

Report of Japanese scientific observer activities  
for southern bluefin tuna fishery in 2017;  
Revise in 2019

日本のミナミマグロ漁業での科学オブザーバの  
2017年の活動報告：2019年の更新

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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、2017年調査の結果を報告する。2019年にデータの一部に問題があることが見つかったことから、それらの航海のデータを除いて、数値を更新した。主要なCCSBT統計海区（4-9海区）において4隻に科学オブザーバーを配乗した。調査カバー率は隻数で4.5%、使用釣鉤数で5.0%、ミナミマグロ漁獲尾数で4.5%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4.2%であった。9海区はカバーされなかった。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184個体分、筋肉325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3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 2017. Because we found less reliable data in 2019, we updated this document based on revised dataset which excluded data of several cruises. Scientific observers were dispatched in four vessels that operated in the main CCSBT statistical areas (area 4-9). Observer coverages were 4.5% in the number of vessels, 5.0% in the number of hooks used, and 4.5% 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 4.2%. Area 9 was not covered. 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 184 SBT and muscle tissue from 325 SBT. Observers retrieved CCSBT conventional tags from 3 SBT individuals.

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

2019年にデータの一部に問題があることが見つかった。よって本文書では、それらの航海のデータを除いて、数値を更新した。

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。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。

In 2019, we found less reliable data in the scientific observer program. We submit the revised document which report activity of scientific observers on Japanese longline for southern bluefin tuna (SBT) based on dataset that excluded data from several cruises.

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。2017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 2017. 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

2017年に主要なCCSBT統計海区(海区4-9)で操業を行った漁船に4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。ミナミマグロを対象とした操業を観察したオブザーバの雇用日数(日本出国から帰国まで)は合計474日、対象調査船における乗船日数は合計319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。2017年の4海区から9海区でのカバー率は、隻数で4.5%、使用釣鈎数で5.0%、ミナミマグロ漁獲尾数で4.5%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。2017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85.1%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、 $5.0\% \times 85.1\% = 4.2\%$ と計算された。

Scientific observers were dispatched in 12 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 employed was 474 while the total number of days on-boarded was 319.

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 4.5% in the number of vessels, 5.0% in the number of hooks used, and 4.5% 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 85.1% of all hauling time in 2017. Thus, the coverage of effort which was actually observed by the observers was calculated as 4.2% (5.0% x 0.851).

#### 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 12,903 個体の生物の体長を測定し、このうちミナミマグロは 3,988 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 184 個体、筋肉を 325 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 4 海区と 8 海区で違いが見られ、オブザーバーが乗船した場合の方が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 12,903 individuals were length measured, including 3,988 SBT. Biological samples collected, as well as sex identified, were summarized by species, area and month in Table 7. Otoliths were collected from 184 SBT and muscle tissue were collected from 325 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 4 and Area 8, in which size of observed were slightly larger.

#### 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、3 隻から 3 個体分 (4 本) であった。

Scientific observers collected 4 conventional tags of CCSBT from 3 recaptured SBT on 3 vessels.

## 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"> <li>- Location (start and end points of line setting)</li> <li>- Time (start and end times of line setting)</li> <li>- Weather and sea condition</li> <li>- Gear configuration</li> <li>- Bait types used</li> <li>- Use of mitigation measures to reduce incidental take of seabirds</li> <li>- Number of seabirds around the vessel</li> </ul>
Data and sample collection during line hauling	<ul style="list-style-type: none"> <li>- Location (start and end points of line hauling)</li> <li>- Time</li> </ul>
(for animals caught by longline)	<ul style="list-style-type: none"> <li>- Body length</li> <li>- Body weight</li> <li>- Life status</li> <li>- Sex</li> <li>- Photographing (especially for seabirds)</li> </ul>
(as biological sampling)	<ul style="list-style-type: none"> <li>- Otolith (for the age estimation of SBT)</li> <li>- Vertebrae (for the age estimation of tagged sharks)</li> <li>- Muscle tissue (for the genetic and isotope research of SBT, other fishes, and the bycatch species including seabirds)</li> </ul>
(as tag recapture)	<ul style="list-style-type: none"> <li>- Tag recovery for SBT, sharks, and others.</li> </ul>

