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Overview of Researches on Ecologically Related Species in Japanese SBT Longline Fishery, 2014-2015

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要約

日本の漁業においてミナミマグロを対象とするのは、はえ縄漁業である。2014 年と 2015 年におけるミナミマグロはえ縄漁業に従事した漁船数はそれぞれ、91 隻と 90 隻であった。日本のミナミマグロはえ縄漁船が操業する水域は、CCSBT 統計海区の 4、7、8 及び９海区である。水産庁はミナミマグロ漁獲量情報を収集するために漁業データ即時収集プログラム（RTMP）を 1991 年より実施しており、1995 年以降ではすべてのミナミマグロはえ縄漁船の漁業データがこの RTMP によって収集されている。

日本の科学オブザーバー計画は、1992 年から開始されており、操業位置、漁獲努力量、漁獲対象・非対象種の漁獲量、生物情報及び海鳥の偶発的捕獲などが本計画において記録されている。2014 年と 2015 年におけるミナミマグロはえ縄漁船の科学オブザーバー配乗隻数はそれぞれ、28 隻と 29 隻であった。両年の科学オブザーバーによる調査カバー率はそれぞれ、隻数は 23.1％と 23.3％で、総投下鈎数の 18.2％と 18.3％が観察された。本文書において、ミナミマグロはえ縄漁船に乗船した科学オブザーバーによって記録されたサメ類、海鳥類及び海亀類の捕獲数を報告した。

Summary

Japanese fleet is using only longline gear to catch southern bluefin tuna (SBT). Number of vessels engaging the SBT longline fishery was 91 and 90 in 2014 and 2015, respectively. Fishing grounds for SBT in recent years correspond to the CCSBT statistical areas of 4, 7 to 9. Since 1991, Fisheries Agency of Japan started Real Monitoring Program (RTMP) to monitor the catch of SBT. All the vessels for the SBT longline fishery have been monitored through this program since 1995.

Scientific observer program on the SBT fishery has been conducted by Japan since 1992, collecting information on fishing position, effort, catch of target and non-target species, biological information, incidental catch of seabirds, etc. The scientific observers were deployed to 28 and 29 fishing vessels in 2014 and 2015, respectively. Coverage rates of observation were 23.1% and 23.3% for vessels and 18.2% and 18.3% for hooks in 2014 and 2015, respectively. This document reported captures of sharks, seabirds and sea turtles recorded by the scientific observers on-board the Japanese SBT longline vessels.

1. Introduction

Japanese fleet is using only longline gear to catch southern bluefin tuna (SBT). Since 1952, Japanese longline operation has started in the Indian Ocean, although SBT 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 SBT 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 SBT meat to the Japanese market. Recently the number of fishing vessels targeting SBT has gradually decreased 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 catch 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 to develop alternative methods possibly avoiding incidental catch of seabirds have 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 longline fishing vessels for SBT has been decreasing since the peak of about 300 in 1985. Fisheries Agency of Japan (FAJ) had reduced number of such vessels by 69 in 1981, 100 in 1982 and 132 in 1998. Vessel reduction policy in 1998 would have influenced further decline of number of vessels after then. The number of vessels has been less than 100 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). Thus, the Japanese vessels were mainly operating in these areas, namely Area 4, 7, 8 and 9, in the second and third quarters for SBT.

Distribution of Catch and Effort

General distribution of SBT catch and effort in 1998-2005 was almost same as the distribution of major fishing grounds mentioned above. Since 2006, however, annual operational patterns and schedule of Japanese vessels targeting SBT have been possibly affected by introduction of the individual quota (IQ) system, abolishing of the seasonal area closure, and drastic/temporal increase of fuel price.

