Available data of striped marlin and swordfish by the Japanese fishery in the North Pacific

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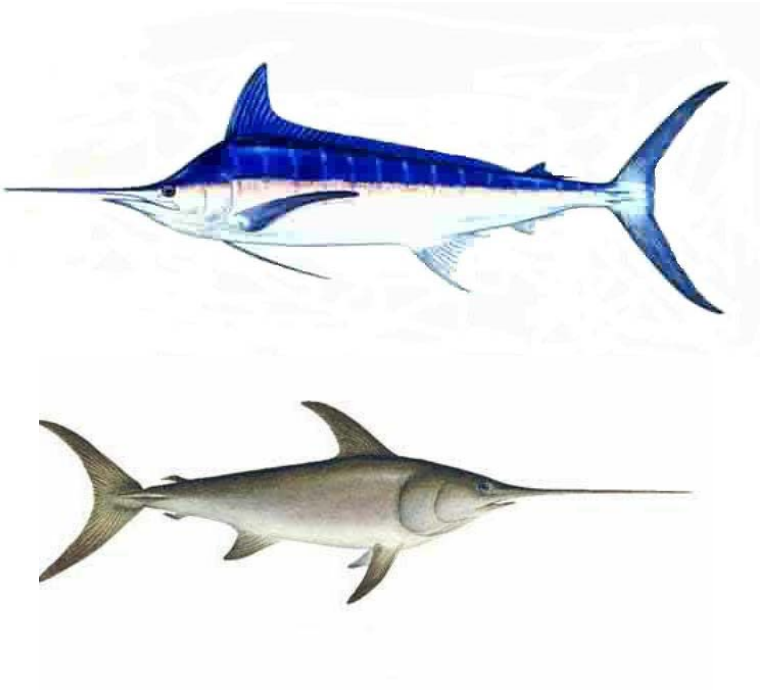

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Abstract

This report provides available data for striped marlin by Japanese fishery, including catch amount, total hooks and size data within two-stock structure zone (BILLWG, 2010). The catch amount was separately estimated by gear from Japanese year books and log books, and the available period was between 1951 and 2008. Total number of hooks by Japanese offshore longline was estimated in each zone during the same period. The number of available size data was also estimated. Additionally, this study provided the updated catch amount of swordfish in the North Pacific. The estimated catch and the total number of hooks of striped marlin in the recent years were significantly decreased in the two zones, compared to those before 1990. These results showed that the recent decreasing trend of the coverage of Japanese offshore and distant-water longline data should be treated with care in the work of stock assessment, especially in the northeastern Pacific.

Introduction

The Billfish Working Group is proposed to describe the spatiotemporal distribution of fisheries within two-stock structure zone (WCPO and EPO, Figure 1) to help define stock assessment model structure (BILLWG, 2010). This study estimated the catch amount of striped marlin caught by the Japanese fishery in the WCPO and the EPO between 1951 and 2008. They were provided annually by zone and gear. There were several gear types: Japanese offshore and distant-water longline, coastal longline, other longline, squid drift net, drift net, bait fishing, net fishing, trap net, and others-primarily harpoon. Total number of hooks by Japanese offshore longline was also estimated in each zone. Like previous years, the annual catch amounts of longline fisheries were obtained by the log-book data, and the others were obtained by the year book.

The available number of size data was estimated. Additionally, this study provided the updated catch amount of swordfish in the North Pacific by stock scenario.

Methods

Japanese catch amount (mt) of the striped marlin between 1951 and 2008 was compiled for

WCPO and EPO stocks using striped marlin catch data obtained by Japanese year books and log books. Catch amount was provided separately by stock and gear. There were several gear types: Japanese offshore and distant-water longline, coastal longline (defined as the longliners less than 20 tons), other longline, squid drift net, drift net, bait fishing, net fishing, trap net, and others-primarily harpoon. The catch amount of swordfish was estimated by stock scenario (Ichinokawa and Brodziak, 2008), sub-area, and gear, using the same procedure in Kimoto and Yokawa 2009.

