Annual Report of Japan

Fisheries Agency of Japan

Fisheries Research Agency
National Research Institute of Far Seas Fisheries

1. Introduction

Japanese fleet is using only longline gear to catch southern bluefin tuna. Since 1952, Japanese longline operation has started in the Indian Ocean, although southern bluefin tuna was sub-target species for the longline fishery targeting yellowfin and bigeye tuna during the early stage of fishery. This is because of the fact that southern bluefin tuna in the tropical region were mostly spent with low meat quality so fishermen did not target it. Further south fishing grounds in the temperate waters for this species were developed in the late 1950s and 1960s. In addition, the innovation of super cold freezer has accelerated demand of “sashimi” grade southern bluefin tuna meat to the Japanese market. Recently the number of fishing vessels targeting southern bluefin tuna is decreasing continuously due to the strong regulation for stock management and government policy to reduce number of longline vessels several times done in the past.

Although varieties of animals were encountered in the Japanese southern bluefin tuna fishery, some of them were dominated in the catch. Such species were butterfly tuna, albacore, bigeye tuna, swordfish, lancet fishes, moon fish, pomfrets, oil fish, escolar and ocean sun fish for the teleosts. Regarding elasmobranchs, velvet dogfish, shortfin mako shark, porbeagle, blue shark and pelagic stingray were dominated. For the incidental capture of albatross, tori-pole was used voluntarily by the fishermen in the early 1990s, and to use tori pole has become a mandate of the CCSBT since 1997. Research effort to modify tori-pole and develop alternative methods possibly avoiding incidental capture of seabirds continued. According to the international plans of action for reducing incidental catch of seabirds in longline fisheries and for the conservation and management of sharks, Japan proposed national plans of action and has promoting mitigation of incidental take of seabirds and management of pelagic sharks.

2. Review of SBT Fisheries

Fleet size and distribution

The number of fishing vessels has been decreasing since the peak of about 300 in 1985. The number of vessels ranged 205-168 in the past five years and 168 in 2002. Fisheries Agency of Japan had reduced number of vessels by 69 in 1981, 100 in 1982 and 132 in 1998. Vessel reduction policy in 1998 would influence further decline of number of vessels after then. Recent fishing grounds were off Cape of Good Hope (Area 9), southern Indian Ocean (Area 8) and water near Tasmania Island (Area 4, 7). The vessels were operating at Area 4, 7 and 8 in the second quarter, and Area 9 in the third quarter.

Distribution of Catch and Effort

General distribution of southern bluefin tuna and effort in the past five years, 1998-2002, was almost same as the distribution of major fishing grounds mentioned above. It is pointed out that some details were different year by year as follows; Distribution of effort was different by year in the second quarter at 10W-50E of Area 9. It was observed that the effort was concentrated in the area, 10W-20E (2000), 20E-50E (2001), and widely distributed in the Area 9 (1998-1999, 2002). The effort distribution in the second quarter of Area 7 and 4 was concentrated in 150E and 155E in the year 1998-1999, and concentrated in 150E in 2000-

2002. The effort distributions in the fourth quarter of Area 8 were concentrated at 100-110E in 1998, at 115-125E in 1999, at 105-125E in 2000 and at 95-105E in 2001. In 2002, the amount of efforts decreased and slightly concentrated at 115-125E. The distribution of catch was mostly in accordance with distribution of effort (CCSBT-SC/0309/SBT Fisheries/Japan).

