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Japanese longline observer activity in the Indian Ocean in 2006

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Abstract

In the 13 cruise of Japanese scientific onboard observer research for SBT (southern bluefin tuna) fishery conducted in 2006, four cruises made their long line operations fully or partially in the lower latitude of the Indian Ocean. In this paper, activities and observed results of these four cruises are briefly reviewed. In total, 88 longline operations (286,997 hooks) were observed in the period from May 2006 to February 2007. In the 1st, 3rd and 4th quarter, effort was mainly distributed off Sumatra and west off Australia, while the effort in the 2nd quarter was concentrated off Somalia. Through the whole period covered by onboard observers, 17 teleost species and 4 elasmobranch species were observed more than 5 individuals. In total, 3,718 individuals were observed, in which 3,576 individuals were measured, and sex was identified for 2,376 individuals. The highest catch rate was 4.72 of bigeye, followed by 3.20 of albacore, 2.28 of yellowfin, 0.66 of lancet fish. Highest catch rate among sharks was 0.268 of bluefin, followed by 0.083 of crocodile shark. That of stingray is also relatively high, 0.195. As for the bigeye, escoler, swordfish, lancet fish, blue shark and sting ray, distribution of their catch appear to be similar to the effort distribution. Yellowfin and skipjack were caught mainly in the tropical region, while Opah, and albacore to some extent, occurred at higher latitude, south of 20°S.

1. Introduction

Japanese longline observer program at the southern bluefin tuna (SBT) fishing ground has been conducted since 1992 (Itoh et al., 2006) in order to collect biological data and samples of SBT and other species caught including by-catch species, and to collect information on longline fishing operation in this area. In 2006, the Fisheries Agency of Japan deployed 13 scientific observers on longline vessels that planned to target for SBT, with the total cost of the deployment, US$395,000. Among these 13 vessels, one vessel with observer did not fish at SBT fishing ground but made their all operations at the tropical area in the Indian Ocean. Additionally, other three vessels also fished at the sub-tropical or tropical area partly in their cruise. This temporal or full change in the fishing ground seems partially to be caused by low catch rate of SBT in the recent years.

In the tropical Indian Ocean, main target species for longliners are bigeye, yellowfin or albacore, and these stocks are managed by IOTC (Indian Ocean Tuna Commission), while the stock of SBT is managed by a different regional fisheries management organization, CCSBT (Commission of Conservation of Southern Bluefin Tuna). The operations made by some vessels with onboard observer in 2006 at the lower latitudinal area of the Indian Ocean described above were the Japanese onboard observer activities which is introduced to the main IOTC management area. In this paper, activity and results of their observation would be briefly reviewed.

2. Materials and methods

As the SBT observer program in 2006 fiscal year (April-March), 13 longline cruises were observed in which one vessel operated only at the tropical area and other three vessels made their operation at the lower latitudinal area than SBT fishing ground. In this paper, 30°S parallel was tentatively regarded as the boundary between SBT fishing ground and other lower latitudinal area in the Indian Ocean. As a result, 88 longline operations (286,997 hooks) in total were observed in the period from May 2006 to February 2007.

Before the observers went on board, they had been lectured, at the National Research Institute of Far Seas Fisheries, on how to collect scientific data on longline operation and organisms caught and biological samples from them, as well as lectured on a measure of safety (Itoh et al., 2006).

As the body length, fork length for most of teleosts (total length for sunfish), precaudal length for sharks and disk length for rays were used.

3. Results and discussion

Distribution of the longline effort observed at north of 30°S were shown in total and quarterly in the Fig. 1. Although the total effort distribution covered relatively broad area of the Indian Ocean, that in each quarter concentrated in small area except the 3rd quarter. In the 1st, 3rd and 4th quarter, effort was mainly distributed off Sumatra and west off Australia, while the effort in the 2nd quarter was concentrated off Somalia. In Table 1, fish species recorded by onboard observers were listed. Species which was recorded less than 6 individuals were aggregated as "other fishes" in Table 1. Through the whole period covered by onboard observers, 17 teleost species and 4 elasmobranch species were recorded. Elasmobranch species consist of three sharks, crocodile shark (24), shortfin mako (9) and blue shark (77) and one ray, sting ray (56). Totally 3,718 individuals were observed, in which 3,576 individuals were measured and sex was identified for 2,376 individuals.

