



ISC/09/BILLWG-2/07

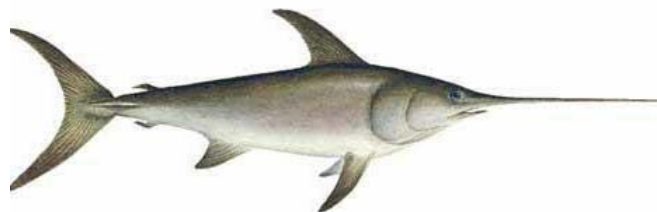
Input Data of Japanese Catch Amount of a North Pacific Swordfish Stock Assessment

Ai Kimoto

Contractor - NOAA National Marine Fisheries Service
National Research Institute of Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka, 424-8633 Japan

Kotaro Yokawa

National Research Institute of Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka, 424-8633 Japan



Input Data of Japanese Catch Amount of a North Pacific Swordfish Stock Assessment

Ai Kimoto^{a,*} and Kotaro Yokawa^b

a) NOAA/NMFS Pacific Islands Fisheries Science Center

b) National Research Institute of Far Seas Fisheries (NRIFSF)

*Visiting research fellow at NRIFSF

Abstract

This report provides input data of Japanese catch amount between 1951 and 2007 for the stock assessment of the North Pacific swordfish. The input data was obtained by Japanese year books and log books, and was estimated separately by stock scenario (Ichinokawa and Brodziak, 2008), sub-area, quarter, and gear designated by the WG (Kimoto and Yokawa, 2009). 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. The area stratification for sub-area in each stock scenario was followed by Sun *et al.* (2008).

Introduction

This report provides input data of Japanese catch amount for the stock assessment of the North Pacific swordfish. Because the ISC Billfish Working Group decided to conduct the stock assessment of the North Pacific swordfish with the two stock structure scenarios, the input data was estimated separately by stock scenario, sub-area, quarter, and gear designated by the WG (Kimoto and Yokawa, 2009).

Methods

Japanese catch amount (mt) of the North Pacific swordfish between 1951 and 2007 was compiled for each stock scenario using swordfish catch data obtained by Japanese year books and log books. Catch amount was provided separately by stock scenario, sub-area, quarter, 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. The area stratification for sub-area in each stock scenario was followed by Sun *et al.* (2008).

Offshore and distant-water longline

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 area and by quarter using data in the period between 1971 and 1990. For the calculation of the average weight, the area stratification for each stock scenario was used. 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 and seasonal catch weight of swordfish.

Catch amount between 1952 and 2007 by Japanese offshore and distant-water longline was estimated separately by stock scenario, sub-area, and quarter. The catch amount in 1951 was obtained by apportioning the year book data in the same ratio as 1952.

Coastal and other longline, bait fishing, net fishing, and trap net

Japan Fishery Agency also started to collect the log book of Japanese coastal longliners (defined as the longline boat of 10 – 19.99 tons) in 1994, and catch weight data was collected since 1998. Fishing grounds of the coastal longliners are in sub-areas 1 and 4. Same as the case of offshore and distant-water longline, the aggregated catch data by month and 5x5 degree grids was used. The catch number data was used for the estimation of areal and seasonal catch of swordfish by coastal longliners, because they showed a quite similar trend to the catch weight data, and they have longer period compared to the catch weight data. Because the exact coverage of log-book was not available for the coastal longliners, the ratio of catch number by area and quarter was used to apportion the total annual catch by coastal longliners appeared in the year book.

Catch amount between 1994 and 2007 by Japanese coastal longline was estimated separately by stock scenario, sub-area, and quarter by apportioning the year book data in the ratio of catch number. For the catch before 1993, the average ratio of catch number by area and quarter in between 1994 and 1998 was used to apportion the total annual catch from year book.

For other longline, bait fishing, net fishing, and trap net, the ratio of catch number, estimated for the coastal longline between 1951 and 2007, was used to apportion the total annual catch from year book to each area and quarter in each stock scenario.

Drift net, Squid drift net, and others-primarily harpoon

Japan Fishery Agency also collected the log book of Japanese driftnet in between 1977 and 1993. Because the catch weight information is not available, this study used aggregated catch number data by month and 5x5 degree grids. The ratio of catch number by stock scenario, sub-area, and quarter was calculated to apportion the year book data. The ratio of catch number before 1976 was assumed to be same as 1977. Due to the moratorium, which prohibited the operation of drift nets in the high seas area, the ratio of catch number in sub-area 1 and 4 after 1994 was set to be same as the average ratio between 1991 and 1993.