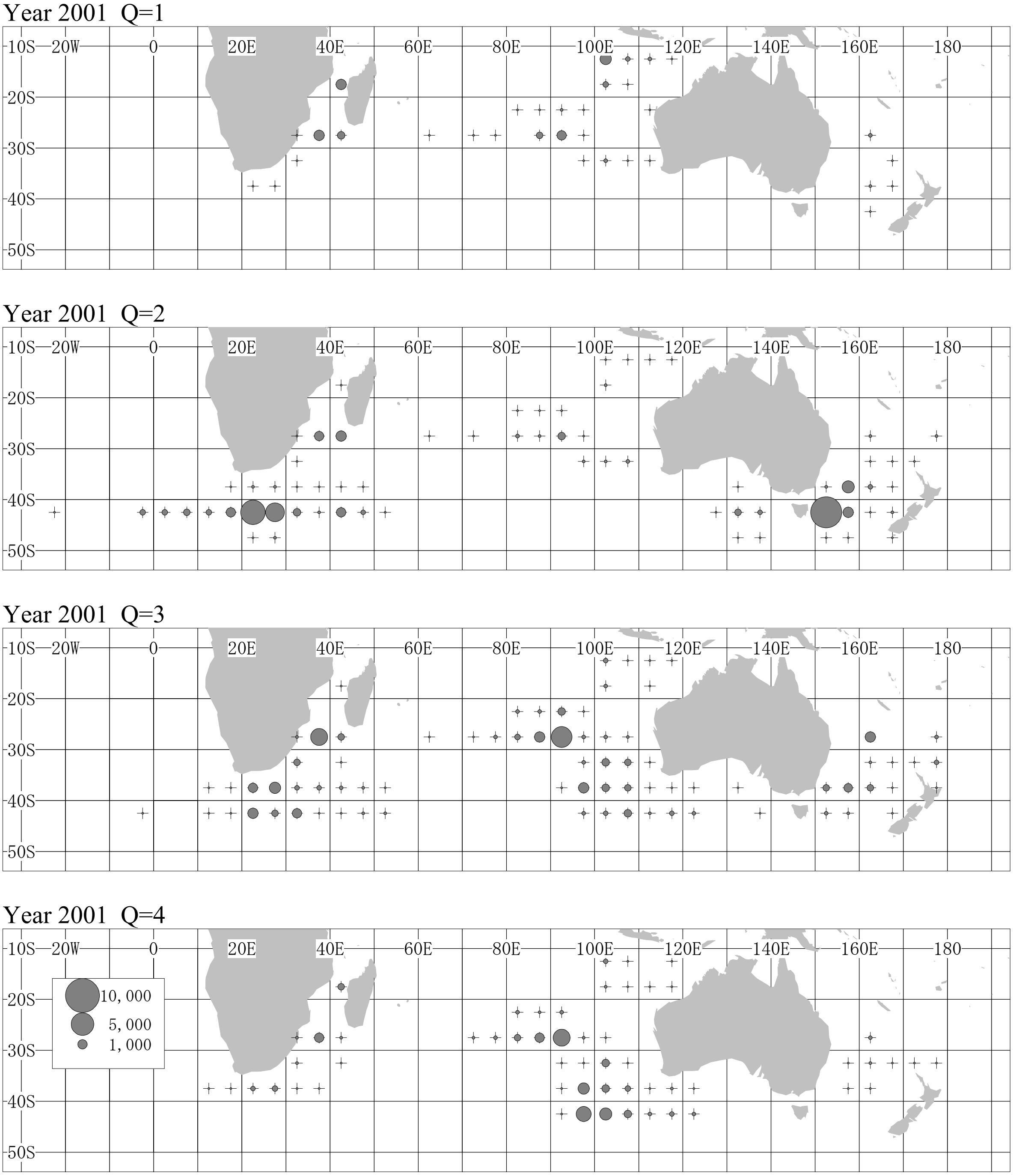


Fig.1. Number of Hooks by quarter and 5x5 degrees square in 2001.
Unit is 1000 hooks