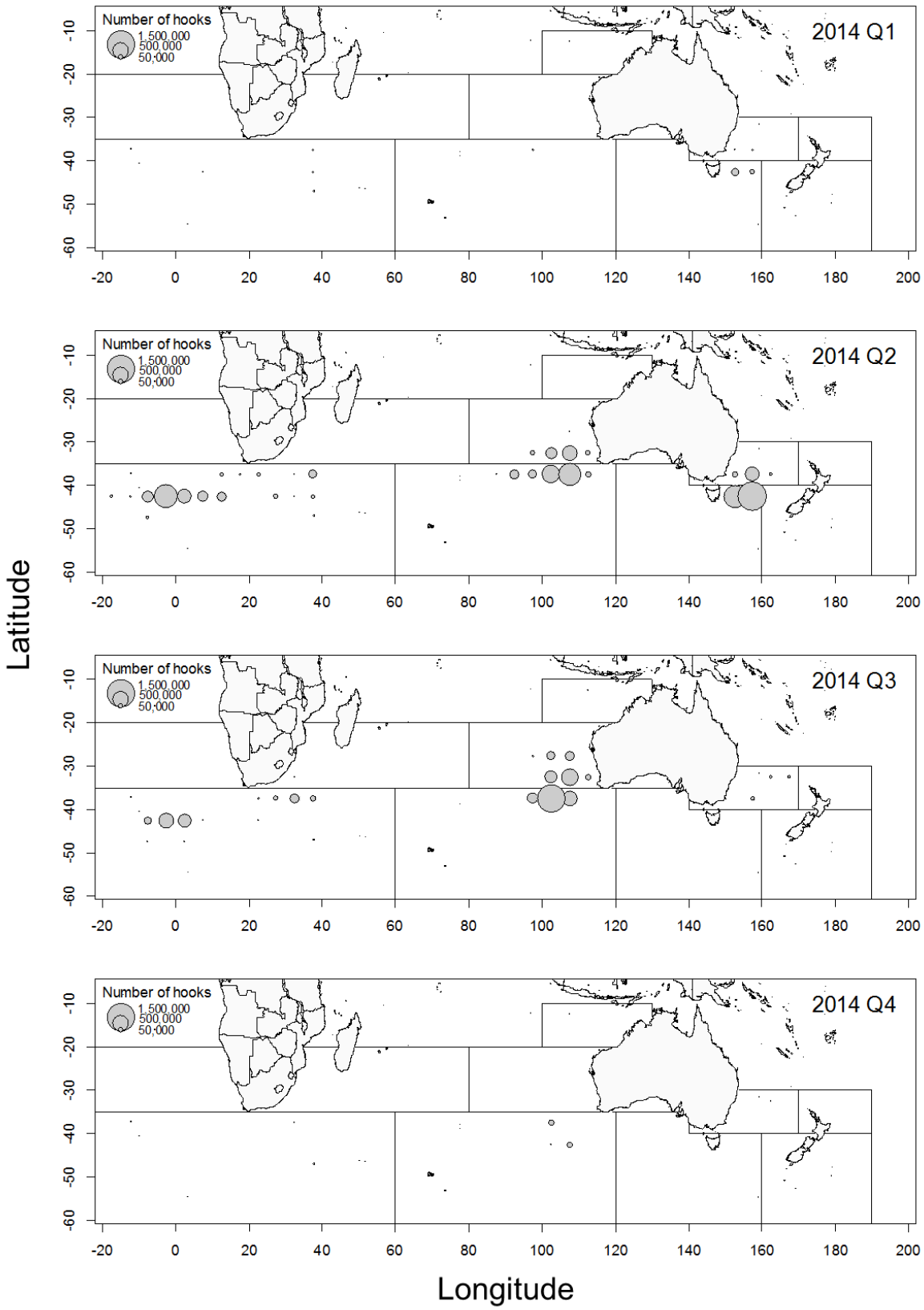

Fig.1. Number of Hooks by quarter and 5x5 degrees square in 2014.

