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Report of Japanese scientific observer activities for southern bluefin tuna fishery in 2020

日本のミナミマグロ漁業での科学オブザーバの 2020 年の活動報告

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要約

本文書ではミナミマグロを対象とした日本延縄船に対する科学オブザーバ計画について、2020 年調査の結果を報告する。主要な CCSBT 統計海区（4-9 海区）において 5 隻に科学オブザーバを配乗した。調査カバー率は隻数で 6.4%、使用釣鈎数で 10.4%、ミナミマグロ漁獲尾数で 6.4%であり、オブザーバが実際に観察した時間を考慮すると使用鈎数で 7.4%であった。カバー率が低かった主な原因は、COVID-19 の世界的感染拡大に伴って、予定していたオブの配乗ができなかったためである。オブザーバが記録したミナミマグロの体長と、RTMP で漁業者から報告された漁獲体長とは概ね一致した。オブザーバはミナミマグロ 2 個体分の CCSBT 通常標識を回収した。

Summary

This document summarizes activities of Japanese scientific observer program for southern bluefin tuna (SBT) in 2020. Scientific observers were dispatched in 5 vessels that operated in the main CCSBT statistical areas (area 4－9). Observer coverages were 6.4% in the number of vessels, 10.4% in the number of hooks used, and 6.4% in the number of SBT caught. When taking into account of the actual observation time during hauling, the coverage in the number of hooks observed were estimated as 7.4%. The main reason for the low coverage rate was that the planned distribution of observer was not possible due to the worldwide spread of COVID-19 infection. The length frequency distributions of SBT reported by the observers and those reported from all vessels in RTMP were generally consistent to each other. Observers retrieved CCSBT conventional tags from two SBT individuals.

1. 科学オブザーバ活動の概要　Overview of the scientific observer program

みなみまぐろ漁場における日本の科学オブザーバ調査は、1992 年からほぼ同一の調査方法で実施してきた。オブザーバは Table 1 に示すように、ミナミマグロおよび生態関連種の生物調査や、気象・漁具・海鳥混獲回避手段の利用状況等に関する情報を収集する。調査項目には優先順位が付けられており、時間が限られているときには重要な項目だけを調査する。調査項目の優先順位は年により異なる場合がある。オブザーバは、各大洋でミナミマグロを主要な漁獲対象として操業する遠洋延縄漁船からランダムに選定された漁船に派遣される。2006 年以降のミナミマグロ漁業は、漁期規制の撤廃、燃費の高騰、および IQ 制の導入により、各船の操業計画が流動的となっている（CCSBT-ESC/1208/34）。ミナミマグロ漁獲枠を持つ船に一定期間オブザーバを派遣しても、その船の年間を通した操業戦略上の都合により、オブザーバの乗船中にミナミマグロ漁場での操業を行わない場合がある。

オブザーバの派遣人数は、当初は 10～18 名/年であったが、予算上の制約により 2007 年以降のオブザーバ派遣人数は 7 名/年程度に留まってきた。これを改善するため、2010 年以降はインドネシア人調査員を加えてオブザーバを増員した。

Japanese scientific observer program of longline fishery for SBT has been performed systematically in a consistent method since 1992. In this program, scientific observers collect biological data and samples from SBT and ecologically related species during the hauling operations. They also collect information about the fishing operations (e.g., fishing configuration, weather and sea conditions, mitigation measures used to reduce incidental take of seabirds). Table 1 summarizes the research items of the observers. When they are busy and have little time to complete all the research items (because of the severe sea, weather, and/or fishing conditions), observers reduce their research activities in accordance with the established priorities. This priority levels differ depending on the fishing year. Scientific observers were sent to the vessels which were chosen at random from all of authorized Japanese commercial longline vessels targeting SBT in each ocean. Since 2006, 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 (CCSBT-ESC/1208/34). Thus, there are difficulties to deploy the observers for a specific period toward the SBT fishing trips in a timely manner; some vessels with SBT quota do not operate in SBT fishing grounds during the period that observers are on-board because of their fishing strategy.

