National Report of Japan

Overview of Researches on Ecologically Related Species in Japanese SBT Longline Fishery, 2008-2010

Fisheries Agency of Japan

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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.

Regarding the incidental take of seabirds, tori line was used voluntarily by the fishermen in the early 1990s, and the Government of Japan has introduced a mandatory measure for SBT longliners to use tori line since 1997. Research effort to modify tori line and develop alternative methods possibly avoiding incidental take 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 established National Plans of Action in 2001 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. 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. The number of vessels was less than 200 recently. 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 in the second and third quarters, at Area 8, 9 in the all season.

Distribution of Catch and Effort

General distribution of southern bluefin tuna and effort in 1998-2005 was almost same as the distribution of major fishing grounds mentioned above. Since 2006, however, annual operational pattern and schedule of Japanese longline vessels was affected by a lot of factors for example the introduction of individual quota (IQ) system, the abolish of seasonal area closure, the drastic/temporal increase of fuel price, and the market price slump of SBT. Due to the introduction of IQ system and abolish of seasonal area closure, a fishing vessel did have its own catch limit but did not have limitation regarding areas, which allowed the fishing vessel to use its entire catch limit in one area (i.e. Area 8).

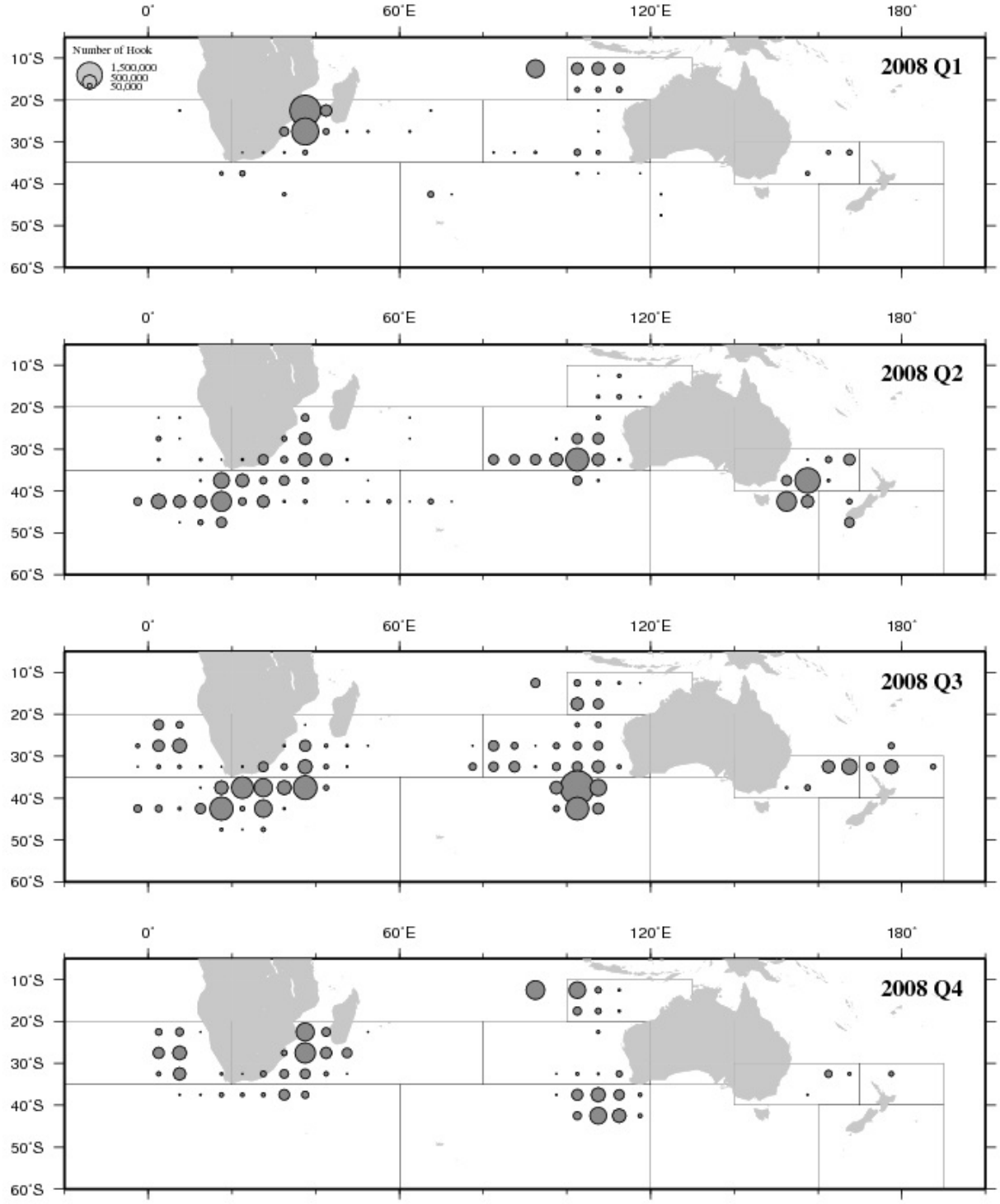


Fig.1. Number of fishing hooks used Japanese RTMP vessels by quarter and 5x5 degrees square in 2008.