For the catch amount by drift net, squid drift net, and others (primarily harpoon), the estimated ratio of catch number in the drift net was used to apportion the catch data from year book to each area and quarter in each stock scenario.

Results and Discussions

North Pacific swordfish catch data (mt) between 1951 and 2007 were compiled annually by gear type separately for each stock scenario (Tables 1 – 3).

For offshore and distant-water longline data, due to the lack of the detailed data of catch weight before 1970, the average weight in the period between 1971 and 1990 was used to obtain the estimation of the catch weight. It is thought to be suitable to use the average weight, because the average weight was quite similar in all quarters through the period between 1971 and 1990, and it is considered that the drastic change after 1970 in biomass was not observed compared to before 1970 from the result of the standardized CPUE (Kimoto and Yokawa, 2009).

Large mesh drift net and others-primarily harpoon 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.

Bait fishing, net fishing, or trap net caught a small amount of swordfish as an accidental catch, and they are operating in the coastal area. Therefore, it was considered that the ratio of catch by these fisheries could be assumed same as those of the coastal longline.

References

- Ichinokawa, M., J. Brodziak. 2008. Stock boundary between possible swordfish stocks in the northwest and southeast Pacific judged from fisheries data of Japanese longliners. ISC/08/BILLWG-SS/04.
- Kimoto, A., and K. Yokawa. 2009. Update of the Catch per Unit Effort (CPUE) trend of Swordfish (*Xiphias gladius*) by the Japanese offshore and distant-water longline fishery in the Pacific. ISC/09/ BILLWG-1/15.
- Sun, C.-L., S.-Z. Yeh, and N.-J. Su. 2009. Standardization of Taiwanese distant water tuna

longline catch rates for swordfish in the North Pacific, 1995-2007, based on two stock structure scenarios. ISC/09/ BILLWG-1/17.

Table 1. Stock Scenario-1 Japanese swordfish catches (mt) by fisheries, 1951-2007; “-” indicates no effort or data not available, “0” indicates less than 1 metric ton, and catch of 2006 and 2007 are preliminary (*).