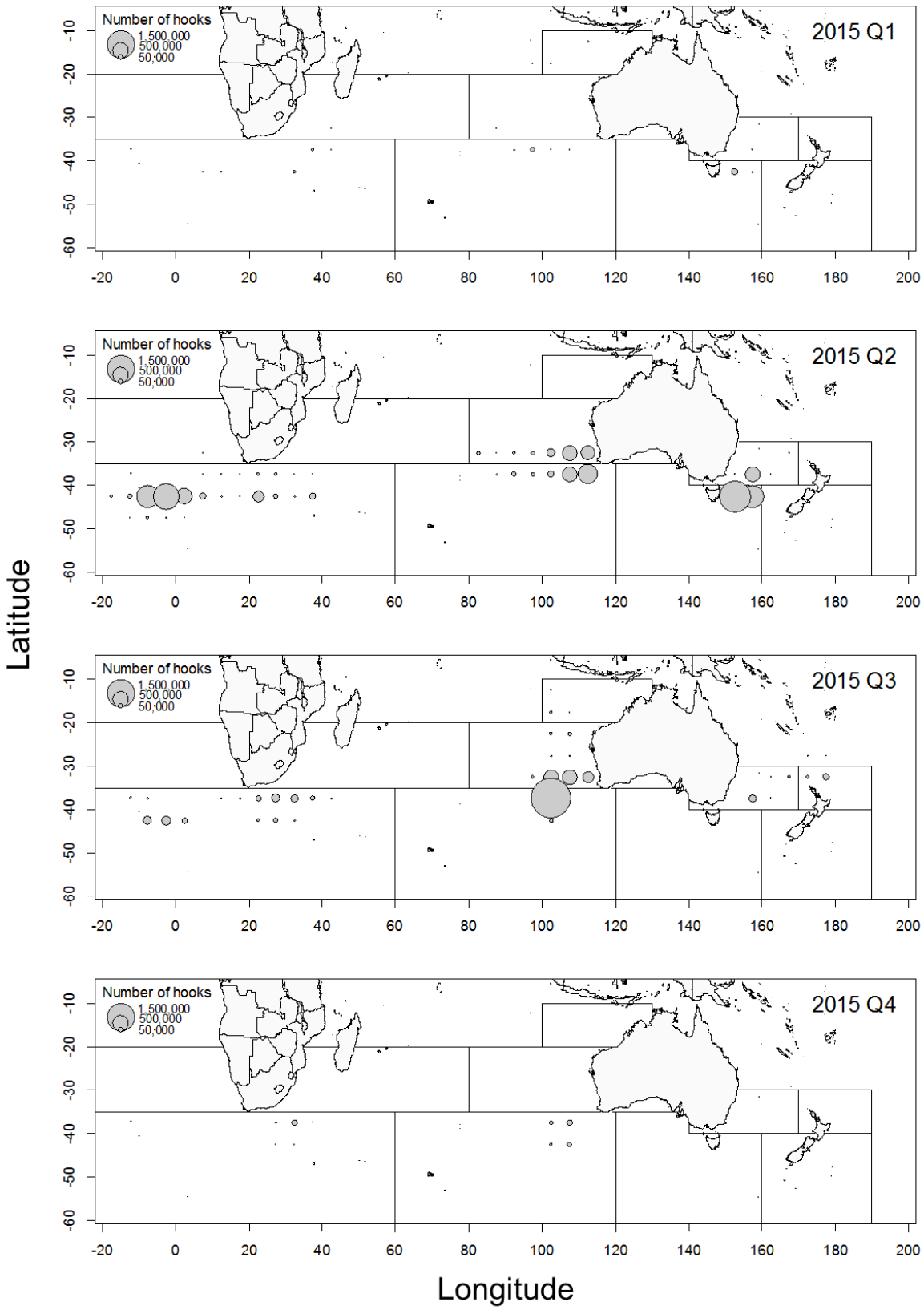

Fig.2. Number of Hooks by quarter and 5x5 degrees square in 2015.

3. Fisheries Monitoring for Each Fleet

Since 1991, FAJ has carried out Real Time Monitoring Program (RTMP) to monitor the catch of SBT. The number of vessels monitored by the program was 12-15 during 1991-1994, and all the vessels operating SBT 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 SBT fishery and collected information including fishing position, effort, catch of target and non-target species, biological information, incidental catch of seabirds, etc. In 2014 and 2015, Japan deployed scientific observers to 28 and 29 fishing vessels, respectively. Number of on-board observers in these two years was more than twice as many as in 2013. While the observers were onboard the vessels, the vessels used 2,917 thousand and 2,896 thousand hooks in 2014 and 2015, respectively. Coverage of observation was 23.1% and 23.3% for vessels and 18.2% and 18.3% for hooks in 2014 and 2015, respectively (Table 1).

Table 1. Number and coverage of cruises, sets and hooks observed in the Japanese RTMP observer program in 2014-2015.

Area	Calendar year	Number of all vessels	Number of vessels observed	Cover rate for the number of vessel	Number of hooks used by all vessels (x 1000)	Number of hooks used by observed vessels (x 1000)	Cover rate for the number of hook
Area 4	2014	25	7	28.0%	2,003	361	18.0%
	2015	23	7	30.4%	1,395	377	27.0%
Area 5	2014	11	2	18.2%	760	187	24.5%
	2015	5	1	20.0%	460	20	4.4%
Area 7	2014	26	6	23.1%	2,770	555	20.1%
	2015	24	6	25.0%	3,000	763	25.4%
Area 8	2014	29	3	10.3%	6,200	716	11.6%
	2015	27	4	14.8%	6,030	595	9.9%
Area 9	2014	36	10	27.8%	4,311	1,098	25.5%
	2015	38	11	28.9%	5,078	1,141	22.5%
Total	2014	91	21	23.1%	16,044	2,917	18.2%
	2015	90	21	23.3%	15,962	2,897	18.1%

4. Seabird

Annual number of incidental catch of seabirds in the Japanese SBT longline fishery in 2014 and 2015 were updated based on the data collected through the scientific observer programs (see Table 2 and Appendix). Annual total captures were 86 and 62 birds for large albatrosses, 6 and 35 birds for dark colored albatrosses, 463 and 609 birds for other albatrosses and, 53 and 69 birds for unidentified albatrosses, 60 and 118 birds for petrels, 35 and 14 for giant petrels, and 99 and 23 for other seabirds in 2014 and 2015, respectively (Table 2). Japan had reported estimated total number of bycatch to the past ERS meetings with following the data stratification procedure established by Takeuchi et al. (1989) (Minami et al. 2013; Minami et al. 2015). In this procedure, the CCSBT statistical areas were grouped into four strata in consideration of region and season. Each of strata, hence, had broad ranges of latitude and longitude. Using this procedure, Areas 6 to 8 were included in a stratum where bycatch rate for albatrosses were not homogenous as shown in Table 2. In

addition, total number of hooks in Area 8 where bycatch rates were much lower than those in Area 7 was larger than that in Area 7 (Tables 1 and 2). Comprehensive analysis using Japanese observer data showed that high bycatch rate occurs locally and frequency of bycatch occurrence changed seasonally, latitudinally and longitudinally (CCSBT-ERS/1703/Info 11, 12, 13). As described above, fishing strategies and distribution patterns of Japanese SBT longliners were changed since 2006 with drastic decrease of number of vessels engaging SBT longline fishery. Therefore, the conventional data stratification is deemed to be not suitable for calculation of bycatch number for at least last decade. The calculated total number of bycatch should be overestimated under the conventional data stratification. In addition, the CCSBT statistical areas themselves, including broad ranges of latitudes and longitudes were not stratified in accordance with bycatch distribution of seabirds. More suitable area stratification would better to be used for estimation of total bycatch number before we carry out evaluation of mitigation measures.

5. Other Non-target Fish

The captures and mortalities of sharks in CCSBT fisheries are summarized in Table 2 (page 9-33). Nineteen and thirteen species of elasmobranchs were reported by the scientific observers in 2014 and 2015, respectively. Blue shark was dominant among elasmobranch catch observed, followed by porbeagle, shortfin mako shark and pelagic stingray (CCSBT-ERS/1703/BGD 02).