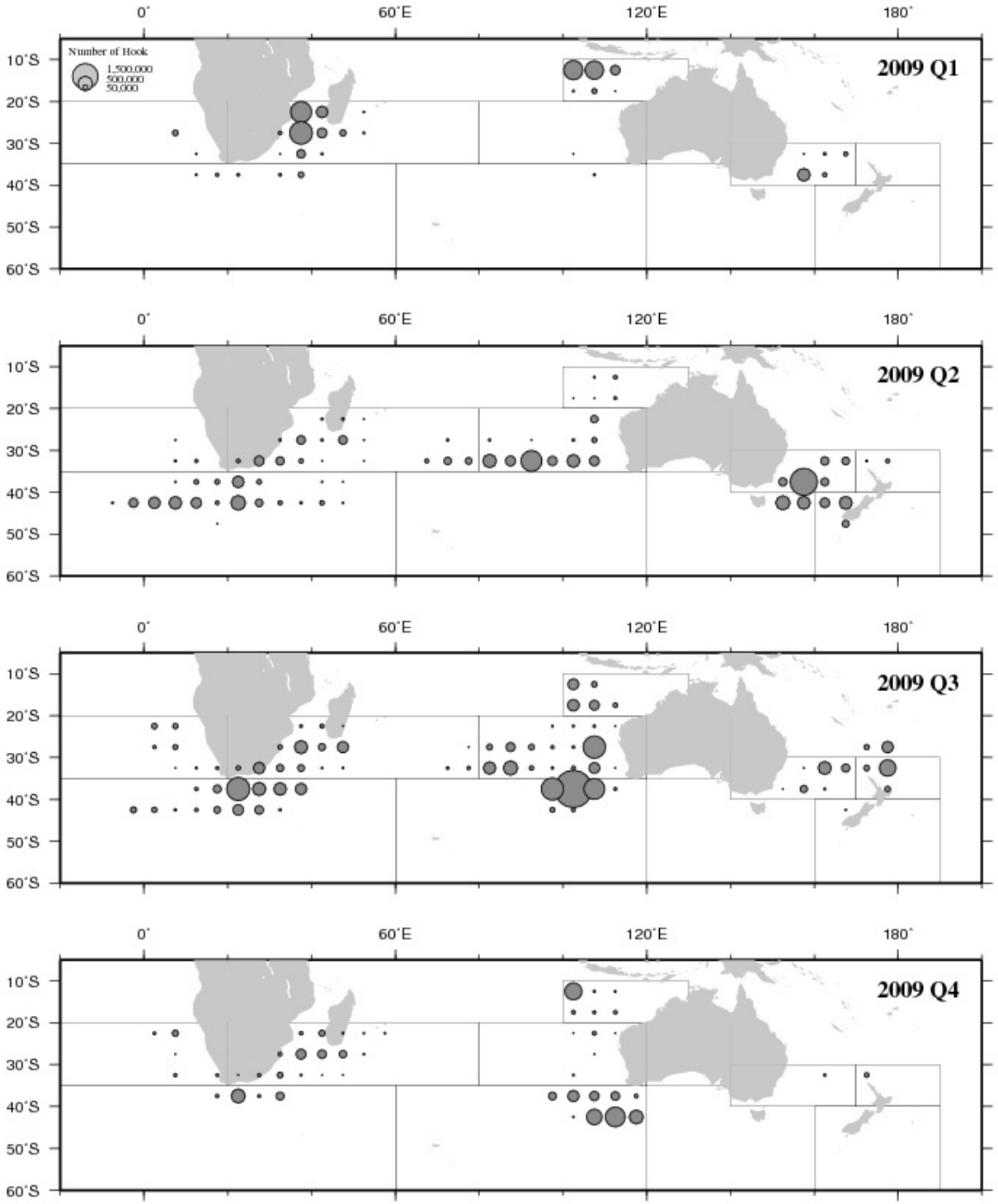


Fig.2. Number of fishing hooks used Japanese RTMP vessels by quarter and 5x5 degrees square in 2009.