Distributions of catch in number for major species caught (more than 30 individuals) were presented in Fig. 2. As for the bigeye, escoler, swordfish, lancet fish, blue shark and sting ray, their catch distributions appear to be similar to the effort distribution. Yellowfin and skipjack were caught mainly in the tropical region, while opah, albacore to some extent, occurred at higher latitude, south of 20°S. Catch rate, catch in number / 1000 hooks, was roughly estimated using total catch and total effort and listed in the left end of Table 2. The highest catch rate was 4.72 of bigeye, followed by 3.20 of albacore, 2.28 of yellowfin, 0.66 of lancet fish. Highest catch rate among sharks was 0.268 of bluefin, followed by 0.083 of crocodile shark. That of stingray is also relatively high, 0.195. Size frequency of each of major species was presented as histogram in Fig. 3. The size measurements provided by the onboard observer are 1354 individuals for bigeye, 909 individuals for albacore, 654 individuals for yellowfin, and 68 individuals for swordfish (Fig. 3). This additional information, together with the size data from commercial operations, will contribute to stock assessment on tuna and billfish species.

It is generally known that the sex ratio (ratio of female to male) of yellowfin is about 1 until it reaches to about 120 cm, and the female decrease steadily for larger fishes (reviewed in Suzuki 1994). As for bigeye, it is known that ratio of male is higher than female over the entire size range, or sex ratio is almost 1.0 (male=female), possibly depending on the area (reviewed in Miyabe 1994, Miyabe 2002). In the Fig. 4, sex ratio by each size class was

shown for yellowfin and bigeye tuna. When all size classes are pooled, sex ratios are almost equivalent between both species, male:female=57:43 and 59:41 for yellowfin and bigeye, respectively. Although the ratio of male seems to increase from about 140 cm for both species, the number of samples larger than 140cm for yellowfin and that larger than 155 cm for bigeye was less than 30 individuals. If the sex ratio in the length class whose observation is much more 30 individuals is compared, i.e. 96-140 cm for yellowfin and 86-155 for bigeye, any consistent trend was not observed in both species except for the tendency that the ratio of male tends to be higher than female for most size classes.

4. Recerences

Itoh, T. and Narisawa, Y., and Tababe, T. (2006): Report of Japanese scientific observer activities for southern bluefin tuna fishery in 2005. CCSBT-ESC/0609/34. 8p

Miyabe, N. (1994): A review of the biology and fisheries for bigeye tuna, *Thunnus obesus*, in the Pacific Ocean. In "Interactions of Pacific tuna fisheries Volume 2 Papers on biology and fisheries" FAO Fisheries Technical Paper 336/2, 207-243.

Miyabe, N. (2002): Recent sex ratio data of the bigeye tuna caught by the Japanese longline fishery in the Atlantic. Col. Vol. Sci. Rep. ICCAT, 55: 2028-2039.

Suzuki, Z. (1994): A review of the biology and fisheries for yellowfin tuna, Thunnus albacares, in the western and central Pacific Ocean. In "Interactions of Pacific tuna fisheries Volume 2 Papers on biology and fisheries" FAO Fisheries Technical Paper 336/2, 108-137.

Table 1. Fish species identified by observer in the operations made at north of 30°S, with the observed and measured number of individuals, and sex, size and hook rate (cahch in number / 1000 hooks) information for each species.