Catch amount between 1951 and 2008 by Japanese offshore and distant-water longline was estimated separately by stock. Catch number information on the operations of Japanese offshore and distant-water longliners was available since 1952, when the collection of log book is initiated by Japan Fishery Agency. This study used aggregated catch data by month and 5x5 degree grids. Detailed catch weight information (by 5x5 degree and by month) was estimated from size sampling data, but it is available only since 1971. Due to the lack of the detailed data of the catch weight in between 1952 and 1970, they were obtained by multiplying the detailed catch number data by the average weight which was estimated by zone using data in the period between 1971 and 1990. Since 1994, Japanese log-book system for the offshore and distant-water longliner started to collect average weight of major species by each operation, and this information was used for the calculation of areal catch weight of striped marlin. The catch amount in 1951 was obtained by apportioning the year book data in the same ratio as 1952.

Catch amount between 1951 and 2008 by coastal and other longline, bait fishing, net fishing, trap net, drift net, Squid drift net, and others-primarily harpoon was estimated from the total annual catch in Japanese year book. These fisheries operated only in the west of 140°W, WCPO zone.

Total number of hooks by Japanese offshore longline between 1952 and 2008 was also estimated in the WCPO and the EPO. This information (by 5x5 degree) was available since 1952 in the log book by Japan Fishery Agency.

Size data of striped marlin caught by Japanese fisheries have been collected, and the data is available since 1994. The number of size data in the North Pacific was estimated in this study.

Results and Discussions

North Pacific striped marlin catch data (mt) between 1951 and 2008 were compiled annually by gear type for each stock (Tables 1). Swordfish catch (mt) between 1951 and 2008 were available in Table 2-3 by gear type and each stock scenario.

The large catch amount of striped marlin had been caught by offshore and distant-water longline before 1990 in the WCPO and the EPO (Figure 2), though the total catch has been

decreasing since then. While the catch in the WCPO was fluctuated between 2,000mt and 4,000mt before 1990, significantly large amount of catch, which was over 4,000mt, was recorded several times in 1960s and 1980s. Since the late 1990s, the catch amount has been decreasing and observed less than 500t in the recent years. The considerable catch amount, which was over 6,000mt, was recorded during 1960s in the EPO, especially it was reached at the historical largest point, about 12,000mt, in 1968. The catch amount after 1990 has been less than 200mt and it was 31mt in 2008.

Large mesh drift net caught relatively large amount of catch, but the detailed data, such as the size data or fishing season, is still not available. Though the detailed data such as log books and size sampling has started to be collected in a recent year, it is necessary to continue to accumulate the detailed data. The remaining fisheries caught a small amount of striped marlin, and they are less than 50mt in recent years.

Total number of hooks by Japanese offshore longline also has been decreasing since 1990 in the WCPO and the EPO (Figure 3). In the WCPO, it was fluctuated between 150 million and 200 million before 1990, then started to decrease to 60 million in the recent years. In the EPO, it had been stable at about 35 million before 1990. The total hooks have been moderately decreasing since then and it was about 7 million in 2008.

The number of available size data was shown in Table 4. Although the available data before 2000 was over 30,000 individuals, they were decreased to 15,000 individuals in the mid-2000s. In these data, there is a possibility that the data in 1990s include both lower jaw fork length and eye fork length, especially in the driftnet. The data in the recent years were preliminary, thus they were not many as the previous years.

These results show that the Japanese data in the recent years is no longer as much as before. The catch amount in the most recent year was decreased to less than 15% in the WCPO and to a few percentages in the EPO of those before 1990. Moreover, the total number of hooks by Japanese longline in the recent years was also decreased to 30% and 20% of those before 1990 in the WCPO and the EPO, respectively. It would require careful consideration on the use of these striped marlin data from Japanese fisheries for the stock assessment.

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Table 1. Japanese striped marlin catches (mt) in the WCPO and the EPO by fisheries, 1951-2008; "-" indicates no effort or data not available, "0" indicates less than 1 metric ton, and catch of 2007 and 2008 are preliminary (*).