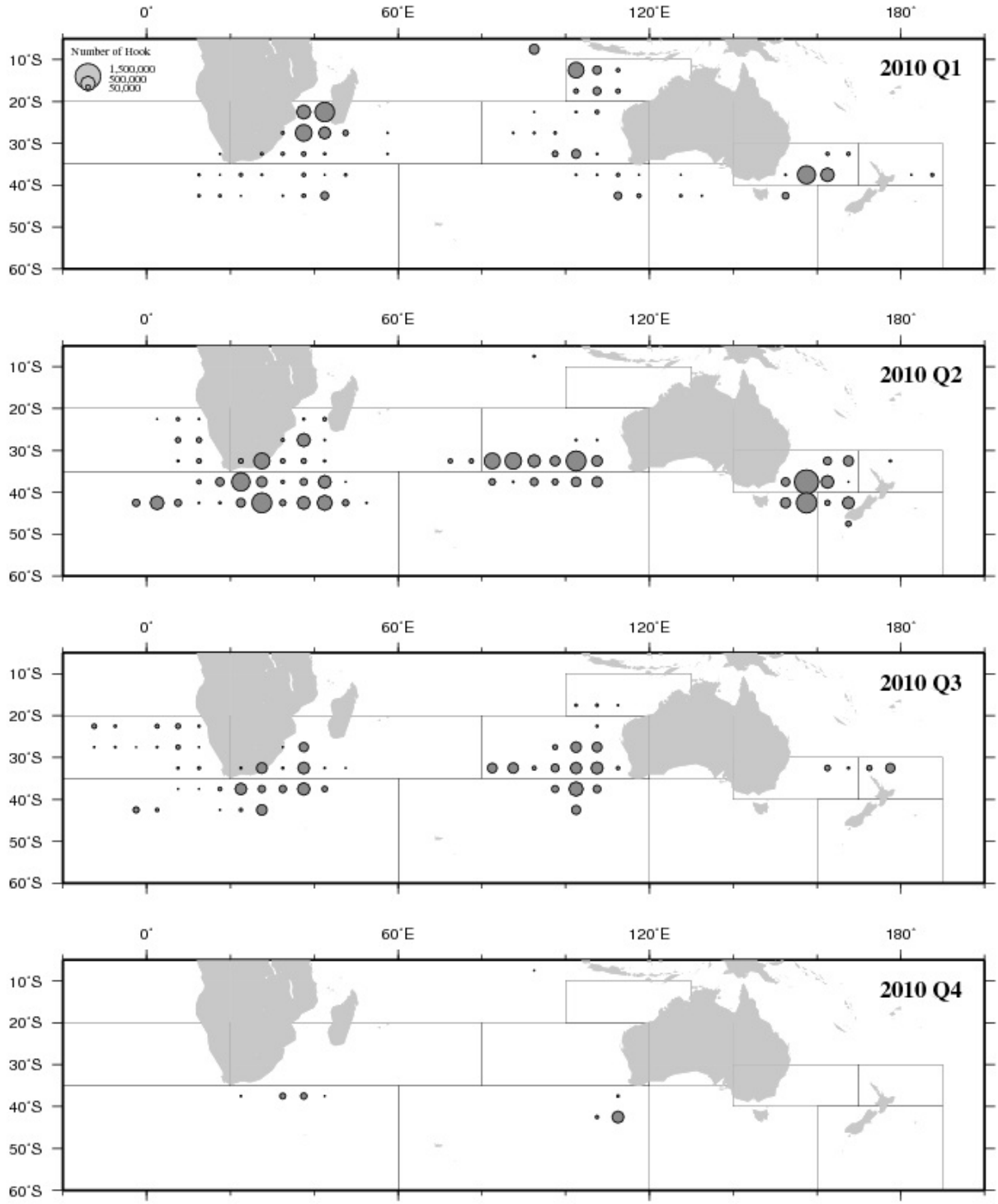


Fig.3. Number of fishing hooks used Japanese RTMP vessels by quarter and 5x5 degrees square in 2010.

3. Fisheries Monitoring for Each Fleet

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

Since 1992, Japan has conducted scientific observer program on southern bluefin tuna fishery and collected information including fishing position, effort, catch by target and non-target species, biological information, incidental catch of seabirds, etc. In 2008, 2009 and 2010, 6, 7 and 8 fishing vessels, and 850,000, 913,000 and 823,000 hooks were observed, respectively. Coverage of observation was 4.8, 7.1 and 9.5 % for vessels and 3.3, 4.4 and 5.6 % for hooks in 2008, 2009 and 2010, respectively (Table 1). The total costs of the scientific observer program were US$138,000 in 2008, US$197,000 in 2009 and US$233,000 in 2010. The observation effort was tried to be distributed in proportion to the fishing effort for each area and season (CCSBT-ERS/1203/Info26).

Table 1. Number and coverage of fishing vessels and hooks observed in the Japanese RTMP observer program in 2008-2010.