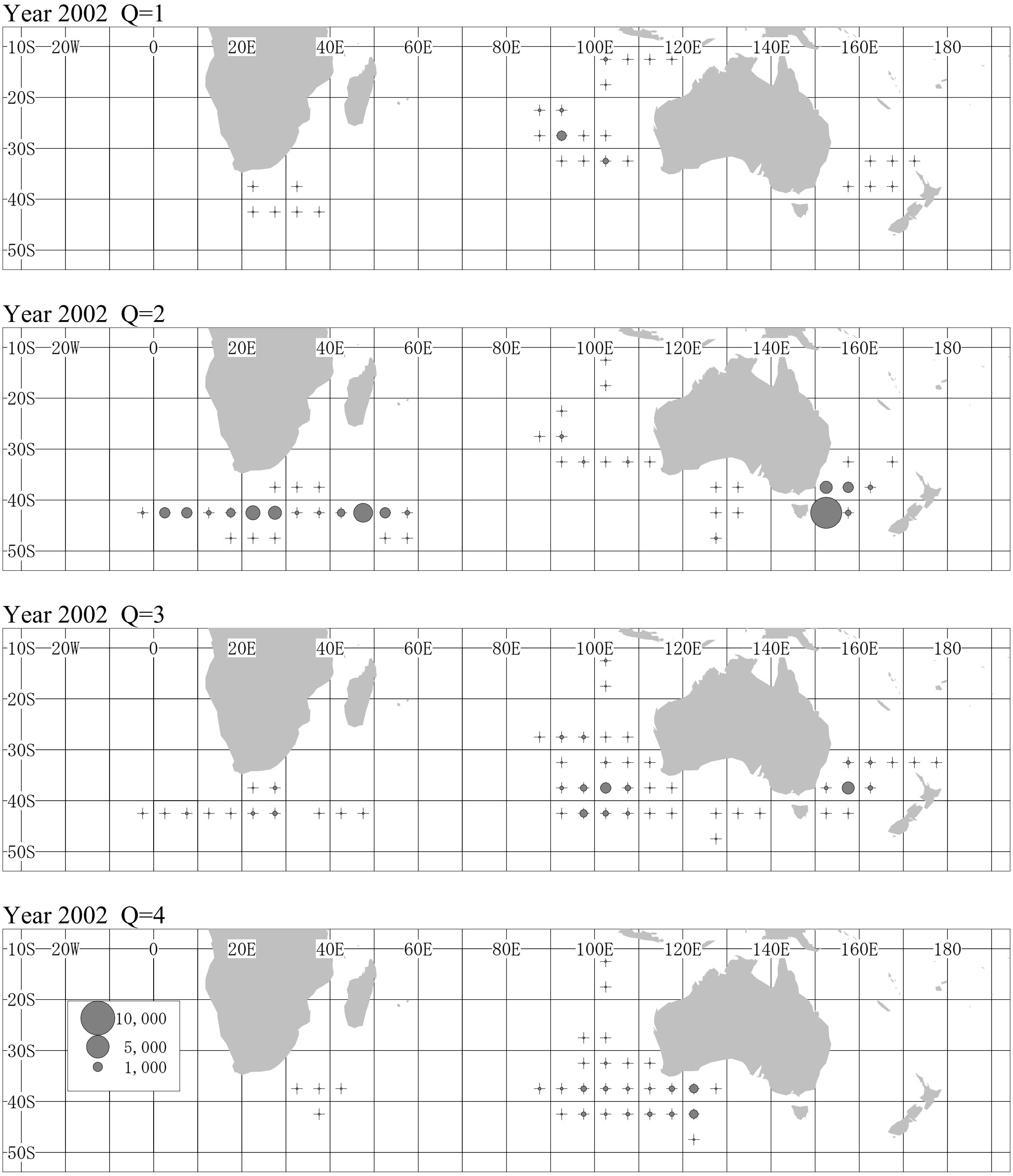


Fig.2. Number of Hooks by quarter and 5x5 degrees square in 2002. Unit is 1000 hooks

3. Fisheries Monitoring for Each Fleet

Since 1991, Fisheries Agency of Japan has carried out Real Time Monitoring Program (RTMP) to monitor southern bluefin tuna catch. The number of vessels monitored by the program were 12-15 during 1991-1994 and all the vessels operating southern bluefin tuna fishing ground since 1995. Each vessel sends daily reports including fishing position, effort, and catch by species in number and weight by FAX to the Fisheries Agency. The information is recorded into computer file in a short period.

Since 1992, Japan has conducted scientific observer program on southern bluefin tuna fishery and collected the information including fishing position, effort, catch by target and non-target species, biological information, incidental catch of seabirds and etc. In 2001 and 2002, 16 and 15 cruises, 593 and 472 operations were observed, respectively. Coverage of observation was 5.7-6.8 % for cruises and 3.7-3.6 % for operations (Table 1). Although spacio-temporal skewness in observer coverage in 1999-2000 caused problem in estimating incidental take of seabirds, the problem was alleviated in 2001-2002 since the arrangement of scientific observers was planned to cover the fishing season and area uniformly (CCSBT-ERS/0402/Info01).

Table 1. Number and coverage of cruises, sets and hooks observed in the Japanese RTMP observer program in 2001-2002.

Year	Observed Number			Coverage		
	cruises	sets	hooks	cruises	sets	hooks
2001	16	593	1,503,740	5.7%	3.7%	3.2%
2002	15	472	1,127,810	6.8%	3.6%	2.9%

The effect of blue-dyed bait and Tori-pole streamer for the reduction of incidental take of seabirds by the Japanese Southern Bluefin Tuna longline fisheries was examined in 2001 and 2002 (CCSBT-ERS/0402/Info08).

4. Seabird

Seventeen species of seabirds were recorded through the scientific observer program in 2001-2002. Catch rates of seabirds estimated for strata defined by fishing season and area ranged 0.026-0.312. Average catch rates was estimated at 0.139 and 0.181 for 2001 and 2002, respectively. Annual total number of seabirds incidentally caught by Japanese high-sea SBT longline vessels was estimated at 6,516 and 6,869 for these years. Although higher numbers were calculated for 1999-2000 due to biased observer coverage in these years, the estimates for 2001-2002 were comparable to the level for 1995-1998. These results suggest that incidental take of seabirds in Japanese high-sea SBT longline fishery has been around 6,000-9,000 birds/year since 1995 (Fig. 3, CCSBT-ERS/0402/Info02).

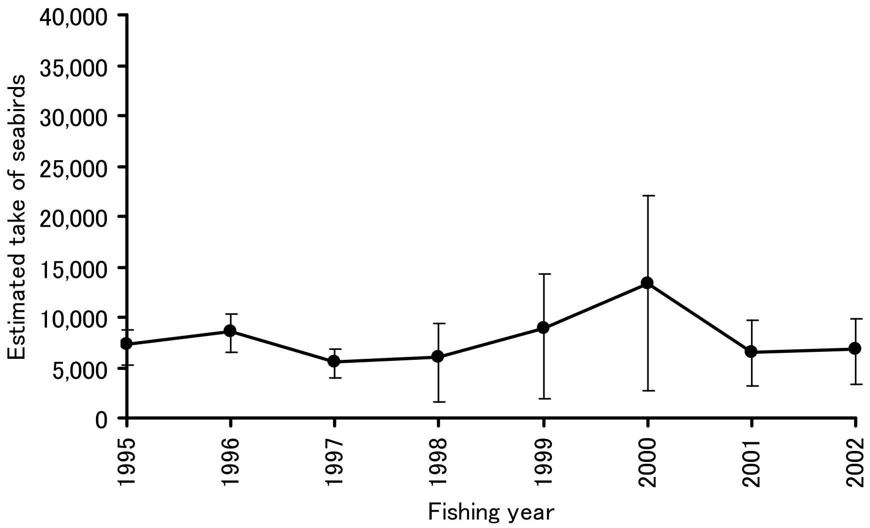


Fig. 3. Annual changes in estimated incidental take of seabirds in the Japanese RTMP for 1995-2000 fishing years. Vertical bars indicate 95% confidence intervals. Estimates for 1995-1997 were cited from Takeuchi(1998a). Estimates for 1998-2002 were re-calculated based on revised data

