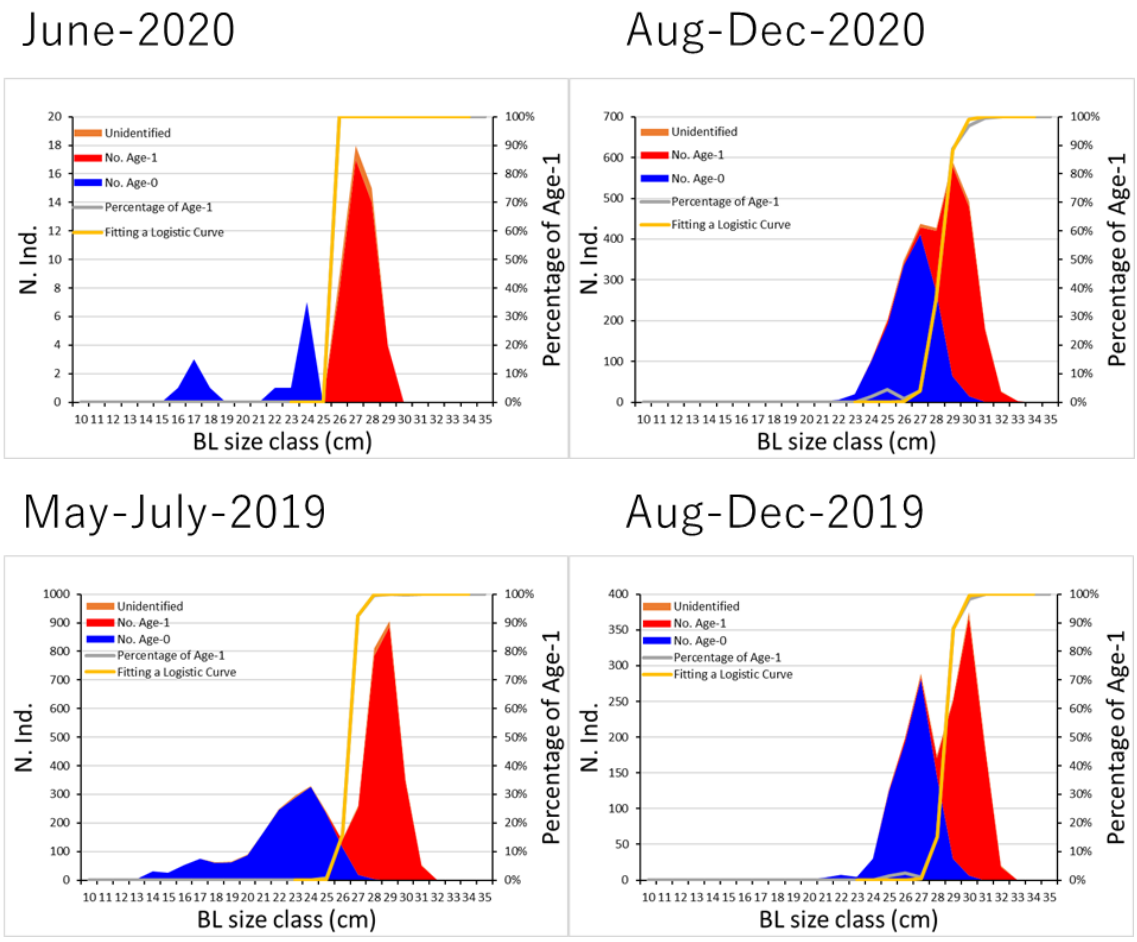

Fig.2 Body length distributions of Pacific saury provided for age-determination and the percentages of age-1 fish in each 1 cm-length class in 2019 and 2020.