Area	Year	Number of vessels observed	Number of all vessels	Cover rate for the number of vessel	Number of hooks used by observed vessels (x1000)	Number of hooks used by all vessels (x1000)	Cover rate for the number of hook
Area 4	2008	1	19	5.3%	166	3415	4.9%
	2009	2	19	10.5%	177	3466	5.1%
	2010	1	28	3.6%	30	3604	0.8%
Area 5	2008	0	6	0.0%	0	723	0.0%
	2009	0	11	0.0%	0	877	0.0%
	2010	0	5	0.0%	0	307	0.0%
Area 6	2008	0	2	0.0%	0	283	0.0%
	2009	0	5	0.0%	0	718	0.0%
	2010	0	4	0.0%	0	481	0.0%
Area 7	2008	1	16	6.3%	82	1274	6.4%
	2009	0	13	0.0%	0	856	0.0%
	2010	0	26	0.0%	0	1307	0.0%
Area 8	2008	2	48	4.2%	397	7967	5.0%
	2009	3	47	6.4%	418	8238	5.1%
	2010	3	26	11.5%	228	2262	10.1%
Area 9	2008	3	71	4.2%	206	12013	1.7%
	2009	3	40	7.5%	318	6507	4.9%
	2010	4	44	9.1%	565	6628	8.5%
Total	2008	6	125	4.8%	850	25675	3.3%
	2009	7	99	7.1%	913	20662	4.4%
	2010	8	84	9.5%	823	14588	5.6%

4. Seabirds

Sixteen species of seabirds were recorded through RTMP observer program in 2008-2010. Annual seabird catch were 4,392 (95% CI: 2,414-6,394) in 2008, 2,820 (95% CI: 1,176-4,499) in 2009 and 6,147 (95% CI: 579-14,902) in 2010, respectively. The recent level of incidental catch of seabirds in RTMP has been stable around 3,000-6,000 birds/year (Fig. 3, CCSBT-ERS/1203/21).