	Offshore and Distant-water longline		Coastal longline	Other longline	Squid drift net	Drift net	Bait fishing	Net fishing	Trap net	Others1)	Total
Area	WCPO	EPO	WCPO	WCPO	WCPO	WCPO	WCPO	WCPO	WCPO	WCPO	
1951	2494	0	-	673	-	0	39	0	92	1149	4447
1952	2901	0	-	722	-	0	39	1	203	1321	5187
1953	2138	0	-	47	-	0	26	10	126	793	3139
1954	3052	16	-	52	-	0	67	0	82	938	4208
1955	3075	7	-	28	-	0	46	36	106	850	4149
1956	3727	3	-	59	-	0	40	1	133	1822	5785
1957	3157	32	-	119	-	0	48	28	71	2312	5766
1958	4101	6	-	277	-	3	69	58	82	2704	7301
1959	4127	24	-	156	-	2	153	47	87	2905	7501
1960	3740	122	-	101	-	4	74	13	161	1689	5905
1961	3791	630	-	169	-	2	58	40	161	1538	6388
1962	4211	1528	-	110	-	8	36	72	197	1607	7770
1963	3638	2497	-	62	-	17	243	49	92	1527	8124
1964	5924	8379	-	42	-	2	24	17	81	2223	16691
1965	4171	7431	-	19	0	1	46	27	81	2640	14416
1966	2738	5681	-	112	0	2	25	6	226	1313	10103
1967	4158	7539	-	127	0	3	38	37	82	1394	13379
1968	3896	12017	-	230	0	0	39	19	71	914	17186
1969	2773	5771	600	3	0	3	40	41	71	2516	11818
1970	5698	7298	690	181	0	3	149	4	55	824	14902
1971	4081	6884	667	259	0	10	280	27	61	1674	13943
1972	2158	4849	837	145	0	243	90	4	72	827	9224
1973	3049	3308	632	118	0	3265	74	72	80	476	11074
1974	2597	4103	327	49	0	3112	104	0	90	581	10963
1975	1681	3599	286	38	0	6534	88	1	105	492	12825
1976	1643	3493	244	34	0	3561	93	14	37	441	9560
1977	1652	1367	256	15	0	4424	106	1	103	337	8261
1978	3221	736	243	27	0	5593	114	129	93	210	10366
1979	3520	2041	366	21	0	2532	132	1	66	327	9006
1980	3410	2969	607	5	0	3467	59	0	80	397	10993
1981	2087	2018	259	12	0	3866	64	5	88	385	8785
1982	1714	3669	270	13	0	2351	116	12	52	476	8673
1983	1500	2221	320	10	22	1845	121	35	124	547	6746
1984	2348	1158	386	9	76	2257	177	0	144	398	6952
1985	3156	741	711	24	40	2323	151	2	81	499	7728
1986	5088	1315	901	33	48	3536	97	6	131	343	11497
1987	4518	3020	1187	6	32	1856	167	0	102	244	11132
1988	4680	1591	752	7	54	2157	205	0	63	400	9909
1989	2823	1918	1081	13	102	1562	145	0	47	345	8035
1990	1673	695	1125	3	19	1926	192	1	65	287	5986
1991	2187	658	1197	3	27	1302	130	1	56	320	5881
1992	2323	632	1247	10	35	1169	94	1	71	137	5719
1993	2896	580	1723	1	-	828	371	2	27	308	6736
1994	2377	534	1284	1	-	1443	90	2	73	218	6022
1995	2440	1053	1840	3	-	970	78	8	58	139	6590
1996	1519	433	1836	4	-	703	87	1	39	25	4646
1997	1198	922	1400	3	-	813	68	0	34	61	4499
1998	1313	472	1975	2	-	1092	146	1	34	123	5157
1999	1403	205	1551	4	-	1126	90	0	28	66	4473
2000	902	250	1109	8	-	1062	91	0	41	165	3628
2001	778	207	1326	11	-	1077	36	0	51	150	3636
2002	585	179	796	5	-	1264	28	0	80	182	3119
2003	842	171	842	3	-	1064	26	1	41	135	3124
2004	561	137	1000	2	-	1339	35	1	23	33	3132
2005	461	101	668	1	-	1214	35	0	28	35	2543
2006	479	144	539	1	-	1190	31	1	30	33	2447
2007*	291	15	860	5	-	970	38	0	21	20	2220
2008*	363	31	606	10	-	1302	28	0	26	43	2408

Table 2. Stock Scenario-1 Japanese swordfish catches (mt) by fisheries, 1951-2008; "-" indicates no effort or data not available, "0" indicates less than 1 metric ton, and catch of 2007 and 2008 are preliminary (*).

