

Report of Japanese scientific observer activities for southern bluefin tuna fishery in 2018

日本のミナミマグロ漁業での科学オブザーバの 2018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、2018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 7 隻に科学オブザーバを配乗した。調査カバー率は隻数で 8.1%、使用釣鉤数で 6.4%、ミナミマグロ漁獲尾数で 6.1%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釣鉤数で 4.8%であった。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。オブザーバは乗船中にミナミマグロからの耳石 126 個体分、筋肉 123 個体分を含む各種の生物標本を採取した。オブザーバはミナミマグロ 8 個体分の CCSBT 通常標識を回収した。

Summary

This document summarizes results of Japanese scientific observer program for southern bluefin tuna (SBT) in 2018. Scientific observers were dispatched in seven vessels that operated in the main CCSBT statistical areas (area 4–9). Observer coverages were 8.1% in the number of vessels, 6.4% in the number of hooks used, and 6.1% 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 4.8%. 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 collected various biological samples including otolith from 126 SBT and muscle tissue from 123 SBT. Observers retrieved CCSBT conventional tags from 8 SBT individuals.

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

みなまぐろ漁場における日本の科学オブザーバ調査は、1992年からは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、その船の年間を通じ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。なお、2014年まではインドネシア人オブザーバには耳石や胃内容物などの生物サンプルの採集を指示していなかったが、インドネシア人オブザーバの配乗比率の増加と調査能力の向上に伴い、2015年より一部のインドネシア人オブザーバにサンプル採取を指示している。

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. Collection of biological samples (otolith and muscle) had not been included in the direction to Indonesian researchers by 2014, however it has

been ordered to a part of selected Indonesian researchers since 2015, along with increasing the ratio of trips with Indonesian researchers and improvement of their research skill.

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。2018年には4回の講習会を開催し、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 SBT fishery were held 4 times in 2018. 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

2018年に主要なCCSBT統計海区(海区4-9)で操業を行った漁船に7名のオブザーバを配乗した。全員が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652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。2018年の4海区から9海区でのカバー率は、隻数で8.1%、使用釣鈎数で6.4%、ミナミマグロ漁獲尾数で6.1%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。2018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75.4%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、 $6.4\% \times 75.4\% = 4.8\%$ と計算された。

Scientific observers were dispatched in 7 vessels that operated in the main CCSBT statistical areas (area 4-9). All observers had experiences of scientific observer activities for SBT or other tunas. The total number of days on-boarded was 652.

We calculated observer coverage between January and December in area 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 8.1% in the number of vessels, 6.4% in the number of hooks used, and 6.1% 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 75.4% of all hauling time in 2018. Thus, the coverage of effort which was actually observed by the observers was calculated as 4.8% ($6.4\% \times 0.754$).

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国際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 18,050 個体の生物の体長を測定し、このうちミナミマグロは 6,614 個体であった。オブザーバは乗船中に耳石、筋肉などの生物標本を収集し、性別を判定した (Table 7)。ミナミマグロについては耳石を 126 個体、筋肉を 123 個体から採取した。

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。詳細にみると 7 海区と 9 海区で違いが見られ、オブザーバが乗船した場合の方が 7 海区ではわずかに小型で、9 海区ではわずかに大型であった。

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 National Research Institute of Far Seas Fisheries 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 18,050 individuals were length measured, including 6,614 SBT. Biological samples collected, as well as sex identified, were summarized by species, area and month in Table 7. Otoliths were collected from 126 SBT and muscle tissue were collected from 123 SBT.

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. In detail, there were differences in the length frequencies in Area 7 and Area 9, in which size of observed were slightly smaller in Area 7 and slightly larger in Area 9.

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、8 個体分 (12 本) であった。

Scientific observers collected 12 conventional tags of CCSBT from 8 recaptured SBT.

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。

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.

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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Location (start and end points of line hauling) - Time
(for animals caught by longline)	<ul style="list-style-type: none"> - Body length - Body weight - Life status - Sex - Photographing (especially for seabirds)
(as biological sampling)	<ul style="list-style-type: none"> - 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)	<ul style="list-style-type: none"> - Tag recovery for SBT, sharks, and others.

Table 2. Observer coverage in Japanese SBT longline observer program in 2018.

