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Mexican progress report on the marlin and swordfish fishery

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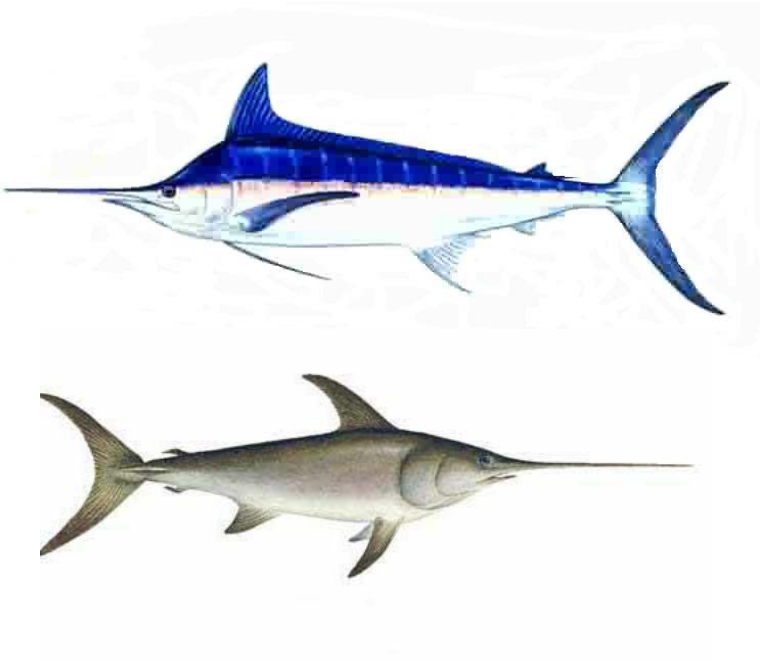

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Introduction:

Mexico has been reporting directly to the joint Marlin and Swordfish Working Group (MARLIN-SWO-WG) of the Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), since it was first convened in 2005. Each year, detailed information on the billfishes and swordfish fishery statistics had been presented, providing also progress reports on the biological and oceanographic research developed in Mexico with these fish resources. The aim of this contribution is now to complement the information previously presented, with the most current data collected in 2007 and with the preliminary results from 2008. This information is mainly derived from the sport fisheries activities with the marlin species and with the commercial swordfish fisheries developed in the Mexican Pacific Waters.These included the total catches and CPUE data (ISC-Category I, II and III) from the different marlin species, and for the swordfish only (ISC-Category I) data is available and reported.

Data Sources:

The National Institute of Fisheries of Mexico (Instituto Nacional de Pesca, INAPESCA-México), has systematically monitored the recreational billfish and the commercial swordfish fisheries fro many years. This work has been routinely performed by several Regional Fisheries Research Centers, (Centros Regionales de Investigación Pesquera, also known as the CRIPS-INAPESCA). They are located strategically in areas along the northwest Mexican Pacific and in the Gulf of California. Two of them are placed in both extremes of the Baja California peninsula, and three more are respectively based across the Gulf of California, in the mainland. In order, from north to South, the regional centers are known as: CRIP-ENSENADA and CRIP-LA PAZ, both in the extremes of the Baja California peninsula. The CRIP-GUAYMAS and CRIP-MAZATLÁN are in the state of Sonora and Sinaloa, and the CRIP-BADEBA is situated in Nayarit (Fig. 1). They together are responsible for continuously research, monitor, collect, review and analyze data of the different fisheries developed in the northwestern region of México. The data here presented is a combination of all those joint efforts.

As reported in previous contributions, all the sport fishing trips are required by Mexican law to carry logbooks and specific forms, (NOM-017-Pesc-1994:D.O.F 9/05/95). Besides this, the INAPESCA scientists based at the listed CRIPS, regularly sample the fishing localities, piers, boat ramps, weight stations, and marinas, complementing with their direct observations, the data collection and the different data sources provided by the existing fleets. In contrast, the swordfish, which is the only billfish subjected in México to commercial catches, requires for the

nature of its fishery to fill logbooks and special forms which are requested by the Mexican fishing authorities. This separated information is reported after each fishing trip to the local fisheries authorities of the Comisión Nacional de Pesca (CONAPESCA). Therefore, the commercial data here presented was collected by the cooperation of the scientific personal from the regional CRIPS and the fishing authorities from CONAPESCA.