5. Other Non-target Fish

Eighteen species of elasmobranchs were reported by scientific observer program of southern bluefin tuna fishery. Blue shark was most dominant occupying about 80% of all elasmobranchs, followed by porbeagle (10%). Velvet dogfish, shortfin mako shark, thresher sharks and pelagic stingray were also much caught. The standardized CPUE for blue shark, porbeagle and shortfin mako shark were calculated using the RTMP and EFP observer data from 1992 to 2002. There were not the drastic changes of CPUE for the three species during this period (CCSBT/ERS/0402/Info11, Fig. 4).

In the RTMP and EFP observer program, 2065 sharks of 6 species were released with tags by the research vessels and scientific observers in about 6 years from 1998 until now. Blue shark was dominant occupying more than 80% and porbeagle (19%) followed it. Seven tags, 6 blue sharks and 1 porbeagle, were returned. Ratio of recapture was 0.34 %. The longest time at liberty is 1105 days and the longest migration is 3400 km, both of them were blue sharks(CCSBT/ERS/0402/09). Number of the recaptured sharks is not enough to make clear the migration pattern and the population structure. So it is necessary to increase the number of tagged sharks.

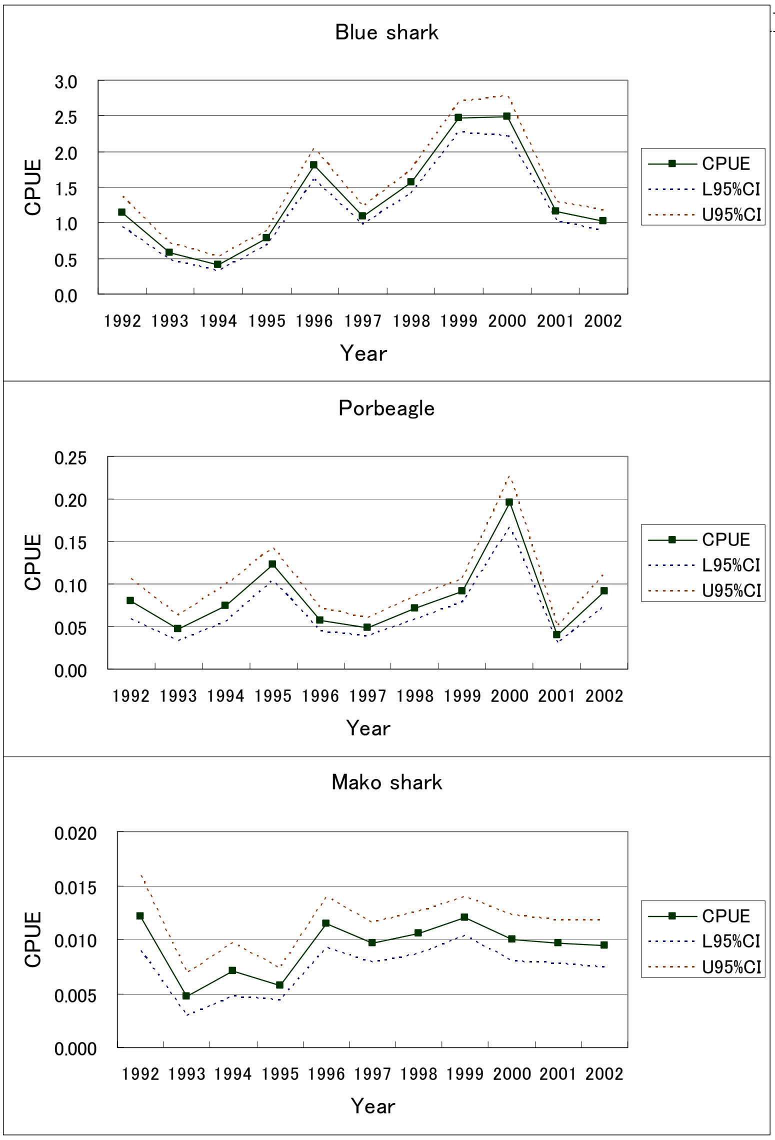


Fig. 4. Standardized CPUE and 95% confidence intervals for three shark species obtained from Japanese observer data.

