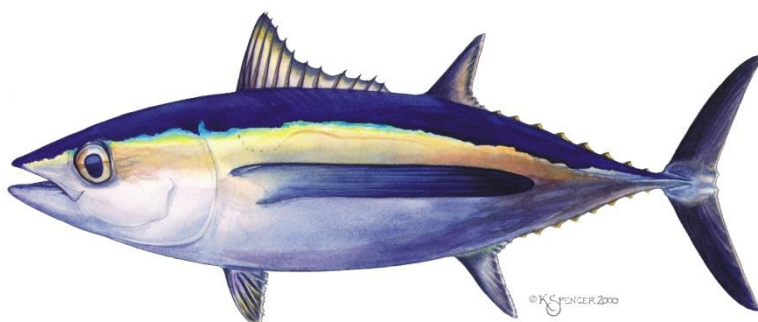


**Juvenile and adult classification with clustered mean weight data in
Japanese longline fishes in areas 1 and 3**

Yoshinori Aoki, Hiroataka Ijima, and Yuichi Tsuda

Fisheries Research Institute, Japan Fisheries Research and Education Agency
Fukuura 2-12-4, Yokohama, Kanagawa, Japan.

Email: aoki_yoshinori04@fra.go.jp



Summary

1. We described a split of size composition and catch from Japanese longline fishery in areas 1 and 3 for all quarters.
2. Length frequency in juveniles and adults of quarters 1 and 2 show consistent trends with the juveniles and adults clustered by mean body weight. Those results of quarters 3 and 4 did not indicate good classifications of juveniles and adults by the clustering method.
3. Historical changes in length composition of quarters 1 and 2 did not indicate changes in trends through years, though a separate trend around year 2000 was distinguished in juveniles of quarter 3. Juveniles of quarter 4 and adults of quarters 3 and 4 have several modes that could be both juveniles and adults.

Introduction

It has been agreed to adopt a classification of albacore into juveniles and adults with a new clustering of fleets using mean body weight of the longline fisheries in stock assessment areas 1 and 3 (Ijima et al., 2022) as shown in Fig. 1. In this document, length composition and catch data in area 1 and 3 were classified into juveniles and adults with the cluster information and report the results by quarters.

Data and Methods

The cluster information generated by Ijima et al., 2022 was adopted to classify the length composition data (Aoki et al., 2022) and catch data of longline fishery in areas 1 and 3 into juvenile (1) or adult (2) by year, month, and latitude/longitude (5x5) and organize the results with fleet. The length composition data were first weighted by number of fish caught or weight according to fleet definition before the classification. Each fleet definitions were mentioned in the captions of figures. It should be noted that the catch data were prepared by the format that has been used in 2020 though the new format that can be used for the data after 2008 has been developed.

Results and Discussion

Length composition classified by quarters

The length compositions clustered into juveniles and adults with Ijima et al., 2022 are shown in Fig. 2. For the first and second quarters, the modes are only one for juveniles and adults generally, confirming that immatures and adults were properly classified as seen in Fig 1. However, two modes appeared in the adult cluster (80-90 cm and 90-110 cm) in the third quarter, with the 80-90 cm mode overlapping with the juvenile cluster. For the fourth quarter, two modes were observed for both juveniles and adults indicating incomplete separation.

The historical length compositions classified into juveniles and adults by quarter are shown in 3. The first and second quarters of juveniles and adults (F1-F4, respectively) show similar trends through years, which is consistent with the results of clustering. On the other hand, a mode in 90 cm appears only around 2000 in the third quarter, indicating inconsistency in modes among years. The fourth quarter includes variety of sizes with no significant differences among years.

Characteristics of the classified catch in quarters

Fig. 4 and Fig. 5 show the time series of catches classified into juveniles and adults for first quarter and all quarters, respectively, and these results are compared with the data from the 2020 stock assessment in Fig. 6. As the data were prepared with the same format as the 2020 assessment, the data show good agreement except for the updates of the last three years. 2018 show slight differences in each fleet that are brought by the increased reporting rate of the data and the removal of errors.

