THE MALDIVIAN TUNA FISHERY

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Introduction

The tuna fishery in Maldives is a major contributor to the national economy. It provides export earnings, creates employment and is directly linked with the livelihoods of many island communities. The fisheries sector employs a considerable percentage of the total labour force. Tuna accounts for about 95% of the total recorded fish catch in 1989. Most of the catch is of skipjack tuna and yellowfin tuna which are caught mainly by small mechanized livebait pole and line vessels. Recorded tuna catches have been increasing and reached to 68,100 mt in 1988 and to 67,803 mt in 1989. The improvement brought in by the fish collector vessels has significantly contributed to the increased production.

Skipjack tuna

Skipjack tuna *(Katsuwonus pelamis)* is the most important fish species caught in Maldives. Catch for recent years are given in Table 1. The average annual catch during 1986-1989 was about 51,000 mt. Skipjack catches during 1986-1989 were higher than ever before with the highest record of 58,600 mt in 1988 (Table 1, Fig. 1), which is a 39.19% increase over 42,100 mt of 1987. However, the skipjack catch for 1989 was 58145, which is almost the same as that of 1988. Almost all of the catch was achieved by mechanized pole and line vessels.

Length frequency sampling at Male' fish market suggests that the two categories of skipjack commonly recognized by the fishermen has a dividing line of about 58 cm FL with some overlapping. The average weights of the large and small size skipjack landed are estimated at about 5.9 kg and 2.1 kg respectively (Hafiz and Anderson, 1988).

Yellowfin tuna

Yellowfin tuna *(Thunnus albacares)* is the second most important tuna species landed in the Maldives. Catches of yellowfin tuna remains almost stable over the last 2 years, with an annual average of about 6300 Mt landed during the period 1984-1989. Most of the catch is landed by mechanized pole and line vessels (Table 3 and Fig. 2). This yellowfin fishery in Maldives is highly seasonal.

Big-eye tuna

Big-eye tuna *(Thunnus obesus)* is very rare in Maldivian tuna catches, although it is caught in large quantities elsewhere in the Indian Ocean. Big-eye tunas, especially juveniles, are not always easy to differentiate from yellowfin tunas. They can best be separated on the basis of liver shape. In order to determine the contribution of bigeye to catches recorded as yellowfin, a survey to inspect tuna livers has been initiated. Three samples have so far been obtained which show that bigeye tunas contribute less than 1% to yellowfin catches.

In February 1989, 218 yellowfin of size range 53cm-147 cm FL were inspected in Haa Alifu Atoll. No bigeye were found.

Also in February 1989, 909 tunas were inspected at the Felivaru Cannery. Of these, 904 proved to be yellowfin and 5 big-eye tuna. The overall contribution of big-eye to the "Yellowfin" sample is therefore estimated at 0.55%. However, it should be noted that the five big-eye tuna sampled were all juveniles (35, 36, 37, 39 and 43 cm FL). The modal length of yellowfin sample was 44 cm FL. Only 70 tunas less than 40 cms FL were sampled during the survey (i.e. 7.7% of the total sample) but 4 out of 5 (i.e. 80%) of the big-eye sample were less than 40 cm FL. Therefore big-eye comprised 5.7% of the tunas less than 40 cm FL sampled. This may possibly indicate more pronounced vertical size segregation in big-eye tuna than is shown in yellowfin tuna. It is important to note that State Trading Organization (STO) does not purchase smallest sizes, so these were greatly underrepresented in the Felivaru sample.

In July 1989 another sample from Felivaru was inspected, with the assistance of scientists from the Indo-Pacific Tuna Program (IPTP), Colombo. Of 675 tunas examined, 2 were found to be bigeye tuna.

Small tunas, Seer fishes and Bill fishes

Frigate tuna *(Auxis thazard)* catches are given in Table 4 and are illustrated in Fig. 3. Annual average catch for the period 1984-1989 was 2233 mt.

Eastern little tuna or Kawakawa *(Euthynnus affinis)* catches are given in Table 5 and Fig. 4. Annual average catch for the period 1984-1989 was 1462 mt, which accounted for an average of 2.16% of the national tuna catch. A larger proportion of the little tuna catch (35% of the total catch in 1989) is taken by trolling vadhu dhonis operating mainly in and around the atolls and 61% of the catch is made by mechanized pole and line vessels in 1989.

Catch statistics for dogtooth tuna *(Gymnosarda unicolor)* have only been kept separately since 1984 and are summarized below (in numbers of fish).