Many teleosts were caught by longline fishery except for tunas and billfishes in the SBT fishing ground. The total catch number of them were the 46,001 individuals including the 36 species in the 15 families and the 8 groups (a part of unidentified species were classified to the unidentified fishes and family or genus) by using the RTMP and EFP observer data from 1998 to 2002. The catch number of butterfly tuna, escoler, oilfish, opah, lancetfishes and pomfrets dominated in the teleosts. Distribution pattern of these 4 species and 2 groups were examined by the CPUE maps of each fish. The escoler, opah and lancetfishes tended to distribute the northern part of the SBT fishery ground, while butterfly tuna and pomfrets distributed the southern part of the ground. lancetfishes and oilfish distributed the eastern and western part of the ground without seasonality. It is suggesting that the distribution pattern of these fishes correlated with the difference in the ecological characteristics of each species (CCSBT/ERS/0402/13).

6. Marine Mammal and Marine Reptile

Three marine mammals and no marine reptiles were recorded through the Japanese scientific observer program in 2001-2002. Incidental capture of marine mammal and marine reptile occurred at a negligible level in the Japanese high-sea SBT longline fishery. There is not enough number of observations for the appropriate statistical estimation of the total incidental catch for these animals.

7. Mitigation Measures to Minimize Seabird and Other Species Bycatch

Current Measures

Mandatory measures (Tori Line)

The Government of Japan has introduced a mandatory measure for tuna longliners to use Tori Line while targeting southern bluefin tuna as the terms of conditions of license to avoid incidental catch of seabirds since 1997. Any violation of this condition is subject to punishment. The Government of Japan makes this mandatory measure known to every fisherman by specifying in the license.

Tori Line is the device of drawing lines (150-200m) with threatening streamers from poles standing at the end of ships. The same streamer as the standard type of CCSBT/ERS is recommended, but each vessel use their own types of streamer which are adapted to the shape of vessels or the methods of operations. The effects of avoiding incidental catch of seabirds were not same by vessels. The best method to gain much effect is to set the streamer just above the baits thrown on the sea surface by adjusting the length and angle of the pole.

Monitoring System and the situation of deployment

The Government of Japan is taking necessary measures to enforce and monitor the mandatory usage of Tori Line including dispatch of enforcement vessels to the fishing areas, and deployment of observers on board of operating vessels. The observers boarding are changed annually. The observers got on board 31 fishing vessels and observed 637 operations.

Voluntary Measures

In February 2001, the Government of Japan developed “Japan’s National Plan of Action for reducing incidental catch of seabirds in longline fisheries” in accordance with “International Plan of Action for reducing incidental catch of seabirds in longline fisheries” of FAO, in which Fisheries Agency of Japan instructed every fishermen to voluntarily carry out night line-setting, use of weighted branch line or cone to ensure speedy precipitation of bait, use of automatic bait casting machines and use of properly defrozen bait in addition to the mandatory requirement for fishing vessel to use Tori Line.

Most vessels conduct the night setting partially by starting the throw of line before sunrise.

A lot of Japanese tuna longline vessels use automatic bait casting machines, which have effect to decrease the incidental catch of seabirds by avoiding irregular stream and sinking baits quickly as well as casting baits just under the Tori Line. In 2000-2001, 83.9% of vessels (26 /31) which had observers equipped that kind of machines.

There are two methods to sink the baits quickly, which are the use of weighted branch lines and defrozen baits. Regarding weighed branch lines, two methods exist. One is to attach lead weights to the nylon leader and the other is to use the heavy nylon leader. It was difficult to research in detail because fishing masters modified the modes of branch lines and wanted to keep them in secret. At least 2 of 16 observed vessels used weighted branch lines and more details are not known. As the method mentioned above to attach lead weights to the nylon leader has the problem from the point of view of safety, the method to use the heavy nylon leader is recommended in the industry. Melting the baits is also effective to sink them quickly. In 531 operations observed, semi-melted baits were used in 484 op. (91.1%), melted ones in 38 op. (7.2%) and non-melted ones in 9 op. (1.7%).

There observed two vessels which took the strategic offal control to lead seabirds to the far place from vessels temporarily by casting the remaining baits to the side opposite to that of throwing the lines in case of many seabirds gathering.

<u>Measures under Development/Testing</u>

The effect of blue-dyed bait and Tori-pole streamer for the reduction of incidental take of seabirds by the Japanese Southern Bluefin Tuna longline fisheries was examined in 2001 and 2002. The influence of the blue-dyed bait on the catch rates of target fish species was also examined. Although the incidental take of seabirds was reduced using the Tori-pole streamer, the blue-dyed bait was more effective for reducing incidental take of seabirds than the Tori-pole streamer. Furthermore, the catch rates of tunas with the blue-dyed bait were not significantly changed as compared to the non-dyed bait. The combination of the blue-dyed bait and the Tori-pole streamer could dramatically reduce the incidental take of seabirds by tuna longline fisheries (CCSBT/ERS/0402/08, Figs. 5, 6). Japan would examine to introduce blue-dyed bait into Japanese commercial longline fisheries, if blue-dyed bait is useful for the mitigation measure in reducing the incidental take of seabirds.