Reference

Aoki, Y., Senda, T., Ijima, H., Matsubara, N., Matsubayashi, J., and Tsuda, Y. 2022.

Summary of size data update for North Pacific albacore (*Thunnus alalunga*) in Japanese fisheries. ISC/22/ALBWG-02/02. Working paper submitted to the ISC Albacore Working Group Intercessional Workshop, 6-12, December 2022, Fisheries Resources Institute, Yokohama, Japan.

Ijima, H., Matsubayashi, J., and Tsuda, Y. 2022. Improve the fleet definition of Japanese longline fishery. ISC/22/ALBWG-02/03. Working paper submitted to the ISC Albacore Working Group Intercessional Workshop, 6-12, December 2022, Fisheries Resources Institute, Yokohama, Japan.

Figure

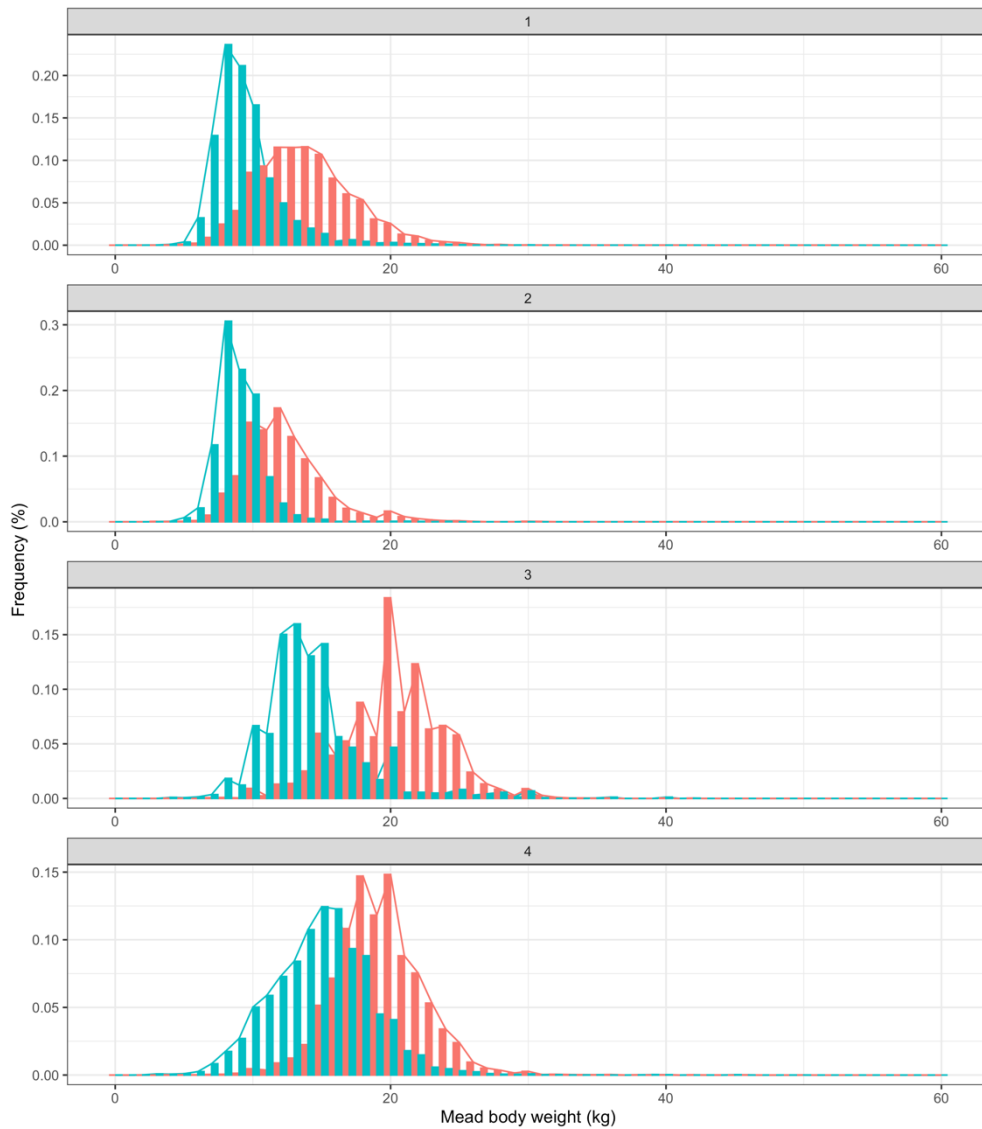


Fig. 1. Mean body weight distribution classified as juveniles (green) and adults (red) in areas 1 and 3 of longline fisheries for quarter 1 (top panel) to 4 (bottom panel).