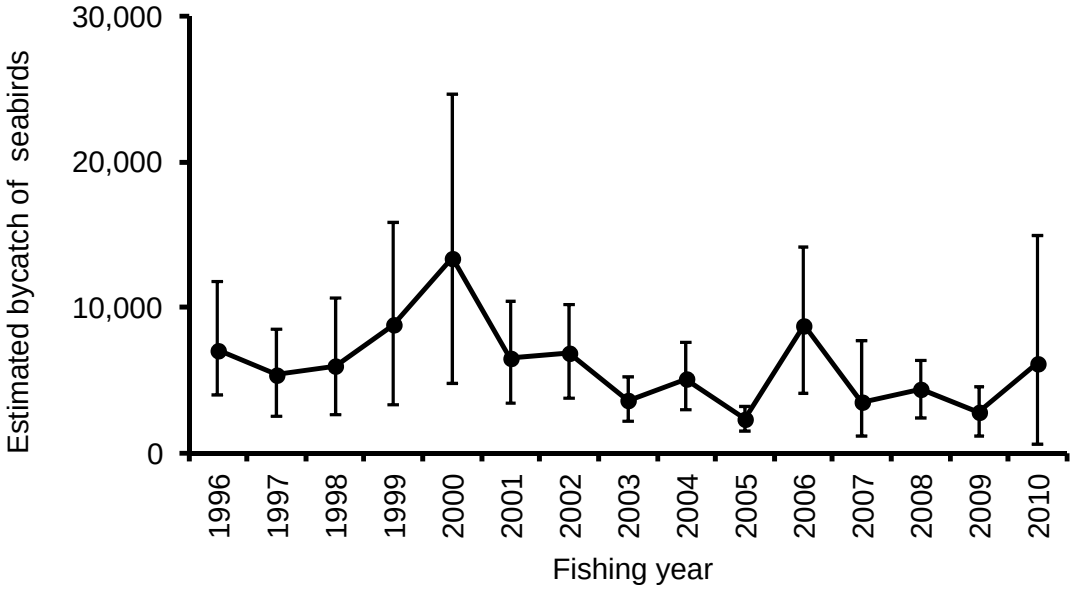


Fig.3. Annual trends of incidental catch of seabirds in the Japanese SBT fisheries. Vertical bars indicate 95% confidence intervals.

By-catch CPUEs of seabirds were the highest in the Tasman Sea in WCPFC conventional area but the value was smaller than that in high interaction area out of the WCPFC area. In the southern WCPFC area, bycatch CPUE of albatrosses was observed more than that of petrels. Albatross species, mostly wandering albatrosses, black-browed albatrosses, Buller's albatrosses, and shy albatrosses, were caught in the Tasman Sea. On the other hand, white-chinned petrels and flesh-footed shearwaters, which are thought to dive deeper than albatrosses and by-caught frequently in the Atlantic and Indian Oceans, were not caught in the Tasman Sea (CCSBT-ERS/1203/Info27).

5. Other Non-target Fish

Ten species of elasmobranchs were reported by the RTMP observers in 2008-2010. Blue shark was most dominant occupying about 75.7-85.2% of elasmobranch catch observed, followed by porbeagle (6.6-13.9%). Velvet dogfish, shortfin mako shark, thresher sharks and pelagic stingray were also much caught. The standardized CPUEs of blue shark, porbeagle and shortfin mako shark were calculated using the RTMP and EFP observer data from 1992 to 2010. The standardized CPUEs of these three shark species seem to be stable with annual fluctuation and do not show any trend of long-term increase or decrease (Fig. 4, CCSBT/ERS/1203/22).

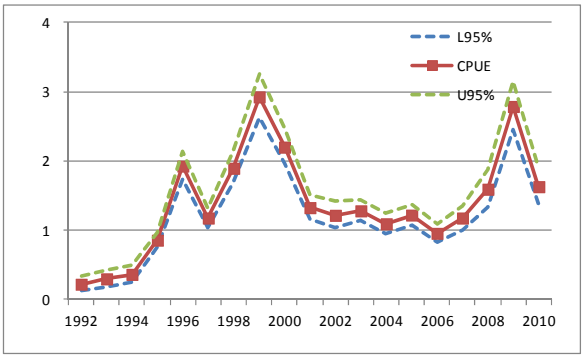
In the RTMP observer program, 3,811 sharks of 12 species were released with tags by the scientific observers in about 13 years from 1998 until 2010. Blue shark was dominant occupying more than 73% and porbeagle (21%) followed it. Thirty-four tags (26 blue sharks and 8 porbeagles) were returned. Ratio of recapture was 0.9%. The longest time at liberty is 1,738 days and the longest migration is 6,900 km, both of them were blue sharks, which suggest the large scale migration of blue shark (CCSBT-ERS/1203/23).