area	Offshore and Distantwater longline																Coastal longline								Other longline								Squid drift net											
	1				2				3				4				5				6				1				4				1											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4								
1951	3409	808	648	1852	235	5	28	184	0	0	0	0	21	5	1	7	7	16	5	16	0	0	0	0	-	-	-	-	-	-	-	-	33	13	9	36	7	7	7	4	-	-	-	-
1952	4183	991	795	2272	288	6	34	225	0	0	0	0	25	6	1	9	8	19	6	20	0	0	0	0	-	-	-	-	-	-	-	-	43	18	12	47	9	10	9	5	-	-	-	-
1953	3955	1822	264	3650	305	6	294	412	0	0	0	0	5	3	2	17	24	13	13	13	0	0	0	0	-	-	-	-	-	-	-	-	22	9	6	24	4	5	4	3	-	-	-	-
1954	5452	3234	657	1049	386	3	138	1589	0	0	0	0	7	5	3	9	4	10	3	1	0	0	0	13	-	-	-	-	-	-	-	-	28	11	7	30	5	6	5	3	-	-	-	-
1955	2496	2328	69	789	2786	1046	82	3382	0	0	0	0	13	8	3	12	9	14	7	8	1	0	0	8	-	-	-	-	-	-	-	-	8	3	2	9	2	2	2	1	-	-	-	-
1956	3037	2196	21	932	4265	693	50	3312	4	0	0	1	14	14	3	10	25	5	6	4	0	0	1	3	-	-	-	-	-	-	-	3	1	1	3	1	1	1	0	-	-	-	-	
1957	5235	2297	72	2411	2057	391	15	1609	0	0	0	1	25	11	4	14	20	17	27	26	0	7	24	5	-	-	-	-	-	-	-	11	4	3	11	2	2	2	1	-	-	-	-	
1958	7163	2093	153	2884	1820	1098	298	2816	0	0	1	6	12	21	3	17	45	46	30	10	1	0	6	3	-	-	-	-	-	-	-	12	5	3	13	2	3	2	1	-	-	-	-	
1959	4663	1701	1473	2342	2132	791	1166	2754	0	0	1	1	45	19	1	20	44	35	15	4	2	3	9	14	-	-	-	-	-	-	-	19	8	5	20	4	4	4	2	-	-	-	-	
1960	6320	1366	947	2383	3013	1335	572	3936	3	7	3	5	30	13	3	17	18	11	13	9	0	11	30	15	-	-	-	-	-	-	-	15	6	4	16	3	3	3	2	-	-	-	-	
1961	3737	1576	1339	1060	4230	1120	532	5483	1	8	11	2	45	12	8	95	31	56	107	14	9	72	124	44	-	-	-	-	-	-	-	14	6	4	16	3	3	3	2	-	-	-	-	
1962	1113	351	123	461	2927	1059	339	3509	1	8	3	6	58	16	14	31	26	25	26	21	25	275	126	63	-	-	-	-	-	-	-	22	9	6	24	4	5	4	3	-	-	-	-	
1963	577	373	160	1195	2685	237	360	3697	7	4	7	10	139	25	7	10	96	33	101	27	21	69	156	168	95	-	-	-	-	-	-	28	11	8	31	6	6	6	3	-	-	-	-	
1964	1601	668	395	933	677	41	116	1115	23	63	48	1152	27	8	5	28	53	67	24	18	131	196	192	87	-	-	-	-	-	-	-	26	11	7	28	5	6	5	3	0	0	0	0	
1965	2014	590	503	1049	486	179	356	2150	19	8	73	598	33	25	38	68	52	59	35	18	111	105	98	76	-	-	-	-	-	-	-	34	14	9	37	7	7	7	4	0	0	0	0	
1966	1925	826	1060	2136	1223	78	80	1339	147	51	70	351	25	28	20	68	41	52	18	32	52	126	55	63	-	-	-	-	-	-	-	32	13	9	35	6	7	6	4	0	0	0	0	
1967	2785	799	507	1575	1840	139	145	1928	26	30	32	294	31	49	15	17	52	66	35	13	59	108	171	168	-	-	-	-	-	-	-	53	21	14	57	10	12	10	6	0	0	0	0	
1968	1847	558	879	1619	1372	41	358	1360	60	67	158	510	62	40	36	22	31	54	19	16	121	149	249	182	-	-	-	-	-	-	-	67	27	18	73	13	15	13	8	0	0	0	0	
1969	2111	411	821	1487	1587	62	122	903	139	140	189	172	32	46	13	25	50	51	22	15	85	344	296	292	82	33	22	89	16	18	16	10	3	1	1	3	1	1	1	0	0	0	0	
1970	1471	391	632	1224	764	64	98	479	285	183	130	154	24	28	9	20	132	104	53	17	162	316	393	193	112	45	30	122	22	25	22	13	10	4	3	11	2	2	2	1	0	0	0	0
1971	1023	325	507	1066	1163	29	44	789	278	219	95	248	22	23	10	24	110	100	57	16	101	223	346	219	95	39	25	103	19	21	19	11	5	2	1	6	1	1	1	1	0	0	0	0
1972	1255	325	200	579	929	40	91	815	580	210	65	299	32	37	8	26	132	167	83	23	175	364	168	194	149	60	40	162	30	33	29	17	3	1	1	3	1	1	1	0	0	0	0	
1973	911	306	144	792	1107	145	108	525	474	186	76	167	30	41	10	20	162	87	53	23	359	537	525	334	116	47	31	126	23	25	23	14	3	1	1	3	1	1	1	0	0	0	0	
1974	678	311	224	1638	540	87	293	320	58	98	70	188	59	52	27	39	113	152	63	33	218	201	207	316	145	59	39	158	29	32	29	17	42	17	11	45	8	9	8	5	0	0	0	0
1975	1114	705	474	1965	609	78	126	276	15	176	106	121	51	54	52	38	68	85	40	13	88	151	267	359	172	70	46	187	34	38	34	20	5	2	1	6	1	1	1	1	0	0	0	0
1976	1273	520	447	1431	1030	343	176	551	421	144	69	186	53	48	52	46	48	176	74	23	149	230	368	199	198	80	53	215	39	43	39	23	17	7	5	18	3	4	3	2	0	0	0	0
1977	1748	752	510	1870	1225	571	48	236	55	73	2	21	60	72	33	32	57	82	41	19	124	394	228	130	239	97	64	260	47	52	47	28	13	5	4	14	3	3	3	2	0	0	0	0
1978	1405	554	423	1552	1596	869	132	454	71	0	4	14	38	58	39	35	48	104	39	42	107	216	143	57	281	114	75	306	56	62	56	33	13	5	4	15	3	3	3	2	0	0	0	0
1979	1373	801	883	1643	1785	558	45	300	207	5	12	12	37	94	46	97	57	90	59	36	42	171	200	51	278	113	74	303	55	61	55	33	19	8	5	20	4	4	4	2	0	0	0	0
1980	1129	633	339	748	1098	326	42	611	170	9	8	122	48	66	42	56	125	117	39	68	40	174	73	24	236	96	63	257	47	52	47	28	7	3	2	8	1	2	1	1	0	0	0	0
1981	1284	962	317	827	1786	361	54	299	160	31	14	182	43	88	103	16	43	147	50	14	15	96	126	20	193	78	52	210	38	42	38	23	15	6	4	16	3	3	3	2	0	0	0	0
1982	1010	666	248	1069	948	327	49	474	264	77	65	253	14	49	33	17	72	81	33	46	24	108	85	52	240	98	64	261	48	53	48	28	10	4	3	11	2	2	2	1	0	0	0	0
1983	2229	981	405	1006	907	526	57	479	441	2	20	168	17	24	12	29	68	71	34	15	34	134	31	2	273	111	73	297	54	60	54	32	13	5	3	14	3	3	2	1	1	1	13	12
1984	1055	464	762	1363	1399	584	35	303	550	22	9	127	34	71	26	23	58	91	75	43	8	17	41	15	326	133	87	355	65	72	65	38	10	4	3	11	2	2	2	1	5	3	8	8
1985	1753	1703	1075	1597	1224	417	39	500	298	0	0	21	44	68	34	27	108	111	62	23	26	74	103	27	280	114	75	305	56	62	56	33	5	2	1	6	1	1	1	1	11	8	14	13
1986	2241	1110	778	1228	904	593	58	664	205	62	36	154	14	35	16	16	88	97	80	38	20	157	112	18	275	112	73	299	55	60	54	32	22	9	6	24	4	5	4	3	14	6	6	13
1987	1707	651	529	916	1739	893	175	1050	656	49	15	293	8	38	26	23	114	107	77	38	23	231	115	22	234	95	63	255	47	52	46	27	12	5	3	13	2	3	2	1	9	2	5	5
1988	1392	497	538	456	2196	1086	148	778	353	5	57	492	17	49	51	21	123	89	32	17	11	95	61	10	190	77	51	207	38	42	38	22	4	2	1	4	1							