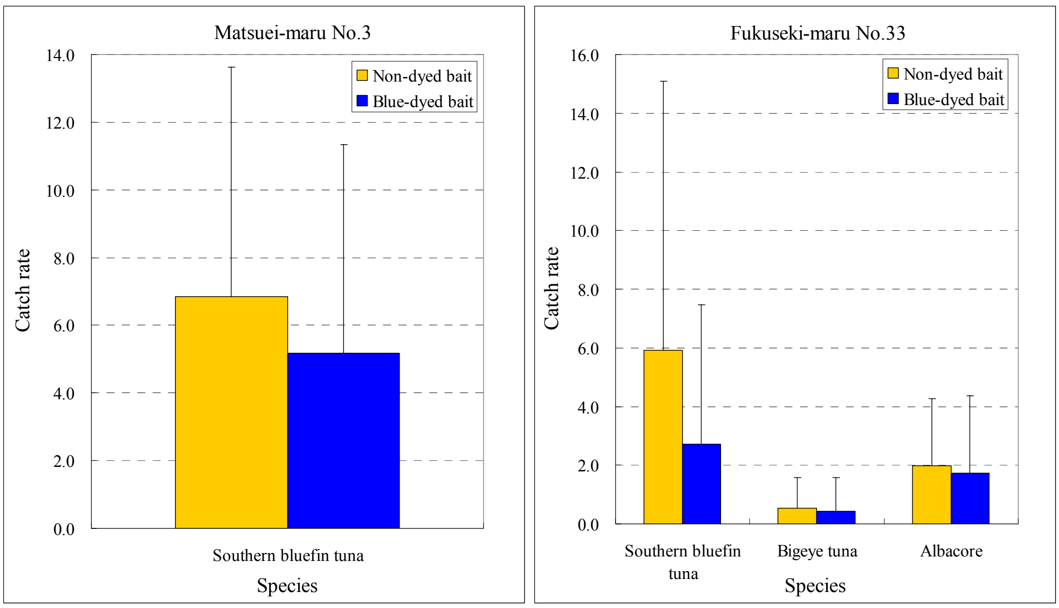
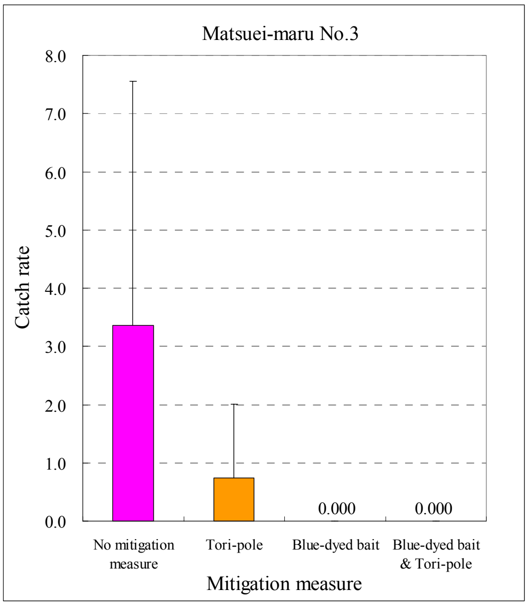


Fig. 5. Catch rates (number of catch/1,000 hooks) of seabirds using blue-dyed bait and Tori-pole streamer in Southern Bluefin Tuna longline fisheries off Cape Town in the Southern Ocean.



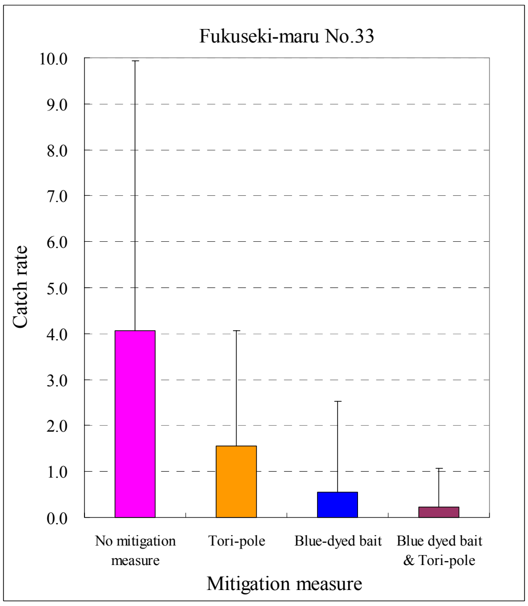


Fig. 6. Catch rates (number of catch/1,000 hooks) of tunas using blue-dyed bait in Southern Bluefin Tuna longline fisheries off Cape Town in the Southern Ocean.

The research to improve the sinking velocity of hooks were conducted by the Tokyo University of Oceans and the trial manufacture and experiment of underwater setting device were also conducted (CCSBT-ERS/0402/Info06).

8. Public Relations and Education Activities

1) Fisheries Agency of Japan had developed the National plans of action for seabirds and sharks according to the FAO international plans of action. These plans were notified by Fisheries Agency of Japan to the fishermen in the rural area through the prefectural governors and the fishermen’s organizations.

2) Poster and sheet for identifying shark species were distributed to the fishermen and other peoples relating to fisheries(CCSBT-ERS/0402/Info21)..