Japan had regularly deployed 10-18 observers per year in the early period of the program, although the program was forced to reduce the number of observers by budgetary restrictions. In 2007-2009, only seven observers were deployed to the vessel operated in the SBT fishing grounds per year. Since 2010, the number of observers has increased with the employment of Indonesian researchers.

2. 科学オブザーバの訓練　Observer Training

オブザーバは派遣される前に講習会にて訓練を受ける。2020 年にはミナミマグロを含む遠洋延縄操業用の講習会を 1 回開催し、オブザーバ候補者に対し、調査方法、記録方法、および安全確保について

講習を行った。講習では実物の魚を用いて調査方法や生物サンプルの採取方法の実習も行なった。オブザーバは、調査航海終了後に、乗船中の調査活動について報告をした。

Before cruises, scientific observer candidates have to take a training seminar. The training seminars for high sea seas tuna longliners including targeting SBT were held one time in 2020. In the training seminars, the candidates brushed up their knowledge and skills on research methods, recording procedures and safety. It also included practical training using the actual tuna to measure the fish size and to collect the biological samples. After returning from the cruises, observers reported their research activities in the debriefing.

3. 科学オブザーバのデザインとカバー率　Design and coverage

2020 年に主要な CCSBT 統計海区（海区 4-9）で操業を行う漁船 21 隻にオブザーバを配乗する計画であった。しかし世界的な COVID-19 の感染拡大によって、オブザーバの飛行機での移動、ならびに感染防止のために漁船への乗船が困難であった。結果として 5 名の配乗にとどまった。5 名全員は過去にミナミマグロまたはマグロ類を対象とした延縄操業船での科学オブザーバ活動の実績を有していた。対象調査船における乗船日数は合計 633 日であった。旅程を含めた雇用期間は 967 日であった。

海域ごと、月ごとの隻数・努力量（釣鈎数）・SBT の漁獲尾数について、全体に占めるカバー率を計算した。比較には、CCSBT へ提出したデータ（隻数、努力量、および漁獲尾数）を用いた。2020 年の 4 海区から 9 海区でのカバー率は、隻数で 6.4%、使用釣鈎数で 10.4%、ミナミマグロ漁獲尾数で 6.4%であった(Table 2)。

オブザーバは、食事の休憩や天候等の要因により操業を観察しない場合がある。2020 年にオブザーバが実際に観察した鈎数の割合は総使用鈎数の 70.9%であった。したがって、オブザーバが実際に観察した延縄努力量に基づくカバー率は、10.4%×70.9%=7.4%と計算された。

In 2020, it was planned to assign observers to 21 longline vessels which would operate in the major CCSBT statistical areas (Area 4-9). However, due to the worldwide spread of COVID-19 infection, it was difficult for observers to fly and board fishing vessels to prevent their potential infection. As a result, scientific observers were dispatched in only 5 vessels. All of five observers had experiences of scientific observer activities for SBT or other tunas. The total number of days on-boarded was 633. The total number of days employment including travel duration was 967.

We calculated observer coverage between January and December in areas 4-9 (calendar year). The data reported from the fishermen (the denominator for coverage calculation) were based on the RTMP and/or the logbook which were submitted in the CCSBT data exchange. Observer coverages were 6.4% in the number of vessels, 10.4% in the number of hooks used, and 6.4% in the number of SBT caught (Table 2).

Scientific observers did not observe whole of the hauling operations because of rest for meal, rough weather condition, and other reasons. The observers actually monitored 70.9% of all hauling time in 2020. Thus, the coverage of effort which was actually observed by the observers was calculated as 7.4% (10.4% x 0.709).