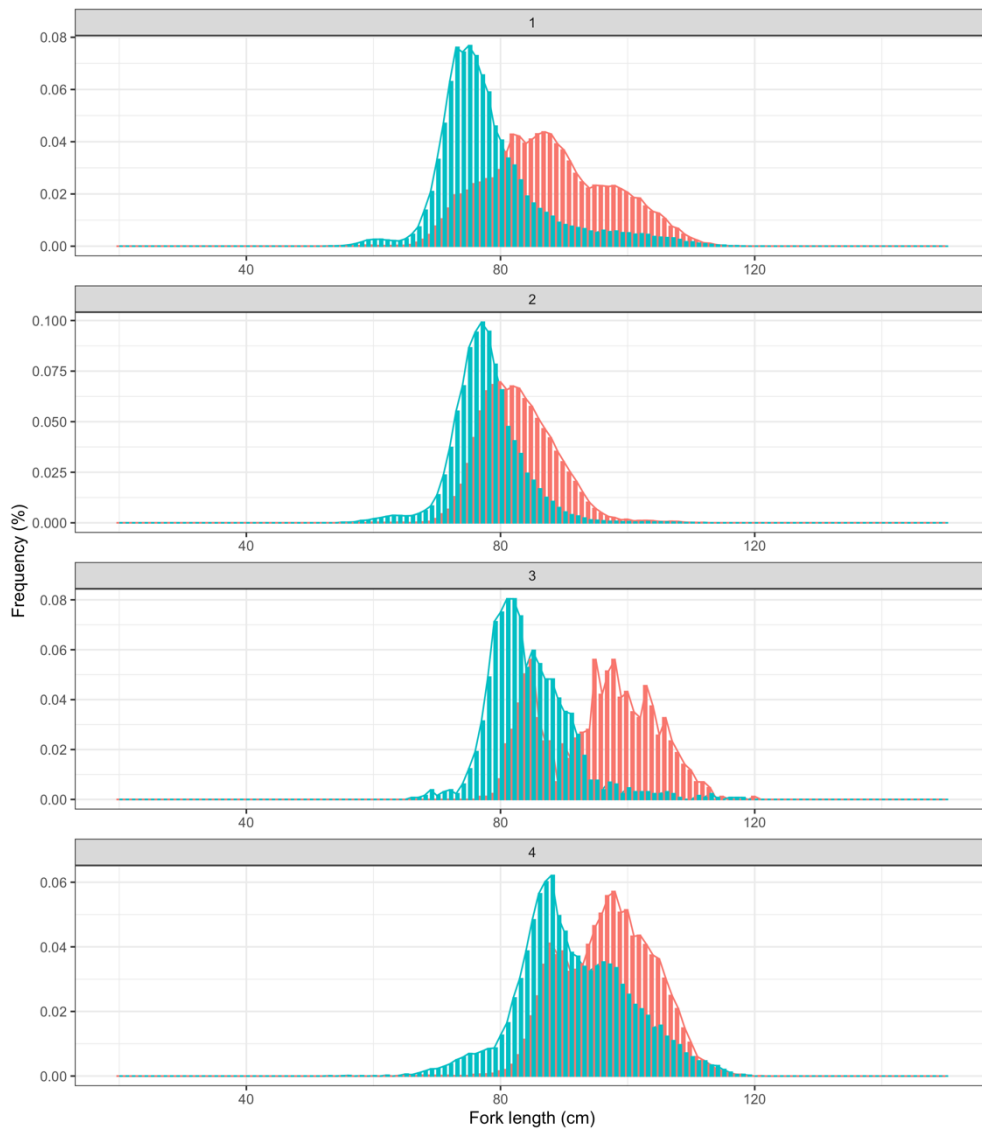


Fig. 2. Length frequency of juvenile (green) and adult (red) clusters in areas 1 and 3 of longline fisheries from quarter 1 (top panel) to 4 (bottom panel).