English name	Scientific name	Number observed	Number measured	Sex identification			Body length			Hook rate
				male	female	unknown	min	max	average	
Albacore	Thunnus alalunga	917	909	2	2	913	56	120	87.5	3.1952
Yellowfin tuna	Thunnus albacares	654	654	369	276	9	62	167	115.4	2.2788
Bigeye tuna	Thunnus obesus	1354	1339	780	540	34	48	180	117.2	4.7178
Skipjack tuna	Katsuwonus pelamis	38	38	3	6	29	53	82	70.2	0.1324
Sailfish	Istiophorus platypterus	23	23	10	13	0	114	175	155.0	0.0801
Blue marlin	Makaira mazara	24	22	7	13	4	76	240	165.9	0.0836
Shortbill spearfish	Tetrapturus angustirostris	14	14	4	7	3	101	155	126.9	0.0488
Striped marlin	Tetrapturus audax	6	6	1	4	1	148	180	160.3	0.0209
Swordfish	Xiphias gladius	68	68	26	38	4	56	210	136.5	0.2369
Lancetfishes	Alepisaurus spp.	189	130	1	1	187	52	162	122.7	0.6585
Opah	Lampris guttatus	62	62	27	29	6	81	112	93.7	0.2160
Pomfrets	Bramidae	26	20	0	1	25	27	74	54.6	0.0906
Dolphin fish	Coryphaena hippurus	24	22	5	13	6	71	113	89.0	0.0836
Snake mackerel	Gempylus serpens	9	9	0	0	9	67	104	91.3	0.0314
Escolar	Lepidocybium flavobrunneum	67	63	2	49	4	63	157	98.7	0.2335
Unidentified mackerels		11	9	1	6	4	89	146	121.1	0.0383
Japanese Spanish mackerel	Scomberomorus niphonius	14	14	3	4	7	107	152	127.8	0.0488
Ocean sunfish	Mola mola	7	0	0	0	7				0.0244
Crocodile shark	Pseudocarcharias kamoharai	24	24	9	14	1	68	89	79.6	0.0836
Shortfin mako	Isurus oxyrinchus	9	9	8	1	0	81	205	155.0	0.0314
Blue shark	Prionace glauca	77	70	47	23	7	70	270	177.5	0.2683
Sting ray	Dasyatis violacea	56	42	2	6	48	30	62	43.9	0.1951
Other fishes		38	29	8	15	14				
Unidentified		7	0	0	0	7				0.0244