4. 収集データ Observer data collected

4～9 海区において、オブザーバが記録した硬骨魚類、サメ類、海鳥類、その他のリストを Table3～5 に示す。オブザーバによる生物の種査定の一部については、後日、オブザーバが撮影した写真に基づいて水産資源研究所の専門家が確認している。オブザーバが体長を測定した種別個体数を海域･月別に Table 6 に示す。合計 21,031 個体の魚類の体長を測定し、このうちミナミマグロは 6,390 個体であった。オブザーバは乗船中に、性別を判定した（Table 7）。耳石と筋肉については分析予算の削減、研究グループの規模縮小、過去 20 年以上の分析データが多く蓄積されていることを考慮して採集しなかった。

観察されたミナミマグロの体長組成を海域ごとに Fig.1 に示す。RTMP による日本延縄船全船によるミナミマグロ全漁獲個体数の体長組成と比較した。オブザーバが観察した体長分布と、全操業船から報告された体長分布とは類似していた。ただし 4 海区ではオブザーバデータは得られなかった。7 海区ではオブザーバデータでは 105 ㎝ FL 未満の小型魚が少なく、これはおそらく船の IQ の効率的使用を目的とした小型魚の放流と関係しているものであろう。

Table 3-5 summarize the number of animals observed, by teleosts, sharks, and seabird and others. Some of them were identified its more detailed taxonomic classification later in the laboratory by specialists in the Fisheries Resources Institute based on photographs which scientific observers took on-board. Table 6 summarizes the number of individuals of which body length were measured by the observers by area and month. A total of 21,031 fish were length measured, including 6,390 SBT. Observers identified sex for some species (Table 7). Otoliths and muscle tissue were not collected due to a reduction of budget for analysis, a reduction of the research group, and taking account that a large number of data have already accumulated from the past 20 years.

Fig. 1 shows length frequency of SBT from observers comparing to those from RTMP by area. The length frequency distributions of the observer data and RTMP data were generally similar to each other. No data were obtained from Area 4. Lack of small fish less than 105 cmFL in observer data in Area 7 is probably due to release of small fish by the vessel for the efficient use of their IQ.

5. 標識魚の再捕　Tag return monitoring

調査を通じて回収した CCSBT 通常標識（通常標識）は、2 個体分（4 本）であった。またオーストラリアの New South Wales の Department of Primary Industries, Fisheries & Aquaculture Management が放流したミナミマグロについて 1 個体の標識を回収した。

Scientific observers collected 4 conventional tags of CCSBT from 3 recaptured SBT. In addition, a tag from a SBT was collected for the tag released from Department of Primary Industries, Fisheries & Aquaculture Management in New South Wales, Australia.

6. 科学オブザーバ事業の問題点　Problem experienced

日本の延縄漁船はコスト削減のために洋上補給し、ほとんど寄港しないため、一部のオブザーバは対象調査船への配乗時に補給船を利用した洋上転船を行った。しかし、洋上転船には天候次第で大きな危険を伴う等の問題点が指摘されている。また 2020 年には世界的な COVID-19 の感染拡大があった。これによって航空機による外国への移動ができなかった。また船員への感染防止を目的として、オブザーバの乗船が制約された。

Japanese commercial longline vessels rarely come into ports because of cost-cutting; thus, some observers were forced to transfer from supply vessels to fishing vessels on high seas. Transfer on high seas is risky, and magnitude of risk is depending on the weather conditions. In 2020, there was a worldwide spread of COVID-19 infection. This made it impossible to travel abroad by air. In addition, the boarding of observers was restricted in order to prevent infection of vessel crew.

Reference

Itoh, T.　2012　Change in operation pattern of Japanese SBT longliners in 2011 resulting from the introduction of the individual quota system in 2006.　CCSBT-ESC/1208/34

Table 1. Research items of observers in Japanese SBT longline observer program.