**Table 2. Observer coverage in Japanese SBT longline observer program in 2017.**

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	2	0	0.0%	0	24	0.0%	0	0	0.0%	
	4	3	0	0.0%	0	16	0.0%	0	6	0.0%	
	5	11	1	9.1%	23	298	7.8%	95	1,311	7.2%	
	6	13	1	7.7%	30	498	5.9%	171	1,719	9.9%	
	7	1	0	0.0%	0	48	0.0%	0	0	0.0%	
	8	1	0	0.0%	0	29	0.0%	0	0	0.0%	
Area 5	6	0	6	0.0%	0	113	0.0%	0	0	0.0%	
	7	0	8	0.0%	0	301	0.0%	0	24	0.0%	
	8	0	6	0.0%	0	335	0.0%	0	79	0.0%	
	9	0	1	0.0%	0	25	0.0%	0	0	0.0%	
Area 7	3	2	16	12.5%	61	457	13.3%	95	996	9.5%	
	4	3	24	12.5%	232	2,092	11.1%	1,313	10,788	12.2%	
	5	3	25	12.0%	250	1,983	12.6%	1,468	11,397	12.9%	
	6		17	17.6%	9	334	2.7%	62	4,156	1.5%	
Area 8	3	0	4	0.0%	0	57	0.0%	0	0	0.0%	
	4	0	16	0.0%	0	885	0.0%	0	4	0.0%	
	5	1	18	5.6%	3	552	0.6%	0	7	0.0%	
	6	1	2	50.0%	14	24	56.4%	0	0	0.0%	
	7	0	8	0.0%	0	35	0.0%	0	92	0.0%	
	8	1	20	5.0%	95	1,841	5.2%	315	10,368	3.0%	
	9	1	17	5.9%	53	476	11.2%	285	4,068	7.0%	
Area 9	3	0	2	0.0%	0	21	0.0%	0	182	0.0%	
	4	0	25	0.0%	0	1,233	0.0%	0	10,685	0.0%	
	5	0	37	0.0%	0	2,136	0.0%	0	15,122	0.0%	
	6	0	31	0.0%	0	1,198	0.0%	0	9,054	0.0%	
	7	0	15	0.0%	0	437	0.0%	0	3,294	0.0%	
	8	0	3	0.0%	0	41	0.0%	0	241	0.0%	
		10	0	2	0.0%	0	35	0.0%	0	51	0.0%
	Area 4	Jan-Dec	1	18	5.6%	53	921	5.7%	266	3,036	8.8%
Area 5	Jan-Dec	0	8	0.0%	0	774	0.0%	0	103	0.0%	
Area 7	Jan-Dec	3	26	11.5%	551	4,865	11.3%	2,938	27,337	10.7%	
Area 8	Jan-Dec	1	22	4.5%	166	3,870	4.3%	600	14,539	4.1%	
Area 9	Jan-Dec	0	40	0.0%	0	5,102	0.0%	0	38,629	0.0%	
Area 4-	Jan-Dec	4	88	4.5%	770	15,532	5.0%	3,804	83,644	4.5%	

**Table 3. Number of teleost fish recorded by the Japanese SBT longline observer program in 2017 in CCSBT statistical area 4-9.**

種名	Species	N
ミナミマグロ	<i>Thunnus maccoyii</i>	4,075
ガストロ	<i>Gasterochisma melampus</i>	216
ビンナガ	<i>Thunnus alalunga</i>	4,561
キハダ	<i>Thunnus albacares</i>	9
メバチ	<i>Thunnus obesus</i>	67
カツオ	<i>Katsuwonus pelamis</i>	7
マカジキ	<i>Tetrapturus audax</i>	8
メカジキ	<i>Xiphias gladius</i>	94
ミズウオ類	<i>Alepisaurus spp.</i>	366
アカマンボウ	<i>Lamprididae</i>	323
シマガツオ類	<i>Brama spp.</i>	691
クロタチカマス科	<i>Gamphylidae</i>	25
アブラソコムツ	<i>Lepidocybium flavobrunneum</i>	229
バラムツ	<i>Ruvettus pretiosus</i>	429
マンボウ	<i>Mola mola</i>	50
その他魚類	Other fish	122

**Table 4. Number of sharks recorded by the Japanese SBT longline observer program in 2017 in CCSBT statistical area 4-9.**

種名	Species	N
ヨシキリザメ	<i>Prionace glauca</i>	1,988
アオザメ	<i>Isurus oxyrinchus</i>	42
ニシネズミザメ	<i>Lamna nasus</i>	516
その他のサメ類	Other sharks	50

**Table 5. Number of seabirds and the other animals recorded by the Japanese SBT longline observer program in 2017 in CCSBT statistical area 4-9.**

種名	Species	N
大型アホウドリ類	Large albatrosses	3
暗色アホウドリ類	Dark coloured albatrosses	0
その他のアホウドリ類	Other albatrosses	31
ミズナギドリ類	Other petrels	5
その他の海鳥	Other seabirds	0
ウミガメ類	Turtles	0