	Offshore and Distant-water longline	Coastal longline	Other longline	Squid drift net	Drift net	Bait fishing	Net fishing	Trap net	Others1)	Total
1951	7246	-	115	-	10	88	10	78	4131	11678
1952	8890	-	152	-	0	6	6	68	2569	11691
1953	10796	-	77	-	0	20	87	21	1407	12408
1954	12563	-	96	-	0	104	17	18	813	13611
1955	13064	-	29	-	0	119	41	37	821	14111
1956	14596	-	10	-	0	66	7	31	775	15485
1957	14268	-	37	-	0	59	11	18	858	15251
1958	18525	-	42	-	0	46	21	31	1069	19734
1959	17236	-	66	-	0	34	10	31	891	18268
1960	20058	-	51	-	1	23	7	67	1191	21400
1961	19715	-	51	-	2	19	11	15	1335	21147
1962	10607	-	78	-	0	26	18	15	1371	12115
1963	10322	-	98	-	0	43	16	17	747	11243
1964	7669	-	91	0	4	40	26	16	1006	8852
1965	8742	-	119	0	0	26	182	14	1908	10991
1966	9866	-	113	0	0	41	4	11	1728	11763
1967	10883	-	184	0	0	33	5	12	891	12008
1968	9810	-	236	0	0	41	9	14	1539	11649
1969	9416	286	10	0	0	42	14	11	1557	11336
1970	7324	391	36	0	0	36	3	9	1748	9547
1971	7037	332	18	0	1	17	31	37	473	7946
1972	6796	520	11	0	55	20	2	1	282	7687
1973	7123	404	10	0	720	27	2	23	121	8430
1974	5983	508	146	0	1304	27	2	16	190	8176
1975	7031	602	18	0	2672	58	2	18	205	10606
1976	8054	691	59	0	3488	170	12	14	313	12801
1977	8383	834	46	0	2344	71	2	7	201	11888
1978	8001	984	47	0	2475	110	1	22	130	11770
1979	8602	973	65	0	983	45	4	15	161	10848
1980	6005	824	25	0	1746	29	1	15	398	9043
1981	7039	675	52	0	1848	58	3	9	129	9813
1982	6064	839	35	0	1257	58	1	7	195	8457
1983	7692	955	44	71	962	30	2	9	166	9931
1984	7177	1141	36	82	971	98	0	13	117	9635
1985	9335	980	19	107	1026	69	0	10	191	11737
1986	8721	960	77	94	1170	47	0	9	123	11201
1987	9495	819	41	141	910	45	0	11	87	11549
1988	8574	665	13	186	1048	19	0	8	173	10686
1989	6690	742	10	199	1397	21	0	10	362	9431
1990	5833	687	3	48	1026	13	0	4	128	7742
1991	4809	799	8	74	424	20	0	5	153	6292
1992	7234	1173	8	47	840	16	0	6	381	9705
1993	8298	1394	0	-	292	43	1	4	309	10341
1994	7366	1357	0	-	421	37	0	4	308	9493
1995	6422	1386	1	-	561	34	0	7	423	8834
1996	6916	1063	4	-	428	45	0	4	597	9057
1997	7002	1213	1	-	365	62	0	5	346	8994
1998	6233	1186	4	-	471	68	0	2	476	8440
1999	5557	1047	2	-	724	47	0	5	416	7798
2000	6180	1112	9	-	808	49	0	5	497	8660
2001	6932	899	9	-	732	30	0	15	230	8847
2002	6230	955	10	-	1164	29	0	11	201	8600
2003	5376	1058	5	-	1198	28	0	4	149	7818
2004	5395	1505	4	-	1062	30	0	4	229	8229
2005	5359	1289	6	-	956	337	0	3	187	8137
2006	6181	1505	3	-	796	342	1	5	244	9077
2007*	6109	2015	2	-	829	367	1	2	122	9446
2008*	4426	1756	2	-	648	349	0	3	173	7357

Table 3. Stock Scenario-2 Japanese swordfish catches (mt) by fisheries, 1951-2008; "-" indicates no effort or data not available, "0" indicates less than 1 metric ton, and catch of 2007 and 2008 are preliminary (*).