Many teleosts were caught by longline fishery other than tunas and billfishes in the SBT fishing ground. There were 44 and 36 species of teleost fish including tuna and billfish found in the observer data in 2014 and 2015, respectively. 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/1703/BGD 02).

6. Marine Mammal and Marine Reptile

Number of captures and mortalities of marine reptile in CCSBT fisheries were 2 and 1 individuals in 2014 and 2015, respectively (Table 2). There were no captures of marine mammals in 2015, although one capture was recorded in 2014 (CCSBT-ERS/1703/BGD 02). Incidental catch 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

<u>Current Measures</u>

Mandatory measures

All tuna longline fishing vessels including those operating to catch SBT are obliged to comply with respective rules adopted by the WCPFC, IATTC, IOTC and ICCAT, when operating in the Convention areas of these RFMOs. In addition, the Government of Japan has prepared low every time when there is amendment of the mitigation measures of these RFMOs and instructed to obey these measures for tuna longliners to obey these regulations.

New conservation and management measures to mitigate seabird bycatch were adopted at ICCAT, IOTC and WCPFC, and entered into force in July 2013 (ICCAT), and July 2014 (IOTC and WCPFC) respectively. Japan has amended its domestic regulations in compliance with those new measures and implemented.

The measures that the Government of Japan to enforce and monitor the level of compliance for bycatch mitigation measures included a dispatch of enforcement vessels to the fishing areas, record of mitigation measures deployed through the logbook and collecting necessary information by scientific observers on board the operating vessels. The boarding observers and vessels carrying them are carefully selected so that avoiding the same vessels being selected in subsequent years. In addition to the mitigation measures adopted by each longline boat, Japanese observer program (JOP) has started to collect information of the general specifications of the mitigation measures adopted by each boat, such as the weight and position of swivels in the weighted branch line as well as the general configuration of tori lines, for the future detailed evaluation of the effect of mitigation

measures.

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 FAJ 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 use tori lines which was already mandatory at that time.

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 2013, at least 51% of observed fishing vessels were equipped with BCMs.

Measures under Development/Testing

1) Mitigation measures:

Performance of weighted and un-weighted branch lines 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 branch line 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 diving seabirds dominated system. The higher rate of tangling of weighted branch lines relative to un-weighted branch lines is the only remaining barrier to making branch line weighting practical.

Effectiveness of hybrid tori-lines with and without weighted branch lines to a control of no mitigation was compared in the North Pacific from December 2011 to June 2012. The results suggested that sole deployment of well-designed tori-lines dramatically reduce incidental catch of albatrosses by pelagic longline fisheries in the western North Pacific, and therefore are recommended as best-practice seabird mitigation for these fisheries.

Effectiveness of aerial extent of tori line (long aerial extent: 85m, middle: 70m and short: 50m) to reduce incidental catch of seabirds was examined using Japanese research vessel in the North Pacific from April to June 2013. The results showed that long and middle aerial extent of tori lines were more effective in preventing seabird attacks and incidental catch of seabirds than short aerial extent.

Effectiveness of tori-line and line weightings (lumo lead) by Japanese research vessel was examined in the North Pacific from April to May 2014. The result indicated that tori-line and lumolead are effective mitigation measures for tuna longline operations in the North Pacific.

The further research on tori-line and line weighting should be useful to reduce incidental catch of seabirds in the north Pacific.

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 similar to 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 2013 and 2014. 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.

8. Public Relations and Education Activities

Public Relation 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.

-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 these seminars, mitigation techniques and methods for releasing live birds were explained by using various kinds of educational materials. Furthermore, they distributed tori lines and circle hooks to longline fishers, without charge, to facilitate the use of tori lines and circle hooks, and to test their effectiveness in commercial fishery. They 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.

Education

Crew training, especially ship masters

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

Japan Tuna Fisheries Cooperative Association will be hold the workshop on seabird mitigation measures for captains and masters of Japanese SBT longline vessels will be held in collaboration with the Birdlife International in Cape Town in next April.

Observers

Before the cruises, scientific observer candidates are obligated to take a training seminar. JOP held the training seminars twice a year to train scientific observers in 2013. During the training seminars, the candidates brushed up their knowledge and skills on research method, recording

procedure and safety. Training included the practices of measuring the fish size and of collecting the biological samples. After the return from the commercial longline vessels, every observer reported their research activity. Their experiences and information have been used for the improvement of the observer program and next research activity. (CCSBT-ERS/1703/BGD 02).

9. Information on other ERS (non-bycatch) such as prey and predator species

The diet of juvenile (predominantly age 1) SBT 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 life stages of the main prey species in this area and on prey distribution and dynamics as a key factor linking environmental change and SBT distribution. In addition, foraging ecology of SBT were analyzed with stomach contents sampled the scientific observers (CCSBT-ERS/1703/23).

10. Others

No other information.

11. Implementation of the NPOA-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 2016 taking into account the latest management measures taken by several RFMOs. 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.