Item	Records
Data collection during line setting	- Location (start and end points of line setting) - Time (start and end times of line setting) - Weather and sea condition - Gear configuration - Bait types used - Use of mitigation measures to reduce incidental take of seabirds - Number of seabirds around the vessel
Data and sample collection during line hauling	- Location (start and end points of line hauling) - Time
(for animals caught by longline)	- Body length - Body weight - Life status - Sex - Photographing (especially for seabirds)
(as biological sampling)	- Otolith (for the age estimation of SBT) - Vertebrae (for the age estimation of tagged sharks) - Muscle tissue (for the genetic and isotope research of SBT, other fishes, and the bycatch species including seabirds)
(as tag recapture)	- Tag recovery for SBT, sharks, and others.

Table 2. Observer coverage in Japanese SBT longline observer program in 2020.

Area	Month	Number of vessels			Number of hooks used (x1000)			Number of SBT retained		
		Observed	All vessels	Cover rate	Observed	All vessels	Cover rate	Observed	All vessels	Cover rate
Area 4	3	0	1	0.0%	0	41	0.0%	0	0	0.0%
	4	0	2	0.0%	0	25	0.0%	0	0	0.0%
	5	0	9	0.0%	0	156	0.0%	0	2,172	0.0%
	6	0	13	0.0%	0	275	0.0%	0	1,486	0.0%
	7	0	2	0.0%	0	70	0.0%	0	755	0.0%
Area 5	6	0	6	0.0%	0	98	0.0%	0	0	0.0%
	7	1	7	14.3%	94	291	32.2%	0	0	0.0%
	8	0	2	0.0%	0	16	0.0%	0	0	0.0%
Area 6	5	1	4	25.0%	7	92	8.0%	92	1,139	8.1%
	6	0	1	0.0%	0	12	0.0%	0	178	0.0%
Area 7	3	0	2	0.0%	0	7	0.0%	0	5	0.0%
	4	1	16	6.3%	66	737	9.0%	191	2,796	6.8%
	5	1	20	5.0%	101	1,594	6.4%	897	17,271	5.2%
	6	0	16	0.0%	0	339	0.0%	0	6,293	0.0%
	7	0	1	0.0%	0	20	0.0%	0	215	0.0%
Area 8	1	0	1	0.0%	0	12	0.0%	0	25	0.0%
	4	0	2	0.0%	0	44	0.0%	0	24	0.0%
	5	0	1	0.0%	0	10	0.0%	0	0	0.0%
	7	1	10	10.0%	11	79	13.3%	46	389	11.8%
	8	1	29	3.4%	106	2,290	4.6%	514	17,244	3.0%
	9	0	23	0.0%	0	903	0.0%	0	8,341	0.0%
	10	0	2	0.0%	0	158	0.0%	0	1,141	0.0%
	11	0	0	0.0%	0	43	0.0%	0	212	0.0%
Area 9	2	1	4	25.0%	32	105	30.1%	91	333	27.3%
	3	3	16	18.8%	149	724	20.6%	509	2,925	17.4%
	4	4	27	14.8%	269	1,647	16.3%	1,073	9,183	11.7%
	5	4	27	14.8%	286	1,839	15.6%	1,037	10,670	9.7%
	6	4	21	19.0%	252	1,384	18.2%	1,351	8,543	15.8%
	7	3	16	18.8%	61	572	10.6%	229	2,776	8.2%
	8	1	11	9.1%	6	246	2.6%	30	1,149	2.6%
	9	0	1	0.0%	0	4	0.0%	0	13	0.0%
Area 4	Jan-Dec	0	15	0.0%	0	568	0.0%	0	4,413	0.0%
Area 5	Jan-Dec	1	9	11.1%	94	405	23.1%	0	0	0.0%
Area 7	Jan-Dec	1	4	25.0%	7	103	7.1%	92	1,317	7.0%
	Jan-Dec	1	21	4.8%	168	2,697	6.2%	1,088	26,580	4.1%
Area 8	Jan-Dec	1	31	3.2%	116	3,539	3.3%	560	27,376	2.0%
Area 9	Jan-Dec	4	30	13.3%	1,055	6,521	16.2%	4,320	35,592	12.1%
Area 4-Area 9	Jan-Dec	5	78	6.4%	1,440	13,833	10.4%	6,060	95,278	6.4%

Table 3. Number of teleost fish recorded by the Japanese SBT longline observer program in 2020 in CCSBT statistical area 4-9.