Table 3. Stock Scenario-2 (Sub Area-2) Japanese swordfish catches (mt) by fisheries, 1951-2007; Blank indicates no effort, “-” indicates data not available, “0” indicates less than 1 metric ton, and catch of 2006 and 2007 are preliminary (*).

	Offshore and Distant water			
area	1			
quarter	1	2	3	4
1951	0	0	0	1
1952	0	0	0	1
1953	0	0	1	1
1954	0	1	1	14
1955	1	0	1	8
1956	1	0	3	4
1957	6	17	37	46
1958	17	11	17	27
1959	18	15	17	17
1960	7	23	34	33
1961	93	119	120	111
1962	164	301	155	148
1963	272	256	390	388
1964	674	273	227	224
1965	268	168	149	223
1966	380	220	145	370
1967	174	185	256	328
1968	201	248	290	507
1969	256	870	1193	1169
1970	1065	542	420	340
1971	329	326	331	271
1972	283	492	286	410
1973	646	752	553	468
1974	321	261	319	452
1975	232	247	389	623
1976	374	369	565	593
1977	464	494	498	612
1978	560	384	327	509
1979	336	308	323	493
1980	343	272	312	665
1981	404	310	277	419
1982	222	200	227	449
1983	407	189	238	459
1984	341	97	132	257
1985	212	175	272	299
1986	268	355	436	449
1987	374	399	503	582
1988	505	258	440	654
1989	483	252	456	496
1990	472	378	506	576
1991	433	354	594	486
1992	626	449	671	784
1993	747	386	351	625
1994	486	329	599	525
1995	470	279	428	493
1996	452	507	302	475
1997	438	298	486	920
1998	719	458	365	611
1999	407	206	302	345
2000	376	290	479	525
2001	855	622	723	700
2002	581	445	526	641
2003	485	388	472	553
2004	570	244	245	387
2005	391	311	192	274
2006*	309	225	250	354
2007*	354	243	234	316