Table 2: Reporting form for estimation of total mortality of ERS in CCSBT fisheries

Country Japan Year (calendar year) 2014
Species (or group) Blue shark

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[1] (x1000)	Total Observed Effort[1] (x1000)	Observer Coverage[2]	Captures (*number*)	Capture Rate[3]	Mortalities (*number*)	Mortality Rate[3]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[4]	TP + WB[4]	TP + NS/ WB[4, 5]	NS + WB[4]	TP + WB + NS[4]	NIL[4]	Others[4,6]
4	2,003	361	18.0%	772	2.139	58	0.161	179		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	376	2.011	1	0.005	310		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	1,876	3.380	399	0.719	1,199		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	1,530	2.137	225	0.314	831		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	1,836	1.672	87	0.079	561		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	6,390	2.191	770	0.264	3,080		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[1] For longline provide number of hooks, for purse seine provide number of sets.
[2] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[3] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[4] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[5] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[6] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Shortfin mako shark

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[7] (x1000)	Total Observed Effort[7] (x1000)	Observer Coverage[8]	Captures (*number*)	Capture Rate[9]	Mortalities (*number*)	Mortality Rate[9]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[10]	TP + WB[10]	TP + NS/ WB[10],[11]	NS + WB[10]	TP + WB + NS[10]	NIL[10]	Others[10,12]
4	2,003	361	18.0%	169	0.468	60	0.166	18		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	40	0.214	10	0.053	1		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	45	0.081	12	0.022	24		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	52	0.073	17	0.024	4		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	97	0.088	22	0.020	27		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	403	0.138	121	0.041	74		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[7] For longline provide number of hooks, for purse seine provide number of sets.
[8] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[9] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[10] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[11] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[12] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Porbeagle

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[13] (x1000)	Total Observed Effort[13] (x1000)	Observer Coverage[14]	Captures (*number*)	Capture Rate[15]	Mortalities (*number*)	Mortality Rate[15]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[16]	TP + WB[16]	TP + NS/ WB[16],[17]	NS + WB[16]	TP + WB + NS[16]	NIL[16]	Others[16,18]
4	2,003	361	18.0%	22	0.061	2	0.006	20		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	1	0.005	1	0.005			0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	192	0.346	57	0.103	103		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	261	0.365	119	0.166	131		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	206	0.188	78	0.071	82		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	682	0.234	257	0.088	336		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[13] For longline provide number of hooks, for purse seine provide number of sets.
[14] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[15] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[16] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[17] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[18] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Other Sharks

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[19] (x1000)	Total Observed Effort[19] (x1000)	Observer Coverage[20]	Captures (*number*)	Capture Rate[21]	Mortalities (*number*)	Mortality Rate[21]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[22]	TP + WB[22]	TP + NS/ WB[22,23]	NS + WB[22]	TP + WB + NS[22]	NIL[22]	Others[22,24]
4	2,003	361	18.0%	63	0.175	25	0.069	11		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	35	0.187	15	0.080	3		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	26	0.047	8	0.014	13		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	78	0.109	33	0.046	44		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	99	0.090	15	0.014	65		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	301	0.103	96	0.033	136		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[19] For longline provide number of hooks, for purse seine provide number of sets.
[20] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[21] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[22] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[23] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[24] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Large albatrosses

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[25] (x1000)	Total Observed Effort[25] (x1000)	Observer Coverage[26]	Captures (*number*)	Capture Rate[27]	Mortalities (*number*)	Mortality Rate[27]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[28]	TP + WB[28]	TP + NS/ WB[28],[29]	NS + WB[28]	TP + WB + NS[28]	NIL[28]	Others[28,30]
4	2,003	361	18.0%	29	0.080	25	0.069	3		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	9	0.048	9	0.048	0		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	32	0.058	32	0.058	0		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	3	0.004	3	0.004	0		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	13	0.012	10	0.009	2		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	86	0.029	79	0.027	5		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[25] For longline provide number of hooks, for purse seine provide number of sets.
[26] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[27] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[28] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[29] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[30] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Dark colored albatrosses

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[31] (x1000)	Total Observed Effort[31] (x1000)	Observer Coverage[32]	Captures (*number*)	Capture Rate[33]	Mortalities (*number*)	Mortality Rate[33]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[34]	TP + WB[34]	TP + NS/ WB[34,35]	NS + WB[34]	TP + WB + NS[34]	NIL[34]	Others[34,36]
4	2,003	361	18.0%	0	0.000	0	0.000	0		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	0	0.000	0	0.000	0		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	0	0.000	0	0.000	0		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	2	0.003	1	0.001	0		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	4	0.004	4	0.004	0		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	6	0.002	5	0.002	0		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[31] For longline provide number of hooks, for purse seine provide number of sets.
[32] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[33] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[34] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[35] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[36] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Other albatrosses

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[37] (x1000)	Total Observed Effort[37] (x1000)	Observer Coverage[38]	Captures (*number*)	Capture Rate[39]	Mortalities (*number*)	Mortality Rate[39]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[40]	TP + WB[40]	TP + NS/ WB[40,41]	NS + WB[40]	TP + WB + NS[40]	NIL[40]	Others[40,42]
4	2,003	361	18.0%	29	0.080	26	0.072	2		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	12	0.064	12	0.064	0		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	232	0.418	214	0.386	4		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	45	0.063	42	0.059	0		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	145	0.132	145	0.132	0		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	463	0.159	439	0.150	6		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[37] For longline provide number of hooks, for purse seine provide number of sets.
[38] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[39] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[40] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[41] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[42] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Unidentified albatrosses