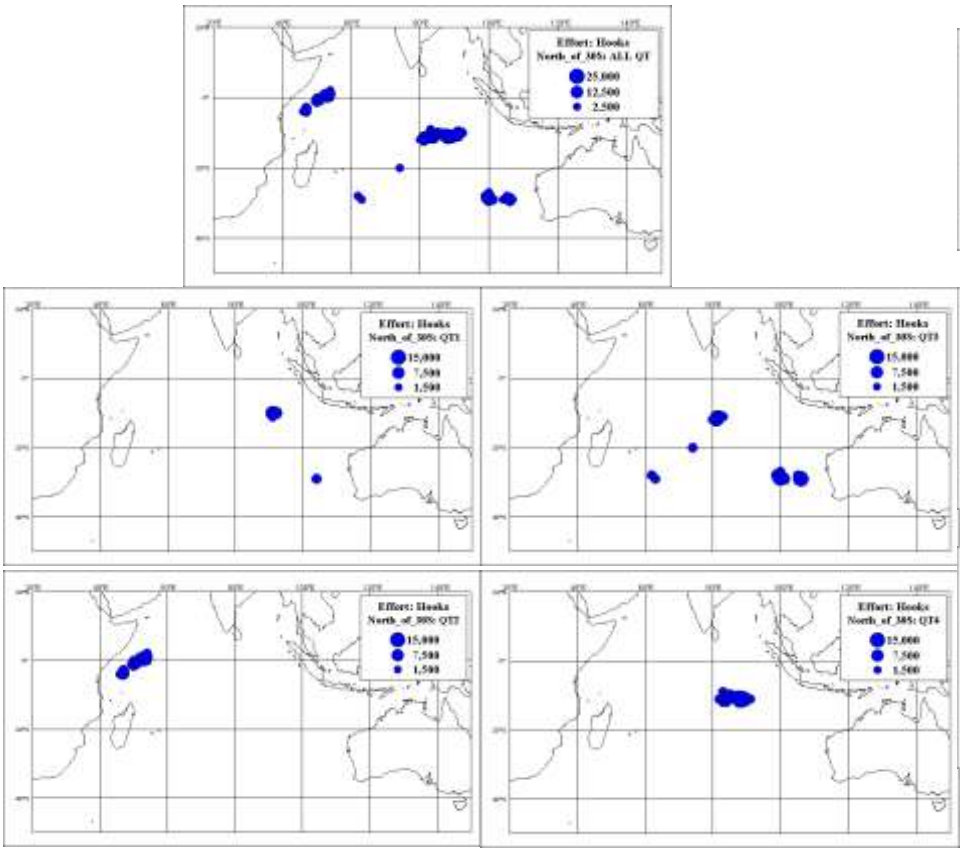
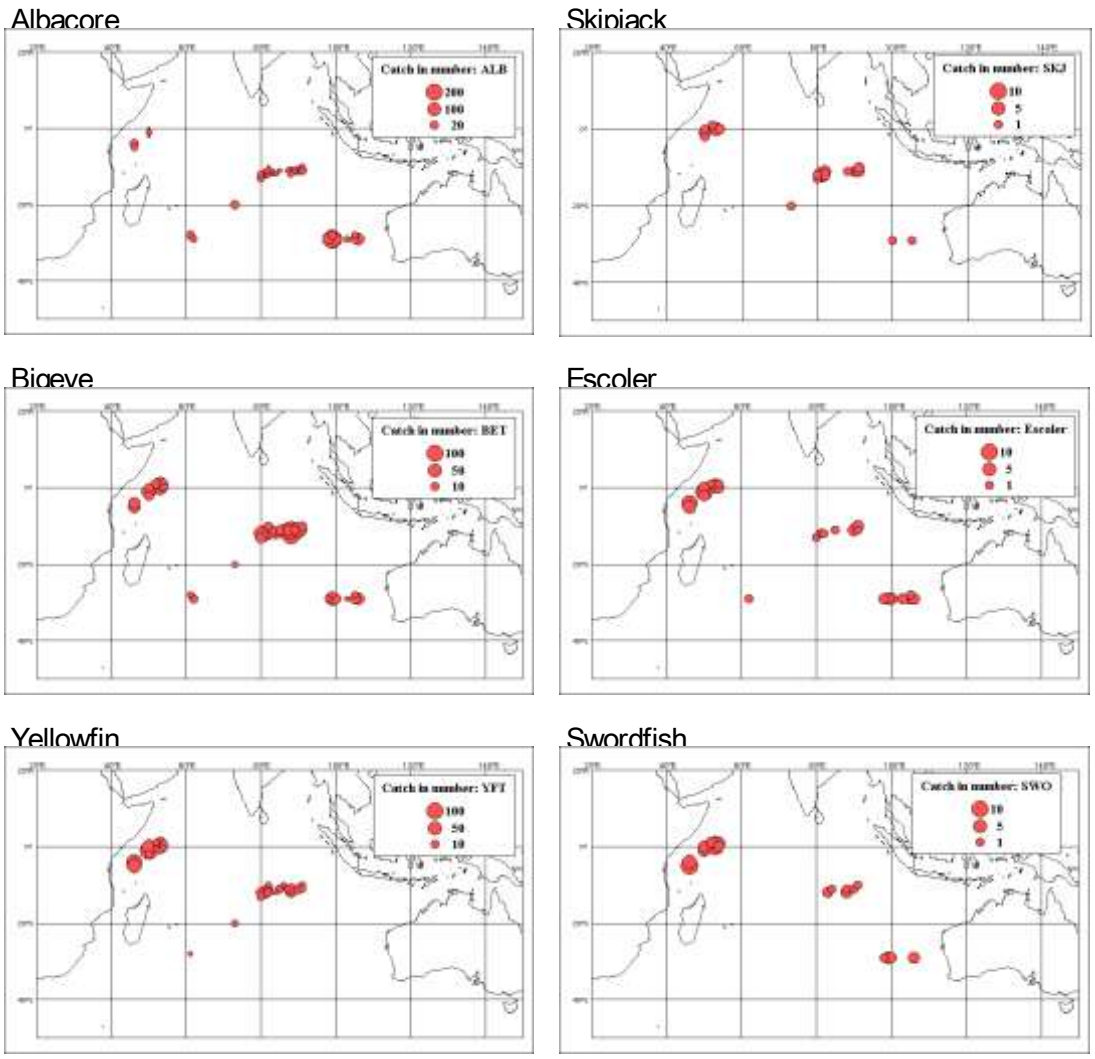
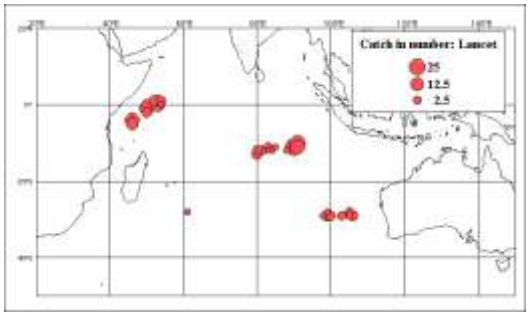