	Offshore and Distant-water longline		Coastal longline	Other longline	Squid drift net	Drift net	Bait fishing	Net fishing	Trap net	Others1)	Total
Sub-area	sub1	sub2	sub1	sub1	sub1	sub1	sub1	sub1	sub1	sub1	
1951	7245	1	-	115	-	10	88	10	78	4131	11678
1952	8889	1	-	152	-	0	6	6	68	2569	11691
1953	10794	2	-	77	-	0	20	87	21	1407	12408
1954	12548	15	-	96	-	0	104	17	18	813	13611
1955	13054	11	-	29	-	0	119	41	37	821	14111
1956	14588	11	-	10	-	0	66	7	31	775	15489
1957	14162	165	-	37	-	0	59	11	18	858	15310
1958	18453	132	-	42	-	0	46	21	31	1069	19795
1959	17169	92	-	66	-	0	34	10	31	891	18292
1960	19961	137	-	51	-	1	23	7	67	1191	21440
1961	19272	642	-	51	-	2	19	11	15	1335	21346
1962	9838	1057	-	78	-	0	26	18	15	1371	12404
1963	9016	2173	-	98	-	0	43	16	17	747	12110
1964	6272	2335	-	91	0	4	40	26	16	1006	9790
1965	7934	1264	-	119	0	0	26	182	14	1908	11447
1966	8751	2038	-	113	0	0	41	4	11	1728	12686
1967	9940	1399	-	184	0	0	33	5	12	891	12464
1968	8564	1821	-	236	0	0	41	9	14	1539	12224
1969	5929	7249	286	10	0	0	42	14	11	1557	15097
1970	4956	4194	391	36	0	0	36	3	9	1748	11373
1971	5781	1774	332	18	0	1	17	31	37	473	8464
1972	5326	2142	520	11	0	55	20	2	1	282	8358
1973	4703	3582	404	10	0	720	27	2	23	121	9592
1974	4630	1998	508	146	0	1304	27	2	16	190	8821
1975	5541	2303	602	18	0	2672	58	2	18	205	11419
1976	6154	3140	691	59	0	3488	170	12	14	313	14041
1977	6314	3665	834	46	0	2344	71	2	7	201	13485
1978	6220	3421	984	47	0	2475	110	1	22	130	13410
1979	7142	2645	973	65	0	983	45	4	15	161	12033
1980	4414	3326	824	25	0	1746	29	1	15	398	10778
1981	5628	2857	675	52	0	1848	58	3	9	129	11260
1982	4968	2091	839	35	0	1257	58	1	7	195	9451
1983	6399	2610	955	44	71	962	30	2	9	166	11248
1984	6350	1632	1141	36	82	971	98	0	13	117	10440
1985	8377	1721	980	19	107	1026	69	0	10	191	12500
1986	7213	2942	960	77	94	1170	47	0	9	123	12635
1987	7638	3681	819	41	141	910	45	0	11	87	13373
1988	6717	4027	665	13	186	1048	19	0	8	173	12856
1989	5003	3041	742	10	199	1397	21	0	10	362	10785
1990	3902	4046	687	3	48	1026	13	0	4	128	9857
1991	2942	4093	799	8	74	424	20	0	5	153	8518
1992	4705	5779	1173	8	47	840	16	0	6	381	12955
1993	6189	4366	1394	0	-	292	43	1	4	309	12598
1994	5427	4094	1357	0	-	421	37	0	4	308	11648
1995	4752	3393	1386	1	-	561	34	0	7	423	10557
1996	5181	3196	1063	4	-	428	45	0	4	597	10518
1997	4860	4146	1213	1	-	365	62	0	5	346	10997
1998	4081	4459	1186	4	-	471	68	0	2	476	10746
1999	4298	2546	1047	2	-	724	47	0	5	416	9084
2000	4509	2890	1112	9	-	808	49	0	5	497	9879
2001	4032	4896	899	9	-	732	30	0	15	230	10843
2002	4037	3986	955	10	-	1164	29	0	11	201	10393
2003	3478	3931	1058	5	-	1198	28	0	4	149	9851
2004	4939	1809	1505	4	-	1062	30	0	4	229	9581
2005	5054	1408	1289	6	-	956	337	0	3	187	9239
2006	5805	1297	1505	3	-	796	342	1	5	244	9997
20072)	5916	1386	2015	2	-	829	367	1	2	122	10639
20082)	4003	1634	1756	2	-	648	349	0	3	173	8567

Table 4. The number of available size data in the North Pacific.