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[43] (x1000)	Total Observed Effort[43] (x1000)	Observer Coverage[44]	Captures (*number*)	Capture Rate[45]	Mortalities (*number*)	Mortality Rate[45]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[46]	TP + WB[46]	TP + NS/ WB[46],[47]	NS + WB[46]	TP + WB + NS[46]	NIL[46]	Others[46,48]
4	2,003	361	18.0%	0	0.000	0	0.000	0		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	0	0.000	0	0.000	0		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	3	0.005	3	0.005	0		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	1	0.001	1	0.001	0		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	49	0.045	49	0.045	0		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	53	0.018	53	0.018	0		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[43] For longline provide number of hooks, for purse seine provide number of sets.
[44] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[45] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[46] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[47] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[48] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Petrels

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[49] (x1000)	Total Observed Effort[49] (x1000)	Observer Coverage[50]	Captures (*number*)	Capture Rate[51]	Mortalities (*number*)	Mortality Rate[51]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[52]	TP + WB[52]	TP + NS/ WB[52,53]	NS + WB[52]	TP + WB + NS[52]	NIL[52]	Others[52,54]
4	2,003	361	18.0%	10	0.028	10	0.028	0		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	1	0.005	1	0.005	0		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	25	0.045	24	0.043	1		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	8	0.011	8	0.011	0		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	16	0.015	16	0.015	0		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	60	0.021	59	0.020	1		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[49] For longline provide number of hooks, for purse seine provide number of sets.
[50] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[51] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[52] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[53] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[54] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Giant petrels

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[55] (x1000)	Total Observed Effort[55] (x1000)	Observer Coverage[56]	Captures (*number*)	Capture Rate[57]	Mortalities (*number*)	Mortality Rate[57]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[58]	TP + WB[58]	TP + NS/ WB[58],[59]	NS + WB[58]	TP + WB + NS[58]	NIL[58]	Others[58,60]
4	2,003	361	18.0%	0	0.000	0	0.000	0		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	0	0.000	0	0.000	0		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	1	0.002	1	0.002	0		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	4	0.006	3	0.004	0		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	30	0.027	28	0.026	0		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	35	0.012	32	0.011	0		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[55] For longline provide number of hooks, for purse seine provide number of sets.
[56] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[57] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[58] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[59] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[60] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Other seabirds

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[61] (x1000)	Total Observed Effort[61] (x1000)	Observer Coverage[62]	Captures (*number*)	Capture Rate[63]	Mortalities (*number*)	Mortality Rate[63]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[64]	TP + WB[64]	TP + NS/ WB[64,65]	NS + WB[64]	TP + WB + NS[64]	NIL[64]	Others[64,66]
4	2,003	361	18.0%	7	0.019	7	0.019	0		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	0	0.000	0	0.000	0		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	23	0.041	21	0.038	1		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	0	0.000	0	0.000	0		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	69	0.063	54	0.049	13		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	99	0.034	82	0.028	14		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[61] For longline provide number of hooks, for purse seine provide number of sets.
[62] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[63] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[64] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[65] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[66] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2014
Species (or group) Sea turtles

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[67] (x1000)	Total Observed Effort[67] (x1000)	Observer Coverage[68]	Captures (*number*)	Capture Rate[69]	Mortalities (*number*)	Mortality Rate[69]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[70]	TP + WB[70]	TP + NS/ WB[70,71]	NS + WB[70]	TP + WB + NS[70]	NIL[70]	Others[70,72]
4	2,003	361	18.0%	0	0.000	0	0.000	0		6.5%	0.0%		0.0%	0.0%	0.0%	93.5%
5	760	187	24.5%	0	0.000	0	0.000	0		0.0%	82.6%		0.0%	0.0%	0.0%	17.4%
6	0	0														
7	2,770	555	20.1%	0	0.000	0	0.000	0		17.3%	0.0%		0.0%	0.0%	0.0%	82.7%
8	6,200	716	11.6%	0	0.000	0	0.000	0		64.7%	34.7%		0.0%	0.0%	0.0%	0.6%
9	4,311	1,098	25.5%	2	0.002	0	0.000	2		3.8%	49.2%		0.0%	34.7%	0.0%	12.3%
TOTAL	16,044	2,917	18.2%	2	0.001	0	0.000	2		16.8%	32.3%		0.0%	13.7%	0.0%	37.2%

[67] For longline provide number of hooks, for purse seine provide number of sets.
[68] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[69] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[70] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[71] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[72] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Blue shark

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[73] (x1000)	Total Observed Effort[73] (x1000)	Observer Coverage[74]	Captures (*number*)	Capture Rate[75]	Mortalities (*number*)	Mortality Rate[75]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[76]	TP + WB[76]	TP + NS/ WB[76],[77]	NS + WB[76]	TP + WB + NS[76]	NIL[76]	Others[76,78]
4	1,395	377	27.0%	1,192	3.162	234	0.621	838		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	34	1.700		0.000	34		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	1,369	1.794	163	0.214	977		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	2,319	3.897	319	0.536	1,586		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	2,222	1.947	188	0.165	535		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	7,136	2.464	904	0.312	3,970		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[73] For longline provide number of hooks, for purse seine provide number of sets.
[74] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[75] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[76] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[77] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[78] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Shortfin mako shark