Figure. 1 Total and quarterly distribution of effort, the number of hooks, of the longline operations made at north of 30°S, observed by Japanese longline observer program in the Indian Ocean.

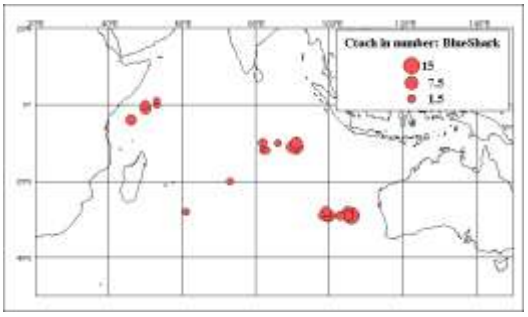


Fugure 2. Distribution of longline catches of main fish species recorded by onboard observers.

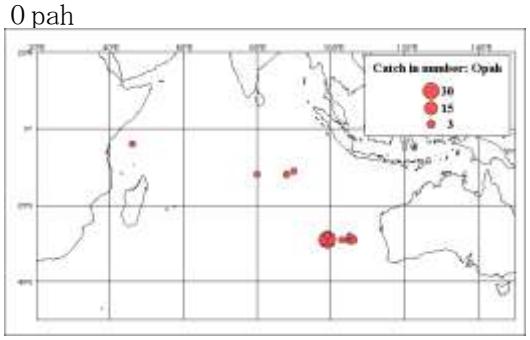
Lancet fish



Blue shark



Opah



Stingray

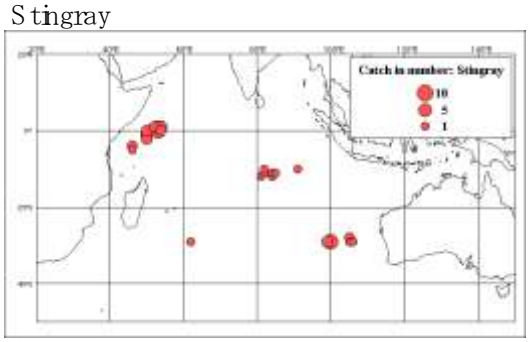


Figure 2. Continued.