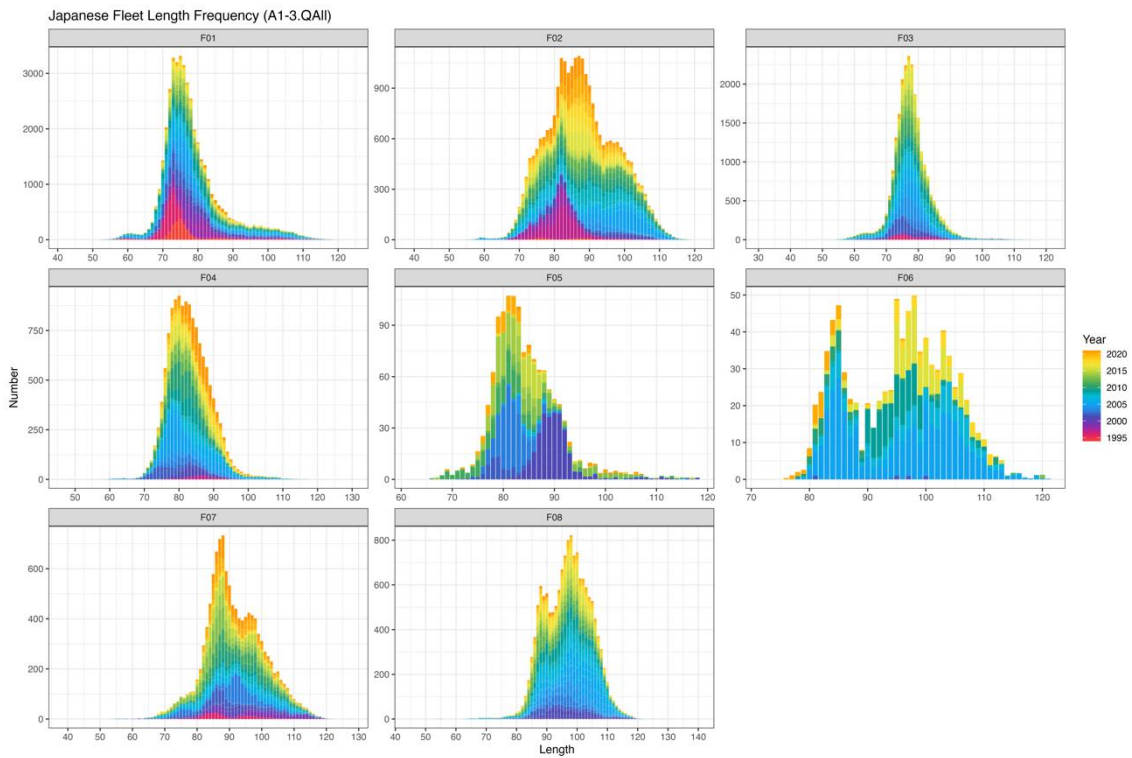


Fig. 3. Historical trends (1994-2021) of length frequency for each fleet. Fleet definition used in each panel is as follows:

- F1: Japan Longline Area 1 & 3, Quarter 1, Juveniles only
- F2: Japan Longline Area 1 & 3, Quarter 1, Adults only
- F3: Japan Longline Area 1 & 3, Quarter 2, Juveniles only
- F4: Japan Longline Area 1 & 3, Quarter 2, Adults only
- F5: Japan Longline Area 1 & 3, Quarter 3, Juveniles only
- F6: Japan Longline Area 1 & 3, Quarter 3, Adults only
- F7: Japan Longline Area 1 & 3, Quarter 4, Juveniles only
- F8: Japan Longline Area 1 & 3, Quarter 4, Adults only

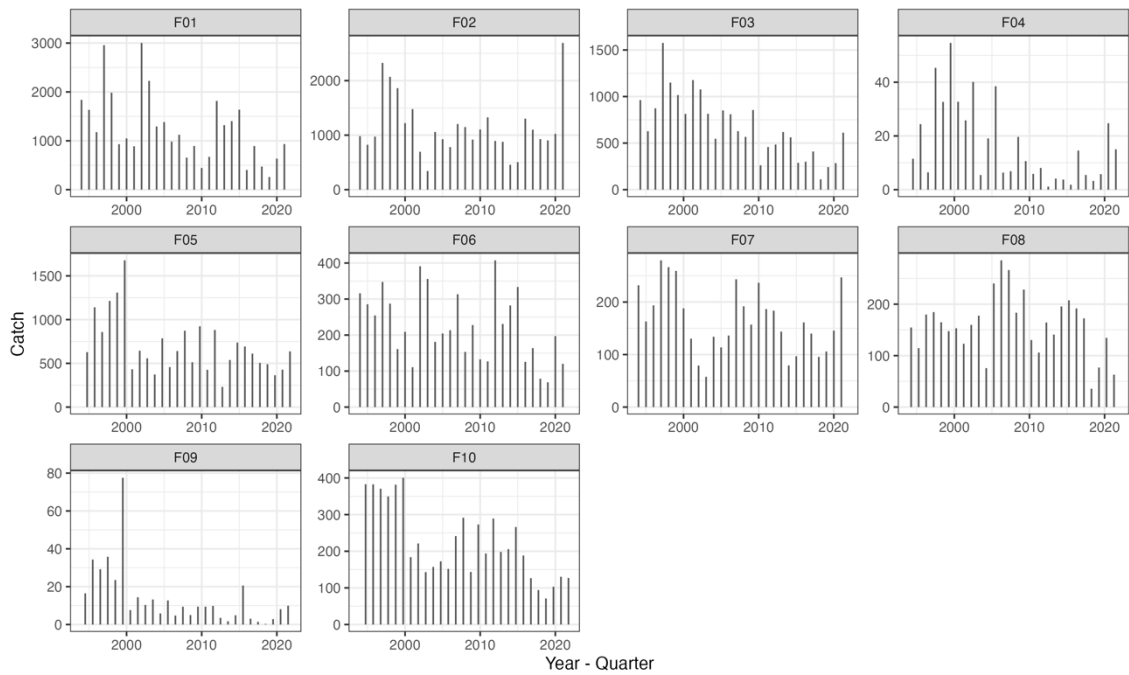


Fig. 4. Catches from 1994 to 2021 in fleet. Fleet definition used in each panel is as follows;

- F1: Japan Longline Area 1 & 3, Quarter 1, Juveniles only, catch in metric tons
- F2: Japan Longline Area 1 & 3, Quarter 1, Adults only, catch in metric tons
- F3: Japan Longline Area 1 & 3, Quarter 2, catch in metric tons
- F4: Japan Longline Area 1 & 3, Quarter 3, catch in metric tons
- F5: Japan Longline Area 1 & 3, Quarter 4, catch in metric tons
- F6: Japan Longline Area 1 & 3, Quarter 1, Juveniles only, catch in 1000s of fish
- F7: Japan Longline Area 1 & 3, Quarter 1, Adults only, catch in 1000s of fish
- F8: Japan Longline Area 1 & 3, Quarter 2, catch in 1000s of fish
- F9: Japan Longline Area 1 & 3, Quarter 3, catch in 1000s of fish
- F10: Japan Longline Area 1 & 3, Quarter 4, catch in 1000s of fish