Year	Number
1994	32070
1995	44754
1996	34112
1997	33716
1998	48723
1999	33853
2000	19466
2001	23975
2002	16350
2003	18148
2004	2766
2005	725
2006	28
2007	6679
2008	8464
Total	323829

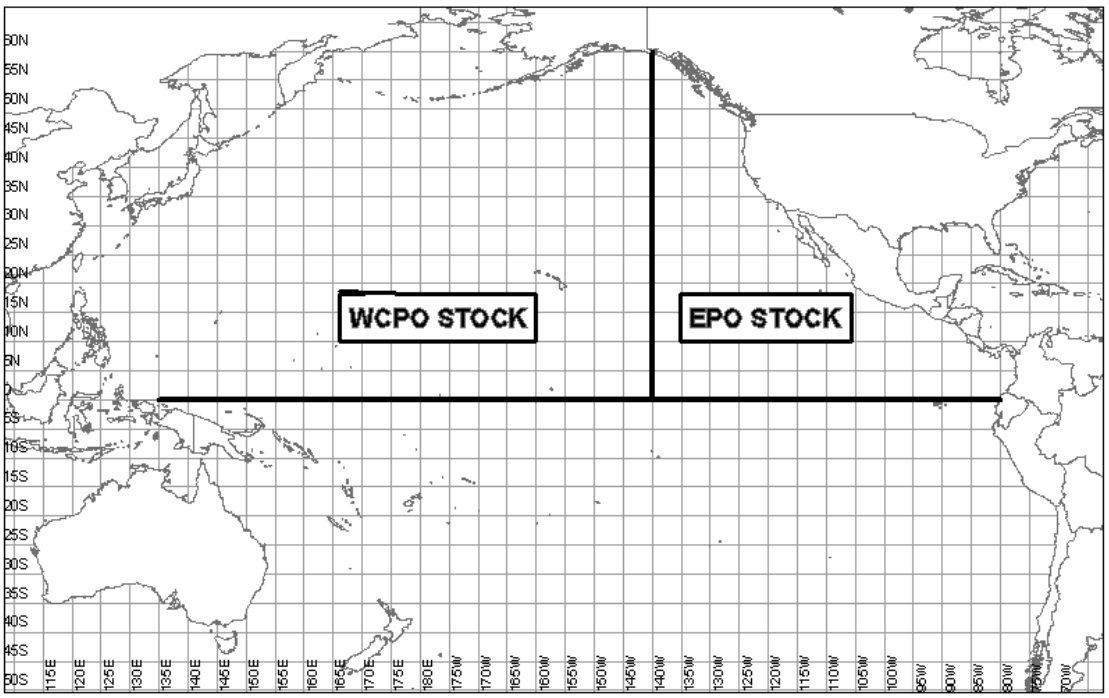

Figure 1. Stock boundary delineated for the 2011 stock assessment of North Pacific striped marlin (BILLWG, 2010).