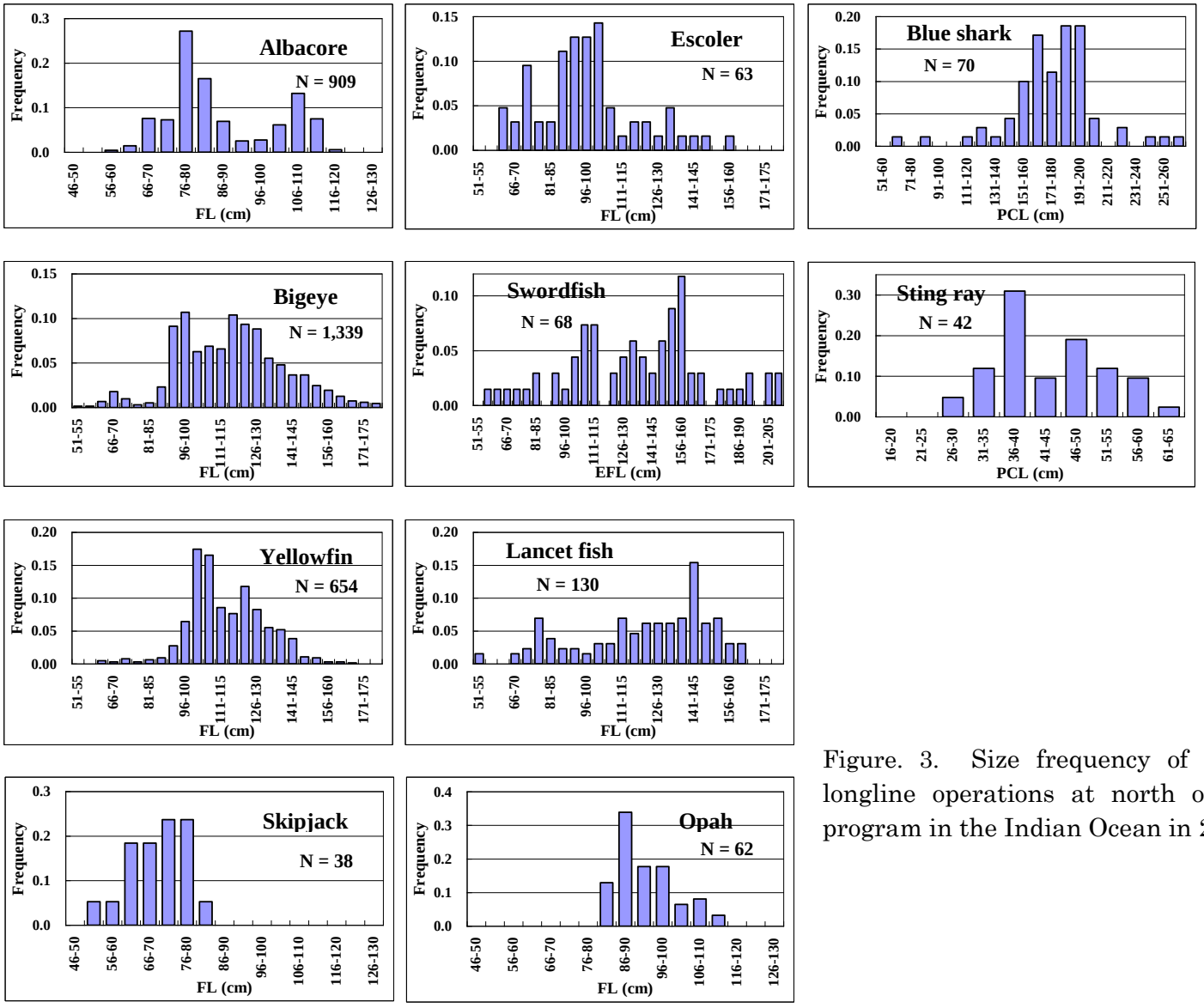


Figure. 3. Size frequency of main species caught by longline operations at north of 30°S during observer program in the Indian Ocean in 2006..