The information on the distributional pattern and the trend of relative abundance of porbeagle

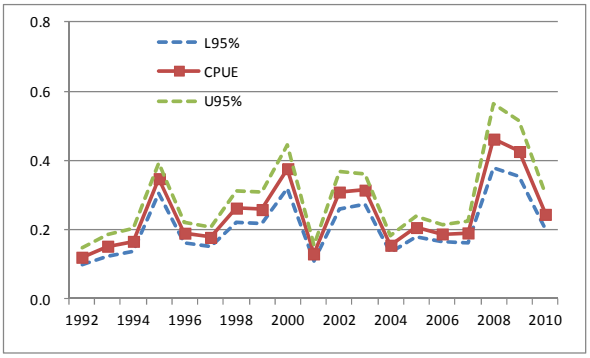
in the Southern Hemisphere was examined. Traditionally, the distribution of this species has been believed to be concentrated in the coastal area and the knowledge on the distribution in the high seas has been relatively scarce, especially in the Southern Hemisphere. However, the records from a series of past research and ongoing observer cruises in Japan indicated the wide distribution and frequent occurrence of this species in the high seas in the Southern Hemisphere, and suggested the possible connectivity among oceans in the Southern Hemisphere (CCSBT-ERS/1203/24).

Many teleosts were caught by longline fishery other than tunas and billfishes in the SBT fishing ground. Forty-one species of teleost fish including tuna and billfish were identified in the RTMP observer data in 2008-2010. Butterfly tuna, escoler, oilfish, opah, lancetfishe, sunfish and pomfrets were the major components of teleost catch (other than tuna and billfish) recorded in the in the high sea longline fishery (CCSBT-ERS/1203/Info26).

Blue shark



Porbeable



Shortfin mako

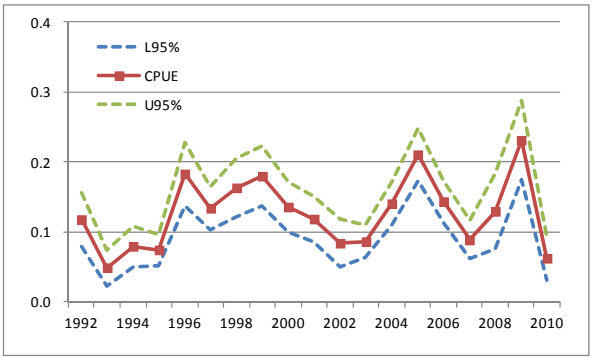


Fig.4. Annual trends in standardized CPUEs of blue shark, porbeagle and shortfin mako shark using three different models for 1992-2010.

6. Marine Mammal and Marine Reptile

No Pinnipedia species and two loggerhead turtle were recorded through the Japanese scientific observer program in 2008-2010 (CCSBT-ERS/1203/Info26). Incidental take 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 take 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.

In non-binding measures, members should comply with all current binding and recommendatory measures aimed at the protection of ecologically related species, including seabirds, sea turtles and sharks, from fishing, which are adopted from time to time: by the Indian Ocean Tuna Commission (IOTC), when fishing in its Convention area; by the Western and Central Pacific Fisheries Commission (WCPFC), when fishing in its Convention area; and by the International Commission for the Conservation of Atlantic Tunas (ICCAT), when fishing in its Convention area.

Tori line (bird scaring line) is a seabird deterrent device, in which a line with threatening streamers is drawn from a pole installed at the end of a ship.

To explore effective and safe designs of tori line in the North Pacific, performance of two types of tori lines, light streamer and hybird streamer (long and short streamers), was compared using 20 commercial longline vessels with 449 sets. Performance of single tori line and double tori lines was also compared using same vessels with 396 sets. There were no significant difference in albatross CPUEs between different tori line types and number of tori lines. These low CPUE of Laysan and black-footed albatrosses suggested all design of tori lines would be similarly effective to reduce the albatross take, and thus, the further research on the design of tori-line should be useful to reduce incidental seabird bycatch in the north Pacific.