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	4	0.0%	0	113	0.0%	0	0	
	4	0	1	0.0%	0	7	0.0%	0	10	0.0%
	5	1	15	6.7%	32	234	13.7%	168	1,979	8.5%
	6	1	20	5.0%	66	847	7.8%	665	7,341	9.1%
	7	0	1	0.0%	0	3	0.0%	0	0	
Area 5	6	0	3	0.0%	0	32	0.0%	0	0	
	7	0	6	0.0%	0	524	0.0%	0	0	
	8	0	6	0.0%	0	419	0.0%	0	0	
Area 7	3	0	14	0.0%	0	381	0.0%	0	497	0.0%
	4	1	26	3.8%	39	2,005	2.0%	265	9,143	2.9%
	5	1	27	3.7%	64	2,094	3.1%	447	15,986	2.8%
	6	0	12	0.0%	0	340	0.0%	0	3,549	0.0%
Area 8	3	0	2	0.0%	0	10	0.0%	0	0	
	4	1	11	9.1%	33	534	6.1%	0	53	0.0%
	5	1	13	7.7%	23	226	10.2%	1	43	2.3%
	8	3	21	14.3%	254	1,857	13.7%	1,342	13,904	9.7%
	9	3	20	15.0%	128	544	23.5%	734	4,280	17.1%
Area 9	3	0	8	0.0%	0	146	0.0%	0	480	0.0%
	4	2	34	5.9%	83	1,743	4.8%	403	12,391	3.3%
	5	2	37	5.4%	161	2,807	5.7%	604	17,734	3.4%
	6	3	34	8.8%	108	1,595	6.8%	746	12,680	5.9%
	7	2	15	13.3%	88	387	22.6%	977	3,661	26.7%
	10	0	2	0.0%	0	90	0.0%	0	302	0.0%
Area 4	Jan-Dec	1	22	4.5%	98	1,203	8.2%	833	9,330	8.9%
Area 5	Jan-Dec	0	7	0.0%	0	975	0.0%	0	0	0.0%
Area 7	Jan-Dec	1	27	3.7%	103	4,820	2.1%	712	28,678	2.4%
Area 8	Jan-Dec	3	21	14.3%	438	3,170	13.8%	2,077	18,280	11.4%
Area 9	Jan-Dec	3	39	7.7%	440	6,773	6.5%	2,730	46,768	5.8%
Area 4-	Jan-Dec	7	86	8.1%	1,079	16,941	6.4%	6,352	104,033	6.1%

Table 3. Number of teleost fish recorded by the Japanese SBT longline observer program in 2018 in CCSBT statistical area 4-9.

種名	Species	N
ミナミマグロ	<i>Thunnus maccoyii</i>	7,390
ガストロ	<i>Gasterochisma melampus</i>	2,134
ビンナガ	<i>Thunnus alalunga</i>	2,380
メバチ	<i>Thunnus obesus</i>	9
メカジキ	<i>Xiphias gladius</i>	54
ミズウオ類	<i>Alepisaurus spp.</i>	282
アカマンボウ	<i>Lamprididae</i>	264
シマカツオ類	<i>Brama spp.</i>	2,922
アブラソコムツ	<i>Lepidocybium flavobrunneum</i>	90
バラムツ	<i>Ruvettus pretiosus</i>	216
その他	Other fish	352

Table 4. Number of sharks recorded by the Japanese SBT longline observer program in 2018 in CCSBT statistical area 4-9.

種名	Species	N
ヨシキリザメ	<i>Prionace glauca</i>	5,325
アオザメ	<i>Isurus oxyrinchus</i>	34
ニシネズミザメ	<i>Lamna nasus</i>	635
その他	Other elasmobranches	439

Table 5. Number of seabirds and the other animals recorded by the Japanese SBT longline observer program in 2018 in CCSBT statistical area 4-9.

種名	Species	N
大型アホウドリ類	Large albatrosses	10
暗色アホウドリ類	Dark colored albatrosses	21
その他のアホウドリ類	Mollymawks and unidentified albatrosses	220
オオフルマカモメ類	Unidentified giant petrels	12
ミズナギドリ類	Unidentified petrels	54
その他の海鳥	Other birds	6
ハクジラ類	Odontoceti	2

Table 6. Number of individuals its length measured under the Japanese SBT longline observer program in 2018.

分類	Name	Area 4			Area 7			Area 8				Area 9				Total		
		May	Jun	Total	Apr	May	Total	Apr	May	Aug	Sep	Total	Apr	May	Jun	Jul	Total	
ミナミマグロ	Southern bluefin tuna	169	684	853	273	458	731	11	12	1,429	814	2,266	404	600	756	1,004	2,764	6,614
メバチ	Bigeye tuna		1	1				4	3			7						8
ビンナガ	Albacore	233	372	605	318	406	724	551	378	21	1	951	4		5		9	2,289
ガストロ	Butterfly tuna		4	4		4	4	33	18	294	102	447	289	586	359	154	1,388	1,843
メカジキ	Swordfish	8	16	24	6	19	25	1	3			4						53
その他魚類	Other teleosts	55	123	178	82	111	193	65	85	104	25	279	357	842	868	271	2,338	2,988
サメ類	Sharks	120	350	470	130	323	453	31	17	1,474	367	1,889	182	444	444	115	1,185	3,997
海鳥	Seabirds	6	13	19	8	10	18	1	1	19	5	26	54	70	58	13	195	258
総計	Total	591	1,563	2,154	817	1,331	2,148	697	517	3,341	1,314	5,869	1,290	2,542	2,490	1,557	7,879	18,050

Table 7. Number of individuals its biological samples collected and sex identified in the Japanese SBT longline observer program in 2018.