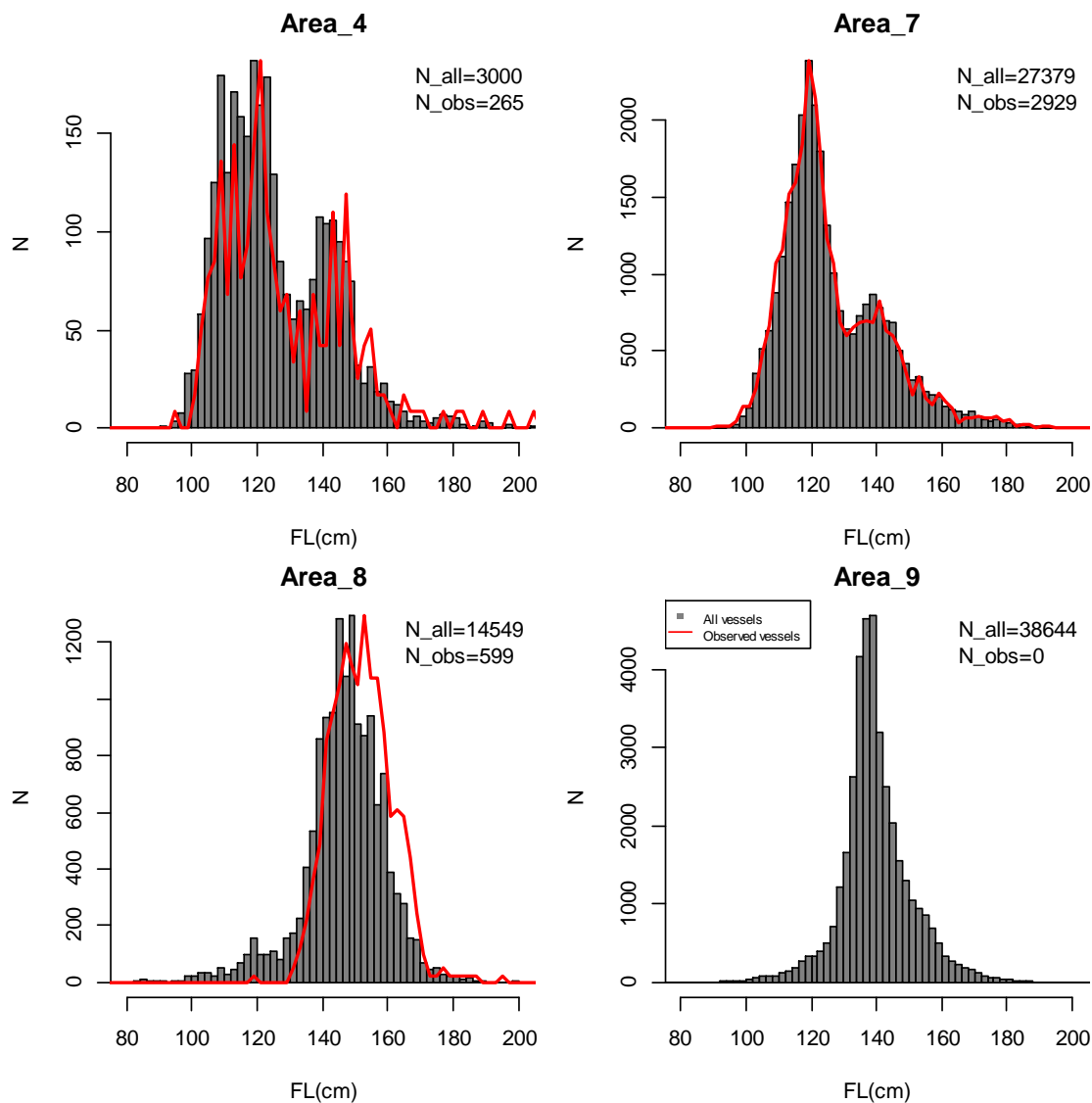
**Table 6. Number of individuals its length measured under the Japanese SBT longline observer program in 2017.**

分類	Name	Area 4			Area 7			Area 8					Total		
		May	Jun	Total	Mar	Apr	May	Jun	Total	May	Jun	Aug		Sep	Total
ミナミマグロ	Southern bluefin tuna	95	170	265	95	1,311	1,463	61	2,930		2	441	350	793	3,988
メバチ	Bigeye tuna	3	12	15		1	40	1	42	7	3			10	67
キハダ	Yellowfin tuna		3	3			6		6						9
ビンナガ	Albacore	80	94	174	279	1,027	2,695	22	4,023	76	188	26	11	301	4,498
カツオ	Skipjack tuna					1	6		7						7
ガストロ	Butterfly tuna					1	9		10		10	132	64	206	216
メカジキ	Swordfish	8	9	17	3	19	41	1	64	1	9	2		12	93
マカジキ	Striped marlin		1	1		1	6		7						8
その他魚類	Other teleosts	59	64	123	50	399	869	71	1,389	22	79	101	56	258	1,770
サメ類	Sharks	3	2	5	21	200	538	35	794	5	55	1,104	245	1,409	2,208
海鳥	Seabirds	1	1	2	1	10	15		26			9	2	11	39
総計	Total	249	356	605	449	2,970	5,688	191	9,298	111	346	1,815	728	3,000	12,903

**Table 7. Number of individuals its biological samples collected and sex identified in the Japanese SBT longline observer program in 2017.**

種名	Species	Otolith	Muscle	Sex
ミナミマグロ	Southern bluefin tuna	184	325	3,538
メバチ	Bigeye tuna	30	38	66
キハダ	Yellowfin tuna	4	6	9
ビンナガ	Albacore		138	135
カツオ	Skipjack tuna		1	
ガストロ	Butterfly tuna		8	210
メカジキ	Swordfish		17	78
マカジキ	Striped marlin		2	8
その他魚類	Other teleosts		107	746
サメ類	Elasmobranches		1	2,172
海鳥	Seabirds		21	

9



**Fig. 1. Length frequency distribution of SBT retained by area in the Japanese SBT longline observer program in 2017.**

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