Monitoring System and the situation of deployment:

The Government of Japan is taking necessary measures to enforce and monitor the level of compliance for mandatory use of tori lines including dispatch of enforcement vessels to the fishing areas, and deployment of observers on board of operating vessels. The observers boarding are changed annually.

Voluntary Measures, including information on proportion of fleet using the voluntary measures:

In February 2001, in accordance with “International Plan of Action for reducing incidental catch of seabirds in longline fisheries” of FAO, the Government of Japan developed “Japan’s National Plan of Action for reducing incidental catch of seabirds in longline fisheries”, 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 lines.

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

Most of Japanese tuna longline vessels use automatic bait casting machines (BCMs), which have an effect to decrease the incidental catch of seabirds by avoiding propeller turbulence, increasing sinking rates of baited hooks, and casting baited hooks constantly below the tori line. In 2008-2010, 91-100% of observed fishing vessels were equipped with BCMs.

Improvement of sinking rates of baited hooks is achieved by the use of weighted branch lines

and of thawed bait. Branch lines can be weighted either by attaching lead weights to the nylon leader or by inserting heavy nylon cord in the branch line. It is difficult to assess the detail of fishing gear because gear information is subject to intellectual property right of fishermen. Some observed vessels used lead-cored branch lines in 2008-2010. Of the 883 observed fishing operations, in which bait condition was recorded by onboard observers during line setting in 2008-2010, partially-thawed bait was used in 43.4%, and fully-thawed bait was used in 40.2%.

Performance of weighted and un-weighted branchlines deployed with revised "hybrid" tori lines on two Japanese vessels participating in the 2010 tuna joint venture fishery in the South Africa EEZ was compared in collaboration with the Washington Sea Grant, University of Washington and Japan. This study showed that branchline weighting was highly effective at preventing seabird attacks within the aerial extent of streamer lines and allowing none between the two hybrid streamer lines in a diving seabirds dominated system. The higher rate of tangling of weighted branchlines relative to un-weighted branchlines is the only remaining barrier to making branchline weighting practical(CCSBT-ERS/1203/Info28).

Measures under Development/Testing

1) Mitigation Measures:

Mitigation measures to reduce incidental catch of sea turtles in longline fishery have been developed and experimented in Japan according to the FAO guidelines to reduce sea turtle mortality in fishing operations. FRA is conducting surveys on the effects of circle hooks on catch rates of sea turtles, tuna and shark.

Experiment of large circle hooks (Koshina type 4.5-sun, foreign type 18/0) on catch rates of target species and sea turtles are on the way through operations of commercial longline in the North Pacific 2010. The use of circle hooks is effective to reduce incidental catch or deep hooking of sea turtles. Most of sea turtles caught by shallow longlines were retrieved alive. The result indicates that careful live retrieval and release is effective in improving the post-hooking survival of hooked sea turtles.

De-hooking devices and sea turtle handling manuals are developed to improve post-hooking survival of sea turtles.

2) Conservation and Management

Large number of leatherback turtles is known to nest in Jamursba-medi and Wermon, West Papua, Indonesia. Nest counts, assessment of hatching success, and improvement of nesting environments for leatherbacks have been conducted since 1999 in Indonesia with the collaboration of the Indonesia Sea Turtle Research Center and Everlasting Nature of Asia, which is a Non-Profit Organization (NPO) in Japan. The nesting survey revealed that Indonesian population of leatherback turtles were suffering from poor reproductive success due to beach erosion, egg predation and low hatching rates. The Everlasting Nature constructed electric fences in the highest-density nesting area to prevent pig predation on leatherback eggs. The electric fence drastically reduced the predation rates of eggs. Sea turtle populations have been affected by many factors on land and at sea (disappearance of nesting beaches, hatchling production, predation of eggs and turtles, interaction with fisheries such as trawl, gillnet, set-net, trap, purse-seine, and longline). Therefore, holistic management is necessary for the conservation of sea turtles, especially leatherback turtles (CCSBT-ERS/1203/25).