種名	Species	Otolith	Muscle	Sex
ミナミマグロ	Southern bluefin tuna	126	123	6,463
メバチ	Bigeye tuna	5	2	5
ビンナガ	Albacore		69	4
ガストロ	Butterfly tuna		69	1,785
メカジキ	Swordfish		0	8
その他魚類	Other teleosts		3	257
サメ類	Elasmobranches		0	4,581
海鳥	Seabirds		71	

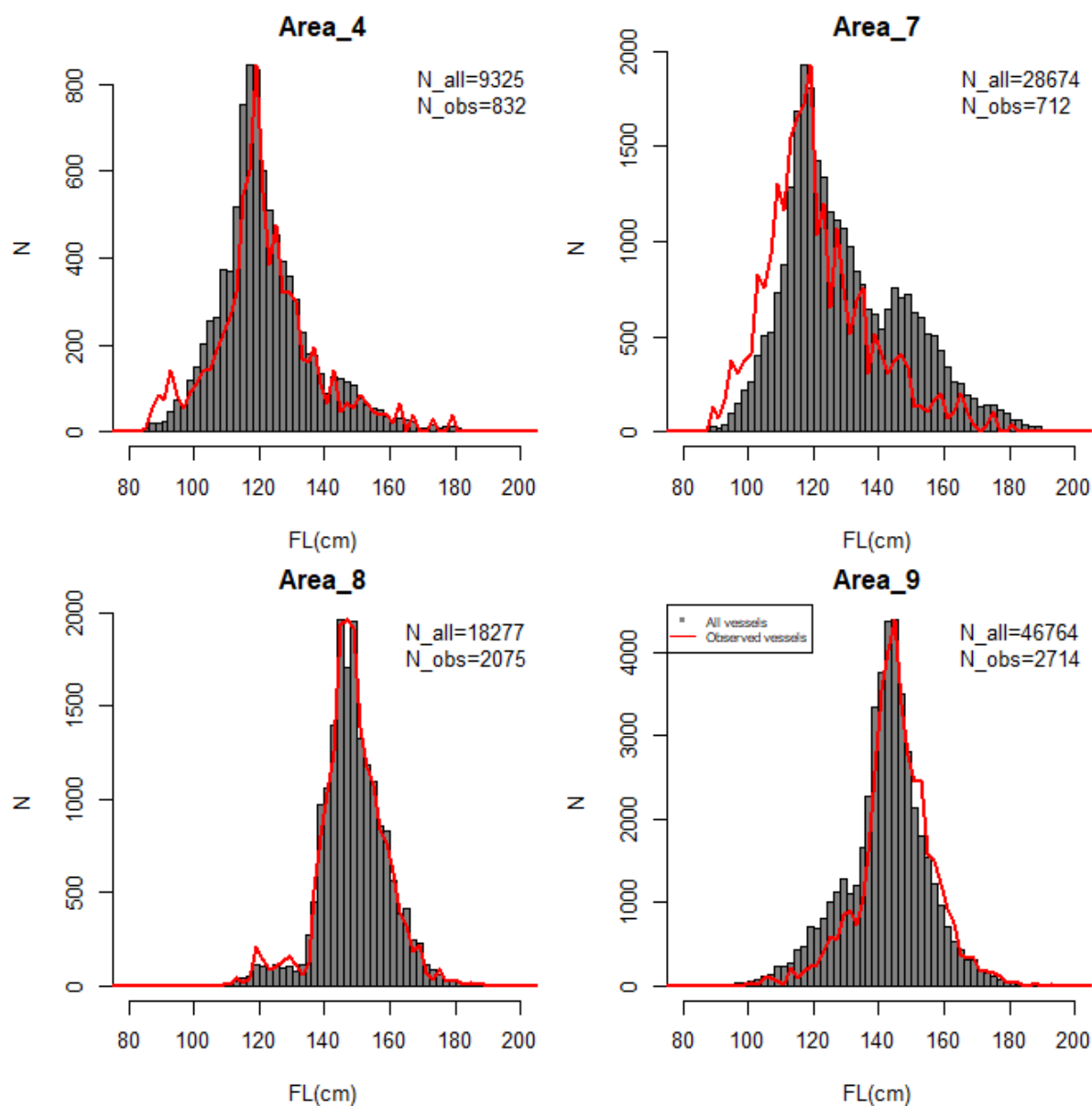


Fig. 1. Length frequency distribution of SBT retained by area in the Japanese SBT longline observer program in 2018.

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