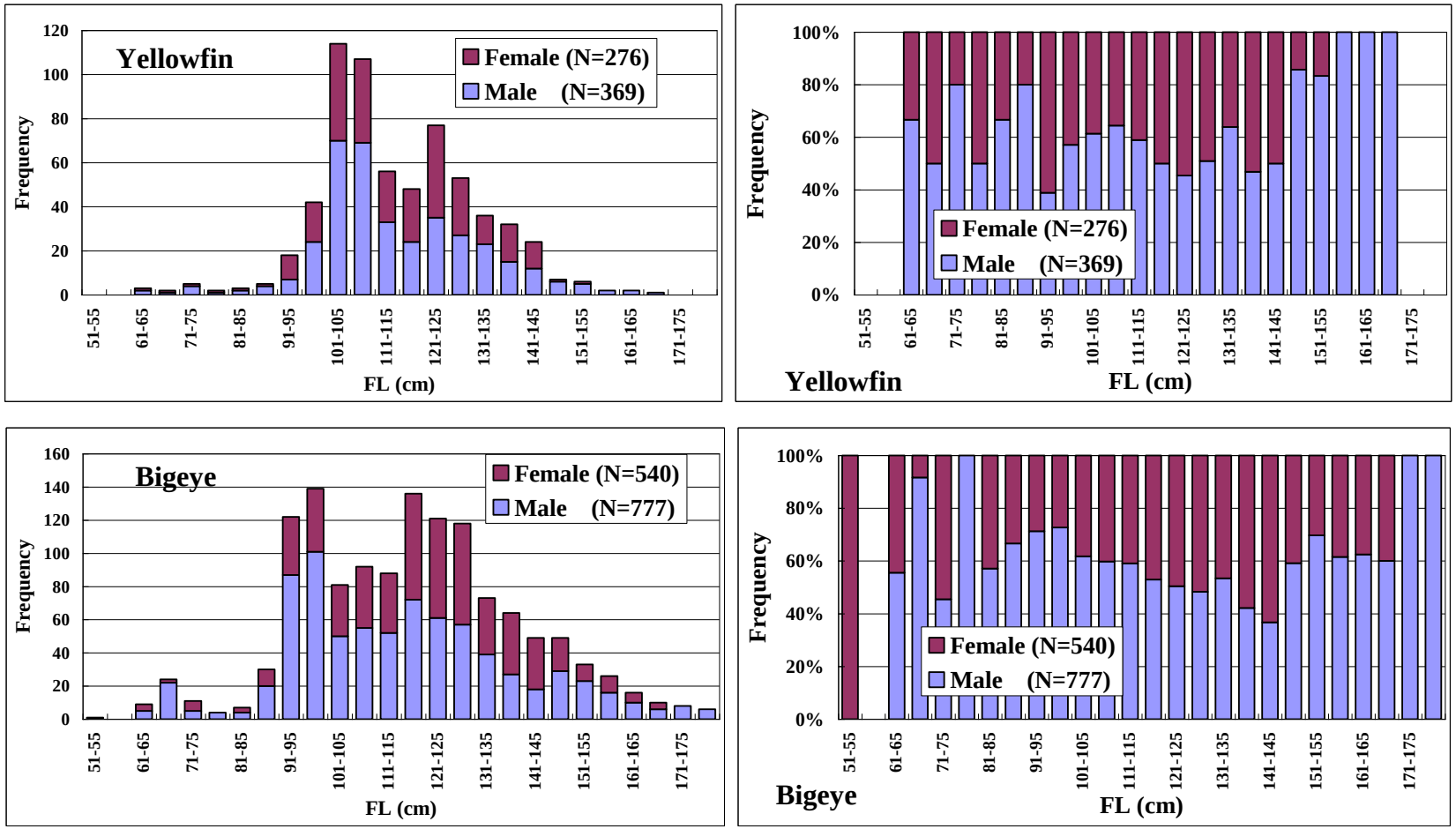


Figure 4. Sex ratio in number (left) and percentage (right) in each size class for yellowfin (top) and bigeye (bottom) tunas.