	1984	1985	1986	1987	1988	1989
Mech. masdhoni	48,691	16,632	12,704	8,577	9,292	14,500
Sail masdhoni	998	2,220	817	1,428	482	500
Vadhu dhoni	12,593	11,434	8,987	7,421	4,038	2,833
Rowing boats	424	21	114	84	152	-
Total	62,706	30,307	22,622	17,510	13,964	17,833

A conversion factor of 2 kg per fish for dogtooth tuna was used to estimate the annual catches of 125 mt, 60 mt, and 35 mt during 1984-1987. But for 1988 and 1989 a conversion factor of 6 kg/fish was used to estimate the total catch of 107 mt in 1989 as suggested by the Male' fish market sampling. Dogtooth tuna are mainly caught by trolling or drop lining near the reefs.

Wahoo *(Acanthocybium solandri)*and sail fish *(Istiophorus platypterus)* are the only seerfish and billfish landed in any quantity in the Maldives as previously reported. Separate statistics are still not available for these species.

Discussion

Mechanization of pole and line fishing vessels has had a profound effect on the traditional fishing practices. Mechanization and development of the infrastructure during the mid 70's have resulted in higher catches.

Higher catches of large skipjack have been recorded in recent years. This may be as a result of motorization which helped fishermen to target for large skipjacks because of increased maneuverability and possibly because of their ability to fish further offshore. However, it may simply be a statistical error. The State Trading Organization (STO) uses 2.0 kg (approximately 45 cms) as the criterion in discriminating small and large skipjacks when purchasing fish from the local fishermen. It has been observed that the fishermen report STO size classification at the islands, recording 2.0 kg up fish as large skipjack (Godha) and fish below 2.0 kg as small skipjack (Mas). On the other hand, the Statistical Unit of the Ministry of Fisheries and Agriculture uses a length of approximately 55 cm to classify small and large skipjack (based on traditional classification). The expansion of STO operations in the atolls has resulted in increasing the purchase of skipjack tuna throughout the country, and probably recording under their weight classification system. That is, fish larger than approximately 45 cm being classified as large skipjacks rather than the traditional 55 cm fish. Therefore it can be assumed that this may be one of the factors in increasing recorded production of the skipjack in the Maldivian tuna fishery in recent years.

As is the case for skipjack tunas the statistics of yellowfin tuna may not be truly representative of the catch. Yellowfin catches are highly seasonal. The total recorded catches of yellowfin tuna have been almost constant during the last 3 years. The STO collecting operations target larger fish and prefers large skipjack. The yellowfin fishery by pole and line is targeted mainly for juvenile surface swimming fishes. Since small size yellowfins are mainly rejected by STO

especially during the high fishing season, the fishermen prefer to catch larger size fish (mainly larger skipjack). Eventhough there is increased market opportunities for canned yellowfin tuna in the European markets due to lack of price differential, the fishermen do not target their fishery for yellowfin.

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Table 1.

NUMBER OF FISHING VESSELS AND ANNUAL FISHING EFFORT

Year	NO. OF VESSELS					NO. OF TRIPS		
	Sailing Masdhoni	Mech. Masdhoni	Total Masdhoni	Vadhu Dhoni	Total Fleet	Sail Masdhoni	Mech. Masdhoni	Total Masdhoni
1970	1929	---	1929	2789	4718	191,421		191,421
1971	2011	---	2011	2898	4909	169,237		169,237
1972	2089	---	2089	2986	5075	158,544		158,544
1973	2146	---	2146	3012	5158	215,278		215,278
1974	2131	1	2132	3056	5188	203,362		203,362
1975	2040	42	2082	3156	5236	171,808	4,200	176,008
1976	1940	218	2158	3284	5442	153,539	21,800	175,339
1977	1801	413	2214	3385	5599	104,943	41,300	146,243
1978	1631	548	2179	3390	5569	53,739	54,800	108,539
1979	1485	767	2252	3386	5638	24,615	79,904	99,519
1980	1255	805	2060	3416	5476	16,877	83,134	100,011
1981	1061	970	2031	3364	5395	13,852	83,731	97,583
1982	952	1166	2118	3428	5546	10,036	97,085	107,12
1983	811	1231	2042	3448	5490	6,339	117,172	123,511
1984	651	1296	1947	3021	4968	6,220	153,460	159,680
1985	43 *	988 *	1031 *	963 *	1994 *	4,681	162,430	167,111
1986	32 *	1009 *	1041 *	753 *	1794 *	3,354	161,910	165,264
1987	21 *	1044 *	1051 *	655 *	1706 *	2,355	158,785	161,140
1988	16 *	1096 *	1112 *	505 *	1617 *	1,242	184,353	185,595
1989	14 *	1114 *	1128 *	414 *	1542 *	911	183,944	184,855

* Engaged in fishing.

Table 2.