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[79] (x1000)	Total Observed Effort[79] (x1000)	Observer Coverage[80]	Captures (*number*)	Capture Rate[81]	Mortalities (*number*)	Mortality Rate[81]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[82]	TP + WB[82]	TP + NS/ WB[82,83]	NS + WB[82]	TP + WB + NS[82]	NIL[82]	Others[82,84]
4	1,395	377	27.0%	85	0.225	11	0.029	38		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	18	0.900	4	0.200	14		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	70	0.092	11	0.014	24		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	15	0.025	2	0.003	1		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	76	0.067	18	0.016	14		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	264	0.091	46	0.016	91		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[79] For longline provide number of hooks, for purse seine provide number of sets.
[80] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[81] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[82] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[83] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[84] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Porbeagle

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[85] (x1000)	Total Observed Effort[85] (x1000)	Observer Coverage[86]	Captures (*number*)	Capture Rate[87]	Mortalities (*number*)	Mortality Rate[87]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[88]	TP + WB[88]	TP + NS/ WB[88],[89]	NS + WB[88]	TP + WB + NS[88]	NIL[88]	Others[88,90]
4	1,395	377	27.0%	80	0.212	25	0.066	53		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	2	0.100	0	0.000	2		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	634	0.831	90	0.118	456		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	354	0.595	107	0.180	246		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	266	0.233	76	0.067	112		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	1,336	0.461	298	0.103	869		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[85] For longline provide number of hooks, for purse seine provide number of sets.
[86] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[87] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[88] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[89] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[90] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Other sharks

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[91] (x1000)	Total Observed Effort[91] (x1000)	Observer Coverage[92]	Captures (*number*)	Capture Rate[93]	Mortalities (*number*)	Mortality Rate[93]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[94]	TP + WB[94]	TP + NS/ WB[94,95]	NS + WB[94]	TP + WB + NS[94]	NIL[94]	Others[94,96]
4	1,395	377	27.0%	70	0.186	12	0.032	30		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	0	0.000	0	0.000	0		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	30	0.039	4	0.005	19		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	22	0.037	1	0.002	20		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	195	0.171	3	0.003	171		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	317	0.109	20	0.007	240		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[91] For longline provide number of hooks, for purse seine provide number of sets.
[92] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[93] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[94] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[95] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[96] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Large albatrosses

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[97] (x1000)	Total Observed Effort[97] (x1000)	Observer Coverage[98]	Captures (*number*)	Capture Rate[99]	Mortalities (*number*)	Mortality Rate[99]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[100]	TP + WB[100]	TP + NS/ WB[100,101]	NS + WB[100]	TP + WB + NS[100]	NIL[100]	Others[100, 102]
4	1,395	377	27.0%	17	0.045	16	0.042	1		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	2	0.100	2	0.100	0		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	14	0.018	13	0.017	1		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	0	0.000	0	0.000	0		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	29	0.025	23	0.020	6		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	62	0.021	54	0.019	8		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[97] For longline provide number of hooks, for purse seine provide number of sets.
[98] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[99] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[100] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[101] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[102] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Dark colored albatrosses

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[103] (x1000)	Total Observed Effort[103] (x1000)	Observer Coverage[104]	Captures (*number*)	Capture Rate[105]	Mortalities (*number*)	Mortality Rate[105]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[106]	TP + WB [106]	TP + NS/ WB [106,107]	NS + WB [106]	TP + WB + NS[106]	NIL [106]	Others[106, 108]
4	1,395	377	27.0%	1	0.003	1	0.003	0		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	0	0.000	0	0.000	0		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	6	0.008	6	0.008	0		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	0	0.000	0	0.000	0		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	28	0.025	28	0.025	0		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	35	0.012	35	0.012	0		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[103] For longline provide number of hooks, for purse seine provide number of sets.
[104] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[105] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[106] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[107] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[108] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Other albatrosses

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[109] (x1000)	Total Observed Effort[109] (x1000)	Observer Coverage[110]	Captures (*number*)	Capture Rate[111]	Mortalities (*number*)	Mortality Rate[111]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[112]	TP + WB [112]	TP + NS/ WB [112,113]	NS + WB [112]	TP + WB + NS[112]	NIL [112]	Others[112, 114]
4	1,395	377	27.0%	65	0.172	62	0.164	3		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	0	0.000	0	0.000	0		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	297	0.389	287	0.376	10		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	42	0.071	42	0.071	0		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	205	0.180	205	0.180	0		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	609	0.210	596	0.206	13		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[109] For longline provide number of hooks, for purse seine provide number of sets.
[110] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[111] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[112] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[113] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[114] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Unidentified albatrosses

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[115] (x1000)	Total Observed Effort[115] (x1000)	Observer Coverage[116]	Captures (*number*)	Capture Rate[117]	Mortalities (*number*)	Mortality Rate[117]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[118]	TP + WB[118]	TP + NS/ WB[118,119]	NS + WB[118]	TP + WB + NS[118]	NIL[118]	Others[118, 120]
4	1,395	377	27.0%	4	0.011	3	0.008	0		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	0	0.000	0	0.000	0		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	11	0.014	8	0.010	1		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	32	0.054	32	0.054	0		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	22	0.019	21	0.018	1		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	69	0.024	64	0.022	2		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[115] For longline provide number of hooks, for purse seine provide number of sets.
[116] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[117] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[118] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[119] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[120] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Petrels