3) Educational pamphlets for identifying seabird species, and explaining incidental take of seabirds and its avoidance were distributed to the fishermen and other peoples relating to fisheries.

4) The National Research Institute of Far Seas Fisheries has cooperated with CCSBT in producing pamphlets for incidental take of seabirds and identification sheets for seabirds.

5) In the other ecologically related species, a sheet for identifying sea turtle species and a manual explaining the method of releasing a sea turtle incidentally taken were created and distributed to the fishermen and other peoples relating to fisheries.

9. Information on other ERS (non-bycatch)

Feeding ecology on southern bluefin tuna is investigated based on stomach samples collected by scientific observers from Japanese longline vessels. Up to now, stomachs from 1150 individuals, which mainly came from areas 7, 8 and 9 during May to August, were analyzed. Twenty five percent of the stomachs were empty, though the rate may be underestimated. The major components of diet in weight were fish (49%), squid (46%) and crustacea (1%). The predominance of fish and squid was observed in all areas and all sizes of tuna, thus it is the common feature of feeding ecology on southern bluefin tuna in the oceanic area. The number of fish in an individual was usually less than five; however, the numbers of squid or crustacea in an individual exceeded 20 in many individuals. This suggests that feeding behavior is different with prey types. Body lengths of many fish in stomach were more than 20 cm, which was larger than those of squid (less than 4 cm in mantle length) and crustacea (1-2 cm)(CCSBT-ERS/0402/Info20). Since 2003, we start stomach sampling on other fish caught in longline operation (all tunas, billfishes, butterfly tuna, lancetfishes) and detail investigation on squid samples in stomach, to obtain information on distributions of bait species and to compare feeding ecology among large pelagic fishes.

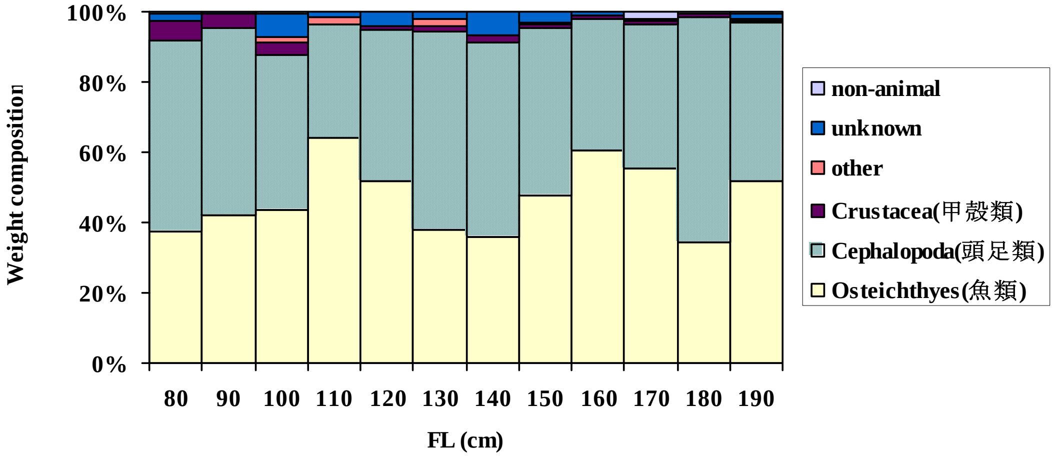


Fig. 7. Weight composition of prey categories in stomach of southern bluefin tuna for each 10 cm fork length class.

Stable isotope analysis can be used to determine diet and trophic level of an animal. It is well known that the stable isotope ratios show a stepwise enrichment along trophic levels in marine and terrestrial ecosystems. Trophic relationships were investigated for seabirds and fish species sampled in the Japanese Southern Bluefin Tuna longline fishery using the method of $\delta^{13}C$ and $\delta^{15}N$ analyses. In seabirds, there were seabird species indicating low $\delta^{13}C$ and $\delta^{15}N$ values such as King penguin and Cape petrel, species with high values such as Wandering and White-capped albatrosses, and species with a wide range of values by individual such as giant petrels and dark colored albatrosses. The prey of seabirds, by species and by individual, in the Southern Ocean may vary over a wide range of trophic levels. In tunas and tuna like species, Southern bluefin and Bigeye tunas, Black and Striped marlins and Swordfish occupied similar trophic levels, while only Albacore occupied a low trophic level.

The stable isotope technique can thus make clear the trophic relationships of marine organisms in the Southern Ocean ecosystems (CCSBT/ERS/0402/14).

According to our predation survey, the primary prey species damaging the longline caught SBT are sharks. Attacks by small toothed whales such as false killer whales are unlikely high as observed in the tropical waters. Including these predation problems, we currently investigate mechanisms of competitions for common preys shared by SBT, whales and other species. Hence, in order to elucidate factors affecting the SBT resources besides fisheries, we need to learn the prey-predator relationships of SBT in the whole SBT habitat waters including areas at the spawning and juveniles stages (CCSBT/ERS/0402/Info19).

10. Others

No other information.