SKIPJACK CATCH IN THE MALDIVES BY VESSEL TYPE, 1970 - 1989 (MT)

Year	Sailing Masdhoni	Mech. Masdhoni	Total Masdhoni	Vadhu Dhoni	Total Catch
1970	27,068	-	27,068	616	27,686
1971	28,200	-	28,200	509	28,709
1972	17,634	-	17,634	337	17,971
1973	18,761	-	18,761	434	19,195
1974	21,760	-	21,760	299	22,160
1975	13,921	680	14,601	257	14,858
1976	14,777	4826 *	19,603	489	20,091
1977	6,935	7097 *	14,032	310	14,342
1978	3,338	10,211 *	13,549	275	13,824
1979	1,603	16,195	17,798	338	18,136
1980	1,349	21,725	23,074	487	23,561
1981	577	19,621	20,198	419	20,617
1982	214	15,480	15,694	187	15,881
1983	122	19,369	19,491	210	19,701
1984	131	31,582	31,713	335 **	32,048
1985	165	42,005	42,170	432 **	42,602
1986	169	45,099	45,268	176	45,444
1987	196	41,676	41,872	239	42,111
1988	142	57,966	58,108	438 **	58,546
1989	135	57,671	57,806	339 **	58,145

* Estimated from total masdhoni catch and numbers of each vessels type, taking into account assumed catch rates and number of days fished by each vessel type

** Includes catches by rowing boats

Table 3.

YELLOWFIN IN THE MALDIVES BY VESSEL TYPE, 1970 - 1989 (MT)

Year	Sailing Masdhoni	Mech. Masdhoni	Total Masdhoni	Vadhu Dhoni	Total Catch
1970	1799	-	1799	190	1989
1971	1081	-	1081	146	1227
1972	1940	-	1940	136	2076
1973	5234	-	5234	241	5475
1974	3868	-	3868	260	4128
1975	3348 *	164 *	4481	410	4891
1976	3569 *	912 *	4481	410	4891
1977	2530 *	1539	4123	350	4473
1978	1324 *	1890 *	3214	370	3584
1979	733	2959	3692	597	4289
1980	471	3176	3647	582	4229
1981	273	4467	4740	544	5284
1982	167	3603	3771	234	4005
1983	112	5872	5984	257	6241
1984	76	6818	6894	230 **	7124
1985	82	5715	5797	269 **	6066
1986	22	5178	5200	121	5321
1987	9	6522	6531	137	6668
1988	12	6366	6378	157 **	6535
1989	6	5972	5978	104 **	6082

* Estimated

** Includes catches by rowing boats

Table 4.

FRIGATE TUNA CATCHES IN THE MALDIVES BY VESSEL TYPE, 1970 - 1988 (MT)

Year	Sailing Masdhoni	Mech. Masdhoni	Total Masdhoni	Vadhu Dhoni	Total Catch
1970	2775	-	2775	248	3203
1971	2849	-	2849	166	3015
1972	3004	-	3004	182	3186
1973	6440	-	6440	186	6626
1974	5804	-	5804	202	6006
1975	3713 *	181 *	3894	163	4057
1976	1971 *	448 *	2419	289	2707
1977	1863 *	953 *	2816	264	3080
1978	720 *	735 *	1455	206	1661
1979	435	994	1429	272	1701
1980	207	1804	1291	304	1595
1981	141	1156	1297	309	1606
1982	80	1750	1830	231	2061
1983	141	3048	3189	351	3540
1984	66	2701	2767	338 **	3105
1985	70	2071	2141	683 **	2824
1986	130	1309	1439	339 **	1778
1987	25	1580	1605	316	1921
1988	14	1373	1387	242 **	1629
1989	5	1949	1954	197 **	2146

* Estimated

** Includes catches by rowing boats

Table 5.

LITTLE TUNA CATCHES IN THE MALDIVES BY VESSEL TYPE, 1970 - 1989 (MT)

Year	Sailing Masdhoni	Mech. Masdhoni	Total Masdhoni	Vadhu Dhoni	Total Catch
1970	242	-	242	402	644
1971	220	-	220	253	473
1972	253	-	253	343	596
1973	574	-	574	514	1088
1974	397	-	397	433	830
1975	140 *	7 *	147	268	415
1976	153 *	34 *	191	762	953
1977	112 *	48 *	160	767	927
1978	78 *	55 *	133	634	768
1979	94	79	173	548	271
1980	104	191	295	768	1063
1981	191	284	403	871	1274
1982	172	671	843	1044	1887
1983	98	895	993	1094	2087
1984	49 *	646	695	1019 *	1714
1985	99	811	910	1267 **	2177
1986	23	476	499	572 **	1071
1987	18	548	566	666	1232
1988	11	690	701	557 **	1258
1989	13	811	824	498 **	1322

* Estimated

** Includes catches by rowing boats