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[121] (x1000)	Total Observed Effort[121] (x1000)	Observer Coverage[122]	Captures (*number*)	Capture Rate[123]	Mortalities (*number*)	Mortality Rate[123]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[124]	TP + WB [124]	TP + NS/ WB [124,125]	NS + WB [124]	TP + WB + NS[124]	NIL [124]	Others[124, 126]
4	1,395	377	27.0%	2	0.006	2	0.006	0		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	1	0.005	1	0.005	0		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	76	0.137	75	0.135	1		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	10	0.014	9	0.013	1		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	29	0.026	29	0.026	0		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	118	0.040	116	0.040	2		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[121] For longline provide number of hooks, for purse seine provide number of sets.
[122] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[123] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[124] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[125] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[126] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Giant Petrels

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[127] (x1000)	Total Observed Effort[127] (x1000)	Observer Coverage[128]	Captures (*number*)	Capture Rate[129]	Mortalities (*number*)	Mortality Rate[129]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[130]	TP + WB [130]	TP + NS/ WB [130,131]	NS + WB [130]	TP + WB + NS[130]	NIL [130]	Others[130, 132]
4	1,395	377	27.0%	1	0.003	1	0.003	0		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	0	0.000	0	0.000	0		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	0	0.000	0	0.000	0		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	2	0.003	2	0.003	0		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	11	0.010	9	0.008	2		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	14	0.005	12	0.004	2		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[127] For longline provide number of hooks, for purse seine provide number of sets.
[128] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[129] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[130] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[131] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[132] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Other seabirds

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[133] (x1000)	Total Observed Effort[133] (x1000)	Observer Coverage[134]	Captures (*number*)	Capture Rate[135]	Mortalities (*number*)	Mortality Rate[135]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[136]	TP + WB [136]	TP + NS/ WB [136,137]	NS + WB [136]	TP + WB + NS[136]	NIL [136]	Others[136, 138]
4	1,395	377	27.0%	0	0.000	0	0.000	0		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	0	0.000	0	0.000	0		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	9	0.016	7	0.013	0		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	2	0.003	2	0.003	0		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	12	0.011	10	0.009	2		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	23	0.008	19	0.007	2		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[133] For longline provide number of hooks, for purse seine provide number of sets.
[134] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[135] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[136] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[137] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[138] Others correspond to single measure.

Table 2: Continued

Country Japan Year (calendar year) 2015
Species (or group) Sea turtles

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures						
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[139] (x1000)	Total Observed Effort[139] (x1000)	Observer Coverage[140]	Captures (*number*)	Capture Rate[141]	Mortalities (*number*)	Mortality Rate[141]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[142]	TP + WB [142]	TP + NS/ WB [142,143]	NS + WB [142]	TP + WB + NS[142]	NIL [142]	Others[142, 144]
4	1,395	377	27.0%	1	0.003	0	0.000	1		1.7%	68.9%	29.4%	0.0%	0.0%	0.0%	
5	460	20	4.3%	0	0.000	0	0.000	0		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
6																
7	3,000	763	25.4%	0	0.000	0	0.000	0		0.3%	31.5%	68.2%	0.0%	0.0%	0.0%	
8	6,030	595	9.9%	0	0.000	0	0.000	0		40.0%	3.7%	55.9%	0.0%	0.4%	0.0%	
9	5,078	1,141	22.5%	0	0.000	0	0.000	0		1.4%	30.6%	63.5%	0.0%	4.5%	0.0%	
TOTAL	15,962	2,897	18.1%	1	0.000	0	0.000	1		7.7%	31.7%	58.7%	0.0%	1.9%	0.0%	

[139] For longline provide number of hooks, for purse seine provide number of sets.
[140] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[141] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[142] TP = tori poles, NS = night setting, WB = weighted branch line, NIL = no mitigation measures used.
[143] Combination use of tori pole and night setting was switched to that of tori pole and branch lines after dawn. Under data recording system for onboard observer in 2015, the switching of application of mitigation measure during setting was not able to be recorded.
[144] Others correspond to single measure.

Appendix

Table A1. Annual number of incidental catch by seabird species for 2014 and 2015.

Group	Species	2014	2015
Large albatrosses	Antipodean albatross	1	1
	Gibson's albatross	6	4
	Royal albatross group	2	2
	Southern royal albatross	5	1
	Tristan albatross	0	3
	Wandering albatross	15	32
	Wandering albatross group	45	16
	Unidentified large albatrosses	12	3
Dark colored albatrosses	Light-mantled albatross	2	17
	Sooty albatross	3	17
	Unidentified dark colored albatrosses	1	1
Other albatrosses	Black-browed albatross	14	25
	Black-browed albatross group	37	32
	Buller's albatross group	139	129
	Campbell albatross	21	35
	Grey-headed albatross	104	172
	Indian yellow-nosed albatross	24	19
	Shy-type albatrosses	83	166
	Southern Buller's albatross	2	0
	Unidentified other albatrosses	39	31
Unidentified albatrosses		53	69
Petrels	Flesh-footed shearwater	15	5
	Great shearwater	0	7
	Grey petrel	17	15
	Parkinson's petrel	1	0
	Sooty shearwater	1	1
	Westland petrel	0	3
	White-chinned petrel	21	71
	Unidentified petrels	5	16
Giant petrels	Northern giant petrel	13	9
	Southern giant petrel	21	5
	Unidentified giant petrels	1	0
Other seabirds		99	23