種名	Species	N
ミナミマグロ	*Thunnus maccoyii*	6,453
ビンナガ	*Thunnus alalunga*	3,661
メバチ	*Thunnus obesus*	295
キハダ	*Thunnus albacares*	37
メカジキ	*Xiphias gladius*	23
ガストロ	*Gasterochisma melampus*	2,963
ミズウオ類	*Alepisaurus spp.*	154
アカマンボウ	*Lampridiidae*	166
シマガツオ類	*Brama spp.*	2,344
アブラソコムツ	*Lepidocybium flavobrunneum*	46
バラムツ	*Ruvettus pretiosus*	25
その他魚類	Other teleosts	399

Table 4. Number of sharks recorded by the Japanese SBT longline observer program in 2020 in CCSBT statistical area 4-9.

種名	Species	N
ヨシキリザメ	*Prionace glauca*	3,507
アオザメ	*Isurus oxyrinchus*	42
ニシネズミザメ	*Lamna nasus*	1,265
その他	Other elasmobranches	274

Table 5. Number of seabirds and the other animals recorded by the Japanese SBT longline observer program in 2020 in CCSBT statistical area 4-9.

種名	Species	N
大型アホウドリ類	Large albatrosses	22
暗色アホウドリ類	Dark colored albatrosses	21
その他のアホウドリ類	Mollymawks and other albatrosses	67
ミズナギドリ類	Giant petrels	62
その他の海鳥	Other birds	10

Table 6. Number of individuals its length measured under the Japanese SBT longline observer program in 2020.

Area	Month	SBT	ALB	BET	YFT	SWO	BUK	other	Sharks	Total
5	7	9	2,404	286	35	7		334	188	3,263
6	5	127	69					15	17	228
7	4	199	417			4		67	196	883
	5	1,034	644			12	3	146	262	2,101
8	7	46					5	1	20	72
	8	514					43		155	712
9	2	88					18	22	320	448
	3	512	1				223	176	1,708	2,620
	4	1,079	3				726	516	629	2,953
	5	1,086	5				951	854	548	3,444
	6	1,417	1				719	675	675	3,487
	7	241	1				216	177	71	706
	8	38					38	35	3	114
5	Total	9	2,404	286	35	7	0	334	188	3,263
6	Total	127	69	0	0	0	0	15	17	228
7	Total	1,233	1,061	0	0	16	3	213	458	2,984
8	Total	560	0	0	0	0	48	1	175	784
9	Total	4,461	11	0	0	0	2,891	2,455	3,954	13,772
Total	Total	6,390	3,545	286	35	23	2,942	3,018	4,792	21,031

Species code is shown in Table 7.

Table 7. Number of individuals its biological samples collected and sex identified in the Japanese SBT longline observer program in 2020.

種名	Species code	Species	Otolith	Muscle	Sex
ミナミマグロ	SBT	Southern bluefin tuna			6,122
ビンナガ	ALB	Albacore			98
メバチ	BET	Bigeye tuna			280
キハダ	YFT	Yellowfin tuna			34
メカジキ	SWO	Swordfish			22
ガストロ	BUK	Butterfly kingfish			2,936
その他魚類	other	Other teleosts			276
サメ類	Sharks	Elasmobranches			5,007