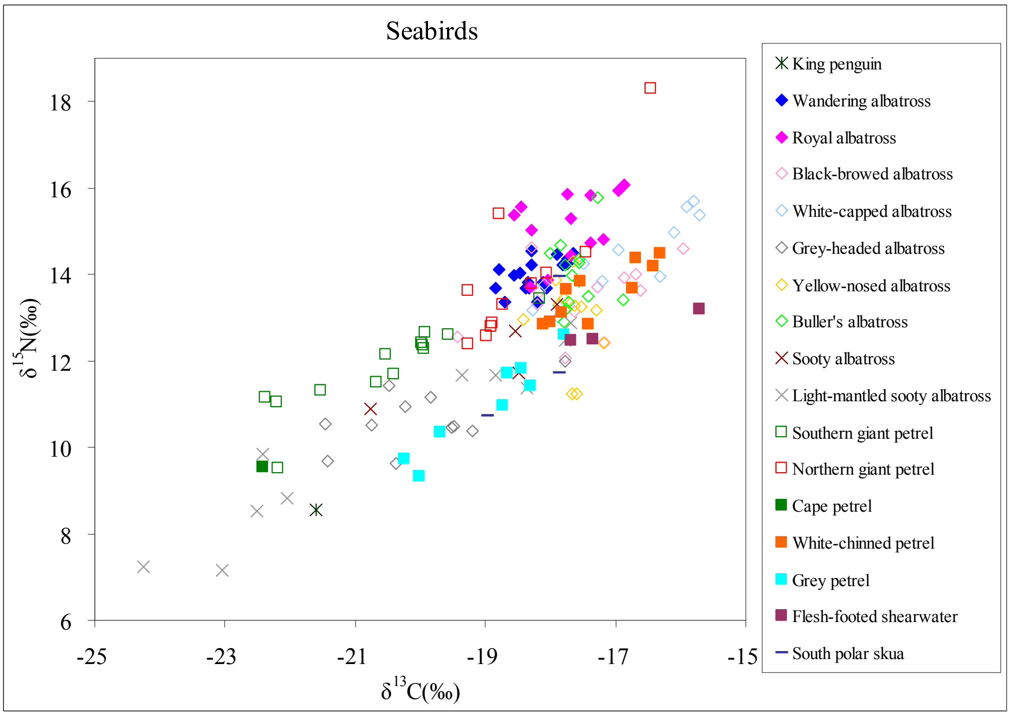


Fig. 8. δ^{13}C and δ^{15}N values of seabirds in the Southern Ocean.

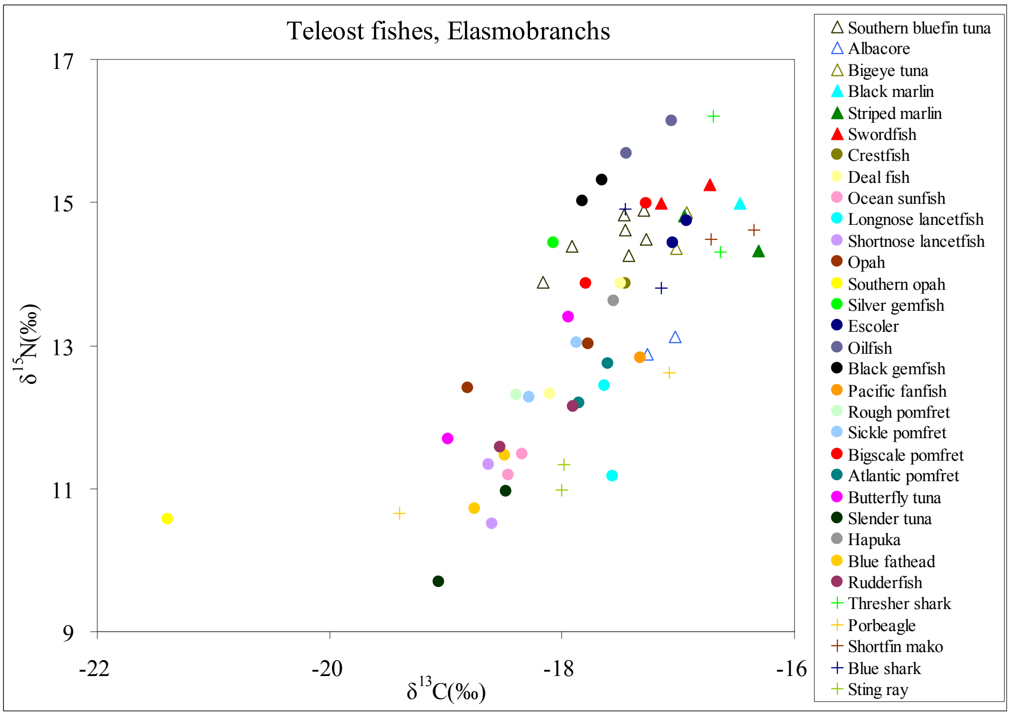


Fig. 9. ^{13}C and ^{15}N values of teleost fishes and elasmobranchs in the Southern Ocean.