

Report of the age-0 southern bluefin tuna distribution in the
northwest coast of Western Australia in 2024

2024年の西オーストラリア州北西沿岸における
ミナミマグロ0歳魚分布調査の結果報告

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要約

ミナミマグロについて仔魚から1歳魚までの分布と回遊はほとんど知られていない。西オーストラリア州北西沿岸で小型0歳魚（尾叉長25cm未満）の分布を調べる調査プロジェクトを2019年に開始し、2022年の第2回調査を含めて最小尾叉長23.0cmまでのSBT小型魚の採集に成功していた。第3回調査を2024年3月に7日間実施し、曳縄での漁獲を試みたものの、SBTの採集は無かった。

Summary

Little is known about the distribution and migration of southern bluefin tuna (SBT) from larvae to age 1. A research project to investigate the distribution of small age-0 fish (<25cm fork length) along the northwest coast of Western Australia was started in 2019, and has been successful in collecting small SBT with a minimum fork length of 23.0cm, including the second survey in 2022. The third survey was conducted for 7 days in March 2024, and attempted to catch SBT using trolling, but no SBT were collected.

1. Introduction

It has been revealed from the collection of larvae and the catch of adult fish with developed ovaries that the spawning grounds of southern bluefin tuna (*Thunnus maccoyii*; SBT) are located in the waters between south of Java and northwest of Australia (10S-20S, 100E-125E) (Ueyanagi 1969, Warashina and Hisada 1970, Farley and Davis 1998). It is known that the fish, which has grown to about 45 cm (1 year old), is distributed on the west coast of Western Australia where Leeuwin Current, a thin, slow speed warm current that flows from north to south, exist (Hynd 1965). However, little is known about the distribution and migration of fish between larvae and age-1. It is important to know the distribution and migration of fish in the life stage during this period, and the influence of the environment on it, because it would make available to understand the annual fluctuation of recruitment of SBT stock.

In the 1980s and 1990s, the Japanese Fisheries Agency carried out several research surveys using the research vessel Shoyo-maru on the west coast of Western Australia, and collected SBT by trolling. As a result, the distribution of age-1 fish was confirmed mainly off Perth (32S), and a total of 11 small age-0 fish of 25 cm or less were collected. However, no survey was conducted after that, and information on the distribution of small age-0 fish was not added.

In December 2019, we started a new research project to investigate the distribution of small age-0 fish (< 25 cm in fork length; FL) off the northwest coast of Western Australia, and has been successful in collecting small SBT with a minimum of 23.0cm FL by trolling gears, including the second survey in December 2022 (Itoh and Tsuda 2020, Itoh 2023). We carried out the third survey in March 2024. The result of the survey is presented in this document.

2. Materials and methods

An Australian vessel, *Kujira* (6.5m long, 2.5m wide, 2.5 ton) was chartered (Fig. 1). One researcher and three crew members boarded. The study area was on the northwest coast of Western Australia, off the west of Exmouth Peninsula (Fig. 2). Ports were limited to Tantabiddi and Coral Bay. In the morning, the trailer carrying the research vessel was towed by a car and unloaded at the port, and in the evening, the vessel was loaded onto the trailer and returned to the accommodation. GPS recorders recorded the position every one second at the sea. During the trolling operation, the boat speed was 5-7 knots. The trolling has four lines with different specifications and each line is equipped with a plastic lure. When any fish were caught, its body length in fork length and the body weight were measured and biological samples including stomach and muscle tissue were taken.

3. Results

The survey was carried out over seven days between March 14 and March 23. Strong winds prevented the vessel from departing for three days.

A total of 41 fish were caught, including 1 longtail tuna *Thunnus tonggol*, 27 skipjack *Katsuwonus pelamis*, 2 dolphinfish *Coryphaena hippurus*, 1 marlin (probably black marlin *Istiompax indica*), 1 wahoo *Scomberomorus commerson*, 1 barracuda *Sphyraena barracuda*, and 8 unidentified fish because hook come off far from the vessel (Table 1). No SBT were collected.

The stomach contents of 29 individuals were observed. The food that appeared was predominantly mantis shrimp larvae, and crustaceans accounted for more than 50% of the weight of the skipjack's food. One fish that may have been *Thunnus* (28 mm body length) was found in the stomach of a skipjack tuna (37cm FL, 2024/3/16, 21.81S, 113.86E) (Figure 3). Genetic analysis in later day revealed that the specimen was a yellowfin tuna.

4. Discussion

Based on data from Japanese commercial longline CPUE in the spawning area in the 1950s and 1960s, body length composition of age-1 fish off the southwest coast of Australia, and monitoring of adult fish landings in Indonesia since the 1990s, it is believed that the spawning season of SBT, which runs from September to April of the following year, has two peaks, one in October and the other in January and February (Mimura and Warashina 1962, Hynd 1963, Shingu 1970, Farley and Davis 1998). The first and second of our surveys, conducted in December, targeted fish born around October that were more than 60 days old and thought to have reached a fork length of 20 cm or more. This time, conducted in late March, targeted fish born during the second peak, but only less than 60 days had passed since the beginning of February. We also targeted fish born between the first and second peaks, but neither of these were collected this time.

There are several possible reasons why no SBT were caught. There may have been few fish born during the spawning season from September 2023 to April 2024. They may not have yet arrived in the surveyed waters off the west coast of Australia. Even if they had arrived, they may still be too small to be caught with a trolling line (fish with a fork length of less than 15 cm are thought to be difficult to collect). If the next survey is conducted after April, more than 60 days after spawning, it is expected that SBT will be collected.