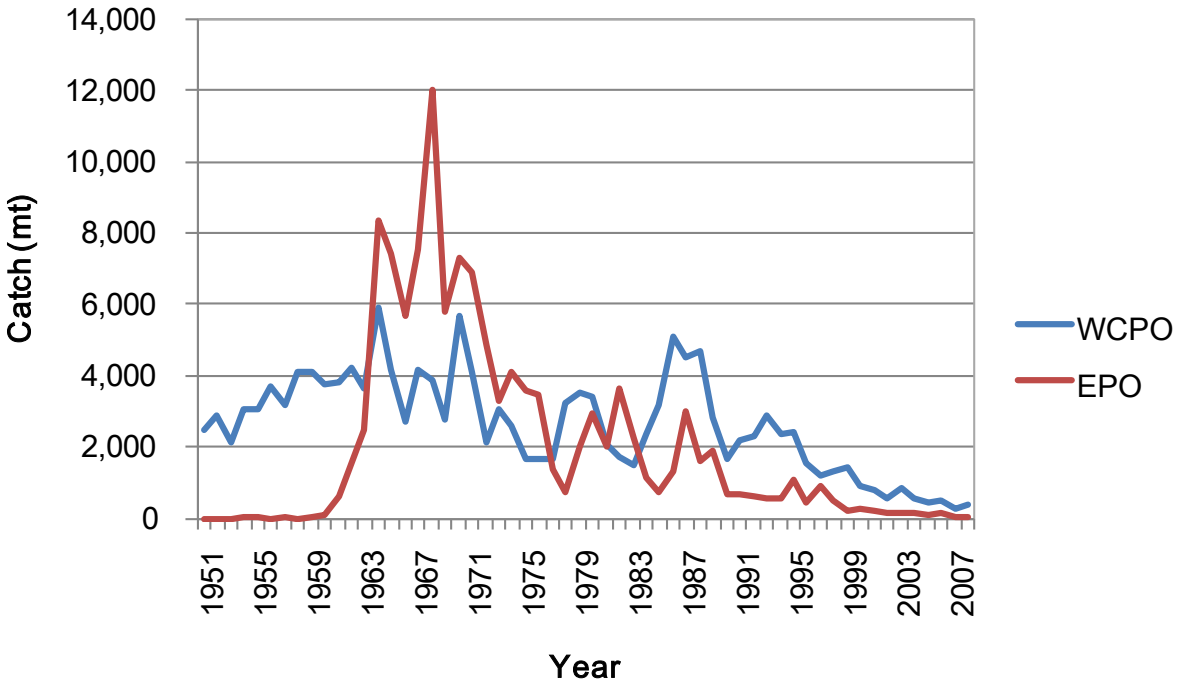

Figure 2. Catch amount (mt) of striped marlin in the WCPO and the EPO.

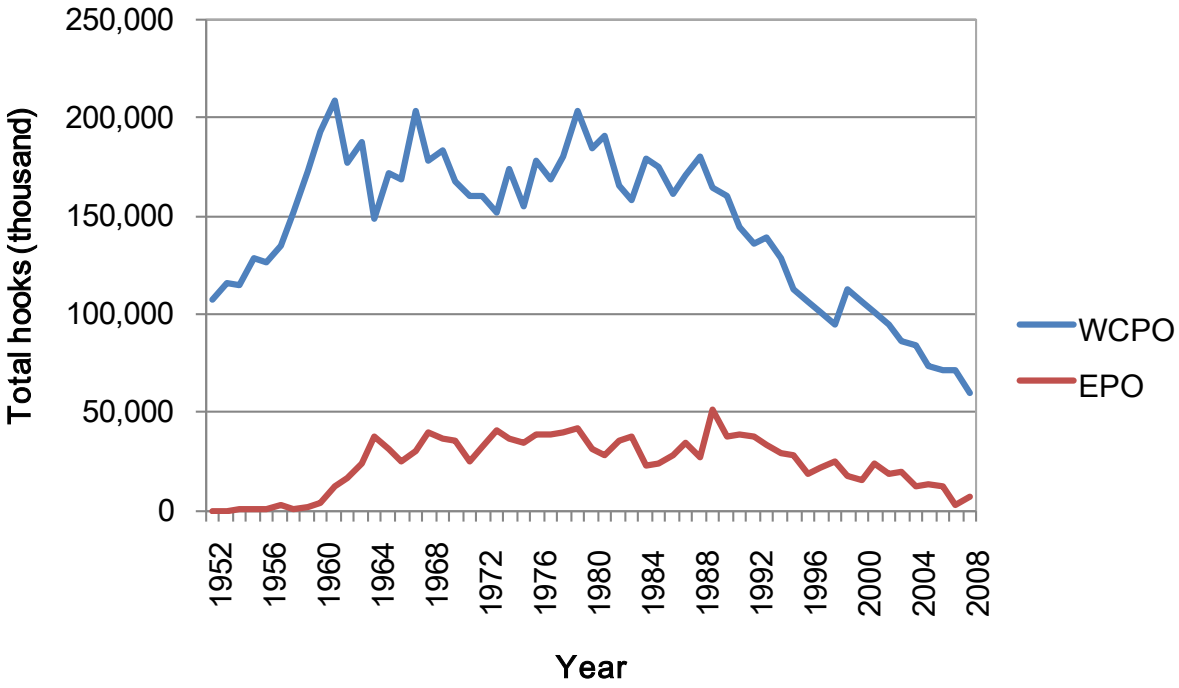

Figure 3. Total number of hooks by Japanese offshore longline in the WCPO and the EPO.