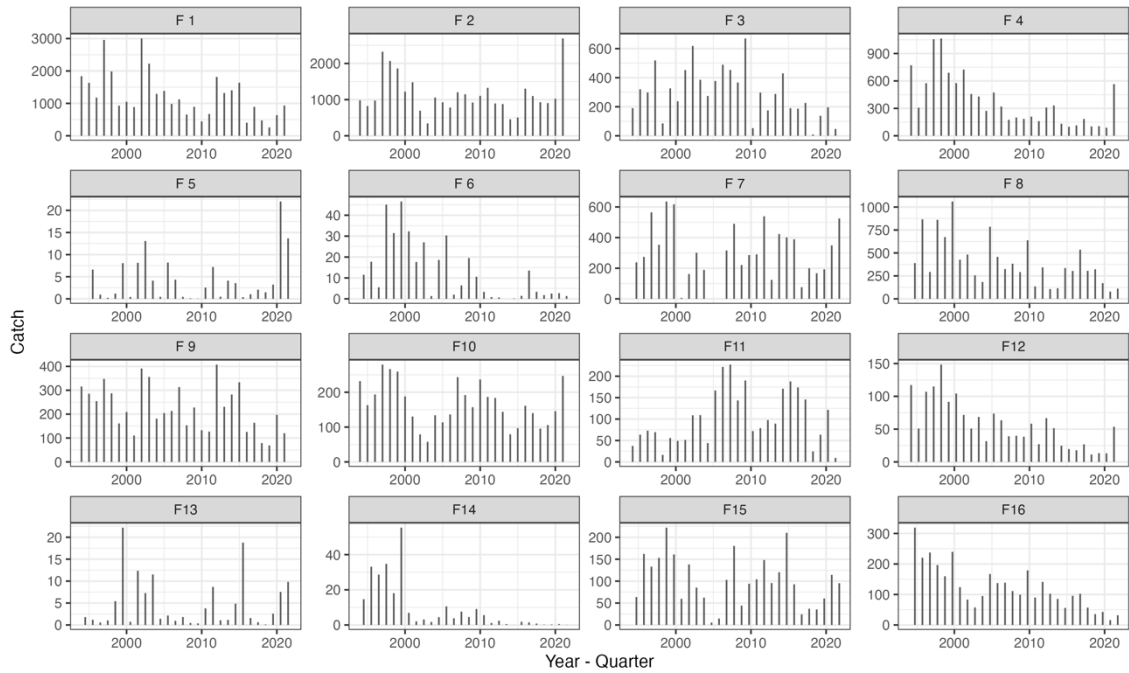


Fig. 5. Catches from 1994 to 2021 in fleets for juveniles and adults in quarters. Fleet definition used in each panel is as follows;

- F1: Japan Longline Area 1 & 3, Quarter 1, Juveniles only, catch in metric tons
- F2: Japan Longline Area 1 & 3, Quarter 1, Adults only, catch in metric tons
- F3: Japan Longline Area 1 & 3, Quarter 2, Juveniles only, catch in metric tons
- F4: Japan Longline Area 1 & 3, Quarter 2, Adults only, catch in metric tons
- F5: Japan Longline Area 1 & 3, Quarter 3, Juveniles only, catch in metric tons
- F6: Japan Longline Area 1 & 3, Quarter 3, Adults only, catch in metric tons
- F7: Japan Longline Area 1 & 3, Quarter 4, Juveniles only, catch in metric tons
- F8: Japan Longline Area 1 & 3, Quarter 4, Adults only, catch in metric tons
- F9: Japan Longline Area 1 & 3, Quarter 1, Juveniles only, catch in 1000s of fish
- F10: Japan Longline Area 1 & 3, Quarter 1, Adults only, catch in 1000s of fish
- F11: Japan Longline Area 1 & 3, Quarter 2, Juveniles only, catch in 1000s of fish
- F12: Japan Longline Area 1 & 3, Quarter 2, Adults only, catch in 1000s of fish
- F13: Japan Longline Area 1 & 3, Quarter 3, Juveniles only, catch in 1000s of fish
- F14: Japan Longline Area 1 & 3, Quarter 3, Adults only, catch in 1000s of fish
- F15: Japan Longline Area 1 & 3, Quarter 4, Juveniles only, catch in 1000s of fish
- F16: Japan Longline Area 1 & 3, Quarter 4, Adults only, catch in 1000s of fish