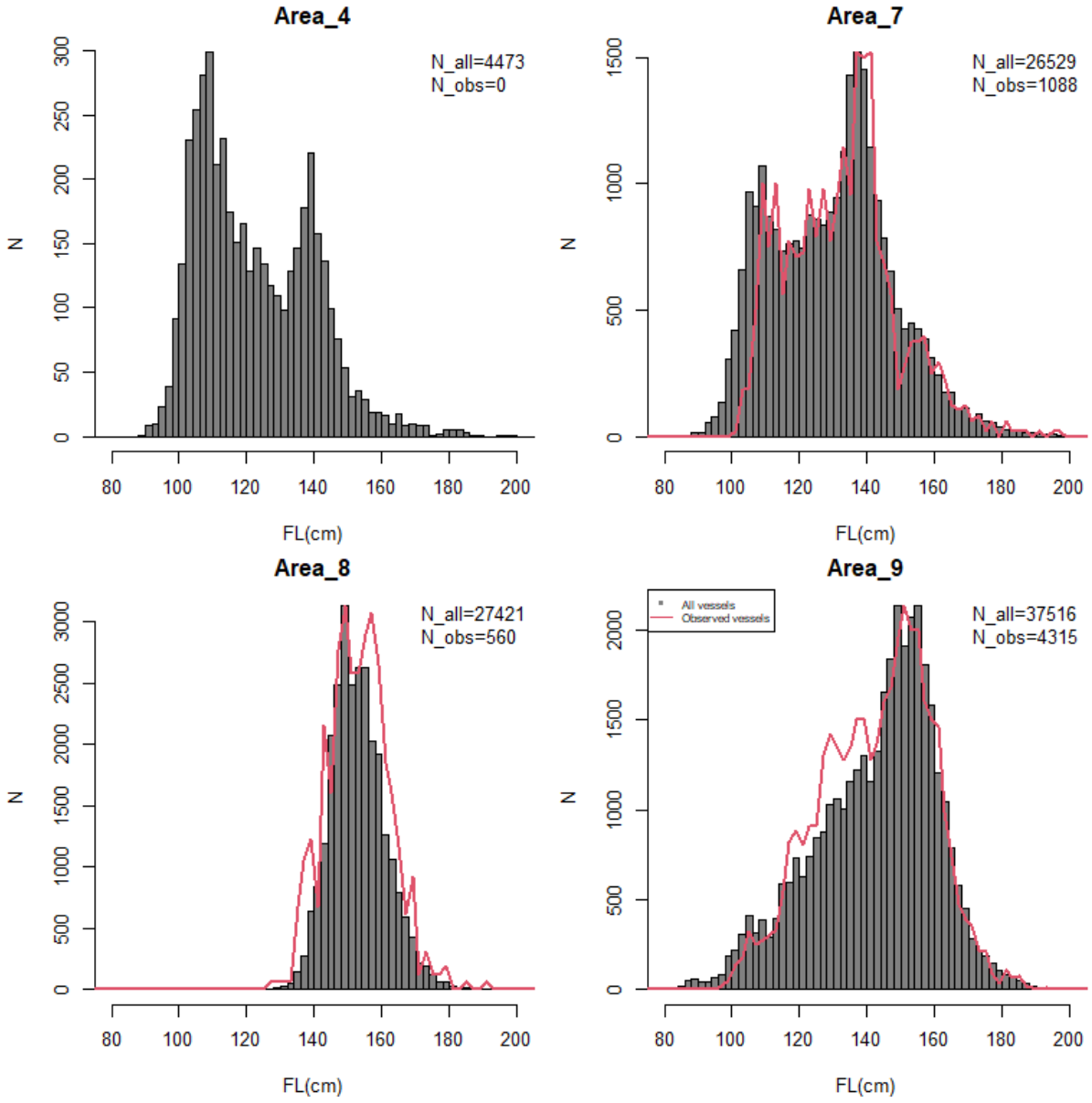

Fig. 1. Length frequency distribution of SBT retained by area in the Japanese SBT longline observer program in 2020.

Bars are from data in all vessels, red lines are from observed data.