Although this is negative evidence, the absence of collections reduces the possibility that there are substantial number of fish born between the first and second peaks, and that

there may be a clear separation between the abundance distributions of age-0 fish corresponding to the two peaks.

The discovery of a yellowfin tuna with a 28 mm in body length in the stomach of a skipjack is an encouraging. If SBT are migrating to the coasts of Australia at around 28 mm in body length, this size would be too small to be caught by trolling, but it may be possible to find them by examining the stomach contents of predators such as skipjack tuna. Stomach contents analysis of other predators is a suitable way for exploring.

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Figure 1. Kujira, used for the 2024 survey of the age-0 SBT distribution research.

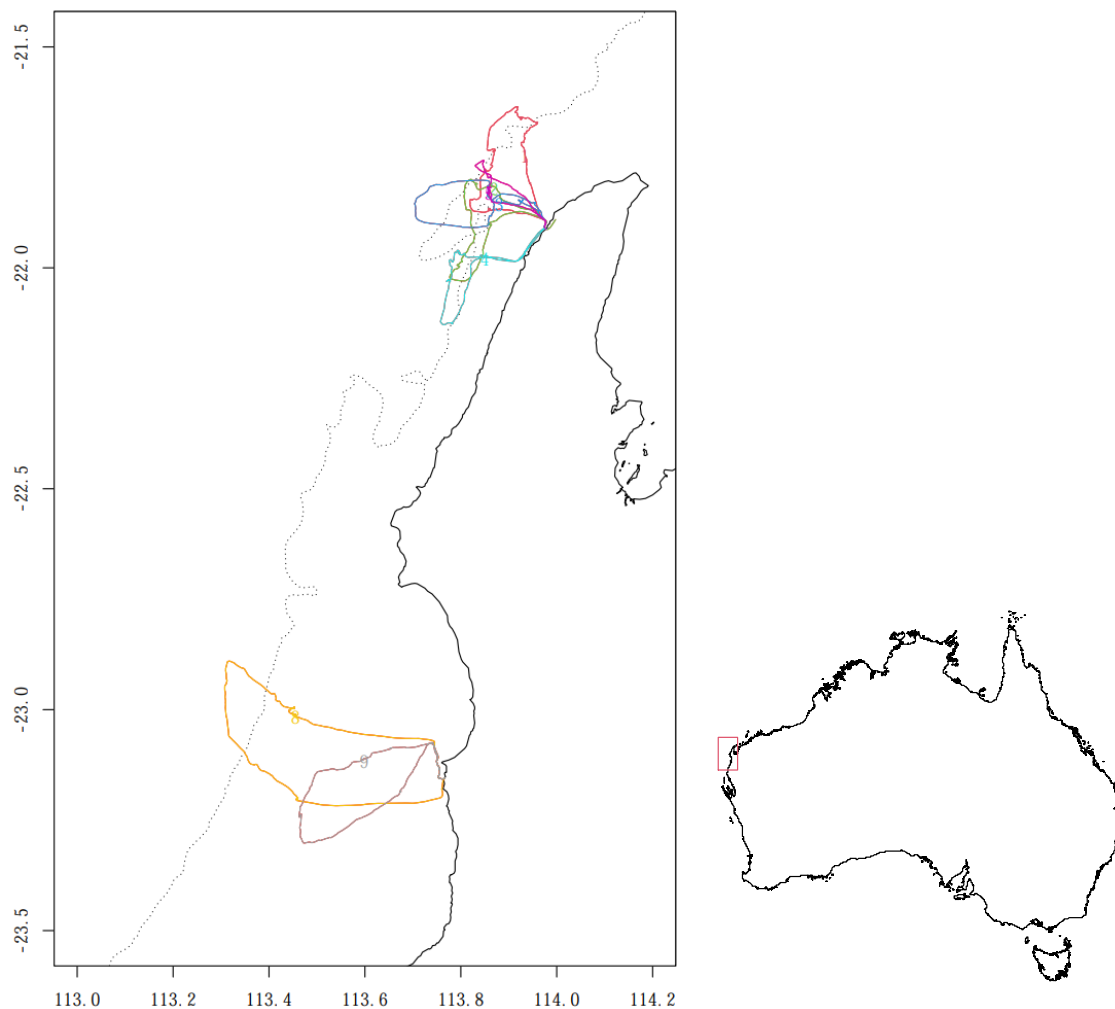


Figure 2. The trajectory of the vessel in the age-0 SBT distribution survey in 2024.
The numbers are the location at 9AM on sequential day.



Figure 3. Yellowfin tuna juvenile found in a stomach of skipjack with 37 cm fork length.

Table 1. List of fish caught in the age-0 SBT distribution survey in 2024.

English name	Scientific name	N	Remark
Southern bluefin tuna	<i>Thunnus maccoyii</i>	0	
Longtail tuna	<i>Thunnus tonggol</i>	1	
Skipjack	<i>Katsuwonus pelamis</i>	27	
Dolphin fish	<i>Coryphaena hippurus</i>	2	
Marlin	<i>Istiompax indica</i>	1	Probably black marlin <i>Istiompax indica</i>
Wahoo	<i>Scomberomorus commerson</i>	1	
Baracuda	<i>Sphyræna barracuda</i>	1	
unknown		8	Hook came off before identification.