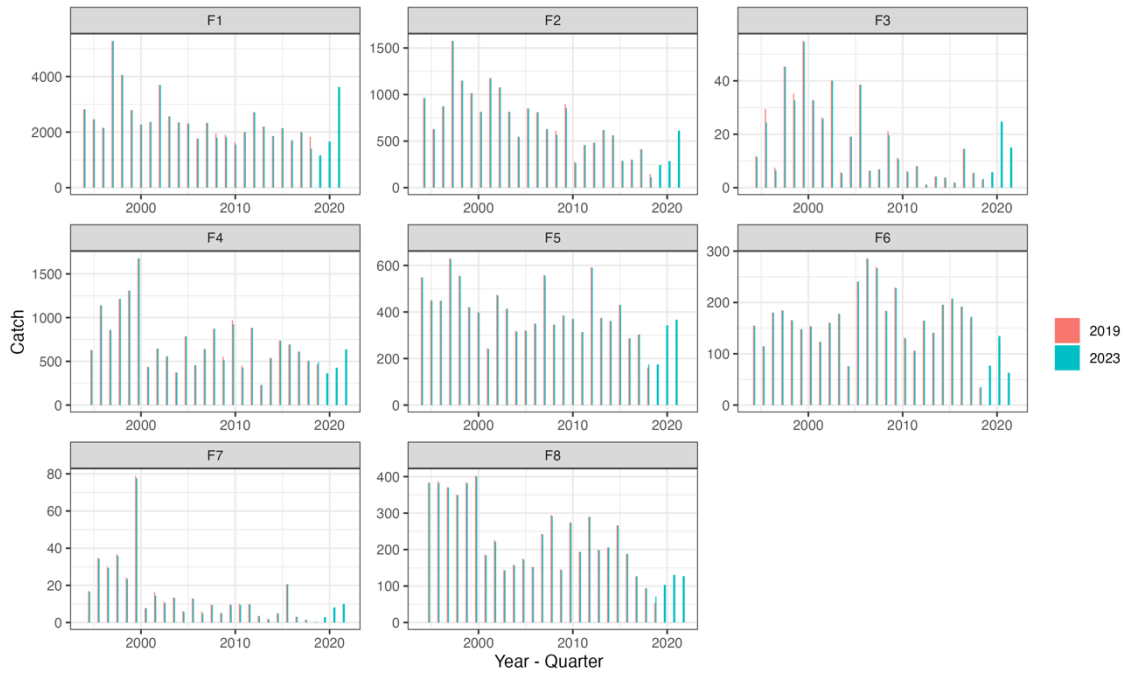


Fig. 6. Comparison of catch data in fleet of 2023 (green) with 2020 (red). Fleet definition used in each panel is as follows:

- F1: Japan Longline Area 1 & 3, Quarter 1, catch in metric tons
- F2: Japan Longline Area 1 & 3, Quarter 2, catch in metric tons
- F3: Japan Longline Area 1 & 3, Quarter 3, catch in metric tons
- F4: Japan Longline Area 1 & 3, Quarter 4, catch in metric tons
- F5: Japan Longline Area 1 & 3, Quarter 1, catch in 1000s of fish
- F6: Japan Longline Area 1 & 3, Quarter 2, catch in 1000s of fish
- F7: Japan Longline Area 1 & 3, Quarter 3, catch in 1000s of fish
- F8: Japan Longline Area 1 & 3, Quarter 4, catch in 1000s of fish