8. Public Relations and Education Activities

1) Educational materials, including booklets pamphlets, video program (DVD/VHS), cartoons were prepared by FRA, the Global Guardian Trust (GGT), and the Organization for the Promotion of Responsible Tuna Fisheries (OPRT), and were distributed to fishermen and other parties related to fishing industry to explain the importance of reducing incidental catch of seabirds and sea turtles (CCSBT-ERS/1203/28).

-Identification guide for sharks, seabirds and sea turtles.

-Booklets and leaflets that illustrate methods for avoiding incidental catch and appropriate handling of seabirds and sea turtles;

-A guide book which summarizes the NPOA-Seabirds and NPOA-Sharks.

-A video program (VHS and DVD) which explain mitigation measures to reduce longline interactions with seabirds and sea turtles.

2) Under the government contract and with the cooperation of FRA and tuna fishing industries, GGT and Japan NUS had hold seminars for fishers at key fishing ports of longline fleets in Japan (in total 23 seminars with participation of approximately 550 fishers). In these seminars, the Japan's National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fishery (NPOA-Seabirds) was introduced and mitigation techniques and methods for releasing live birds were explained by using various kinds of educational materials. Furthermore, GGT distributed tori lines to longline fishers, without charge, to facilitate the use of tori lines and to test effectiveness of various kinds of tori lines in commercial fishery. We also continued information exchange with fishers through discussion and questionnaires at the seminars and through port-side interviewing with fishers about practical usage and innovation/improvement on tori lines and other mitigation measures (CCSBT-ERS/1203/28).

Education

Crew training, especially ship masters

The Federation of Japan Tuna Fisheries Co-operative Associations has hold seminars for crew members, ship masters and ship owners in fishing ports (i.e. Kesen-numa). Also, the Federation of Japan Tuna Fisheries Co-operative Associations has distributed brochures on bycatch mitigation to Japanese longliners at foreign ports (i.e. Cape Town). The Federation of Japan Tuna Fisheries Co-operative Associations will continue this effort.

Observers

Before the cruises, six, seven, and eleven observers were trained in 2008, 2009, and 2010, respectively. All observers in 2008-2009 and seven observers in 2010 were Japanese researcher, and four observers in 2010 were Indonesian. All observers had much experience for the SBT fisheries. They brushed up their knowledge and skills on research method, recording procedure, and safety ensuring by the training program. Some training programs included the practical training with the actual tuna as necessary (e.g. measure the fish size, collection of the biological samples).. After the return from the longline vessels, every observer reported their observer activity. Their experiences and information were used for the improvement of next year's observer program (CCSBT-ERS/1203/Info26).

9. Information on other ERS (non-bycatch)

The diet of juvenile (predominantly age 1) southern bluefin tuna *Thunnus maccoyii* (SBT, N = 720), caught over 11 years of the recruitment monitoring survey off southern Western Australia during summer, consisted overwhelmingly of teleosts (97.4% by volume). Pilchard *Sardinops sagax* (27.4%V), blue mackerel *Scomber australasicus* (16.7%V), and jack mackerel *Trachurus declivis* (14.2%V) were the major taxa, with pilchard more abundant in coastal waters and jack mackerel more frequently encountered in fish caught closer to the shelf-edge. Prey size varied from 5 to 240 mm, with 67% of ingested items measuring between 30 and 50 mm. Pilchard dominated the prey size category 130–190 mm (84% by number), but the overall contribution of this species to the diet of juvenile SBT was much lower than previously reported. Future research in relation to the feeding ecology of juvenile SBT should focus on the biology and ecology of the young lifestages of the main prey species in this area and on prey distribution and dynamics as a key factor linking environmental change and SBT distribution (CCSBT-ERS/1203/26).

10. Others

No other information.

11. Implementation of the IPOA-Seabirds and IPOA-Sharks

Japan developed its own National Plans of Action (NPOAs) for both seabirds and sharks in 2001 according to the FAO International Plans of Action (IPOAs) and revised them in 2009 taking into account the latest management measures taken by several RFMOs. Fisheries Agency of Japan (FAJ) disseminated the NPOAs to fishermen through local governments and fishermen's organizations. FAJ has reviewed implementation status of these two NPOAs and submitted its implementation reports to the FAO Committee on Fisheries (COFI) every two years since 2003.