Some of the information presented in this paper was published before in the Carta Nacional Pesquera, 2004 (CNP-INP, 2004), which constitutes one of the official national fishery data bases produced and reviewed seasonally by the INAPESCA-México. Information which was also previously offered in our sequential Progress Reports presented to the (MARLIN-SWO-WG). These are now complemented with the new data tabled in the latest version of the (CNP-INP, 2006). In addition, in this report, we present the most current data collected in 2007 and 2008 by the Sport Fisheries Monitoring Program, (SFMP-CRIP-LA PAZ-INAPESCA-Mexico). As it was suggested by the Joint Working Group, the information presented here covers the ISC-Category data I, II and III for the marlin species caught in Mexican waters and only Category I, for the sword fish.

Billfishes in Mexican Waters:

Six species of billfishes are recorded commonly in the Mexican Pacific waters. Given their relative abundances, the most important is by large the marlin (Tetrapturus audax). The other three marlin species which are present although in very small numbers are: the blue (Makaira nigricans), the black (M. indica) and the short bill spearfish (T. angustirostris). Besides these, the sail fish (Istiophorus platypterus), and the swordfish (Xiphias gladius) are also the other two billfishes species distributed in the Pacific side of México. As explained before, from those billfishes species found in México, only the swordfish is currently subject in some degree to some commercial catches and all the others are reserved totally for the recreational fisheries.

The sport fisheries activities along the Mexican Pacific coast are developed and concentrated in a specific designated fishing zone, which extends parallel to the Mexican Pacific coast, up to 50 nautical miles (nm) from the shore line. This area was officially established in 1983, as a reserve zone only for the recreational fishing activities, excluding the commercial catches (Diario Oficial, 1983). Later in 1987, for their relative importance, two other zones were established to complement the exclusion zones for the commercial operations. One is around the

coast and tip of the state of Baja California Sur and the other, off the Gulf of Tehuantepec in the South of México (Fig.1).

Along this extensive sport fishing area the marlin catches are basically concentrated mainly in three places. These sites are located on both sides of the entrance of the Gulf of California. The two more important, in terms of the numbers of fish caught by year are: Cabo San Lucas and Buenavista, in the state of Baja California Sur (B.C.S), which are located at the tip of the Baja California peninsula. Undoubtedly, they constitute the prime sport fishing locations for billfishes on the whole Pacific coast of Mexico, accounting for almost 90% of the total billfishes caught every year. The corresponding 10% is from the other location, placed across the Gulf of California, at the mainland Mexico, in the port of Mazatlán, Sinaloa.

As explained above, besides the regulations with exempt the billfishes species present in Mexican waters for commercial fisheries operations since 1983. In 1995, the sport fisheries activities were ruled also by a specific new norm (NOM-017-Pesc-1994; D.O.F. 9/05/95). In our previous Mexican Progress reports presented to ISC, or those other contributions directly reported to the Marlin WG, such as: Ulloa, Fleischer, Dreyfus y Vaca (2004); Dreyfus, Fleischer, Robles y Ulloa (2005); Fleischer (2005): Fleischer, Dreyfus, Robles y Ulloa, (2006), Dreyfus, Fleischer, Klett , Ulloa y Robles, (2007), Dreyfus. Fleischer, Ulloa y Robles. (2008), we complemented the history of the billfishes management and regulations existing in Mexico.

Marlin species are also in some degree subject to incidental catches in some Mexican long line fishery and by the gillnets operations directed to sharks and the swordfish. Recently the Mexican Government issued the NOM-029-Pesc-2007, directed to regulated the shark fishery and therefore, to prevent further the by catch problem with these and other non-target species. At the present, there is still no reliable information on the incidental catches for the marlins derived from these two national commercial fisheries acting in the Mexican Pacific waters. However, as reported before, Macías-Zamora (1992) and Macías-Zamora, Vidaurri-Sotelo and Santana Hernández (1994) reported some reliable information related with the sail fish incidental catch in Mexican fisheries.

The swordfish, which is the only commercially targeted billfish, is also taken incidentally by the recreational fishery directed to the marlin species, although this occurs in very low numbers. Here some data on

the low level catches of this species are presented confirming the low level of incidentally which occurs in the sport fishing activities in Mexico.

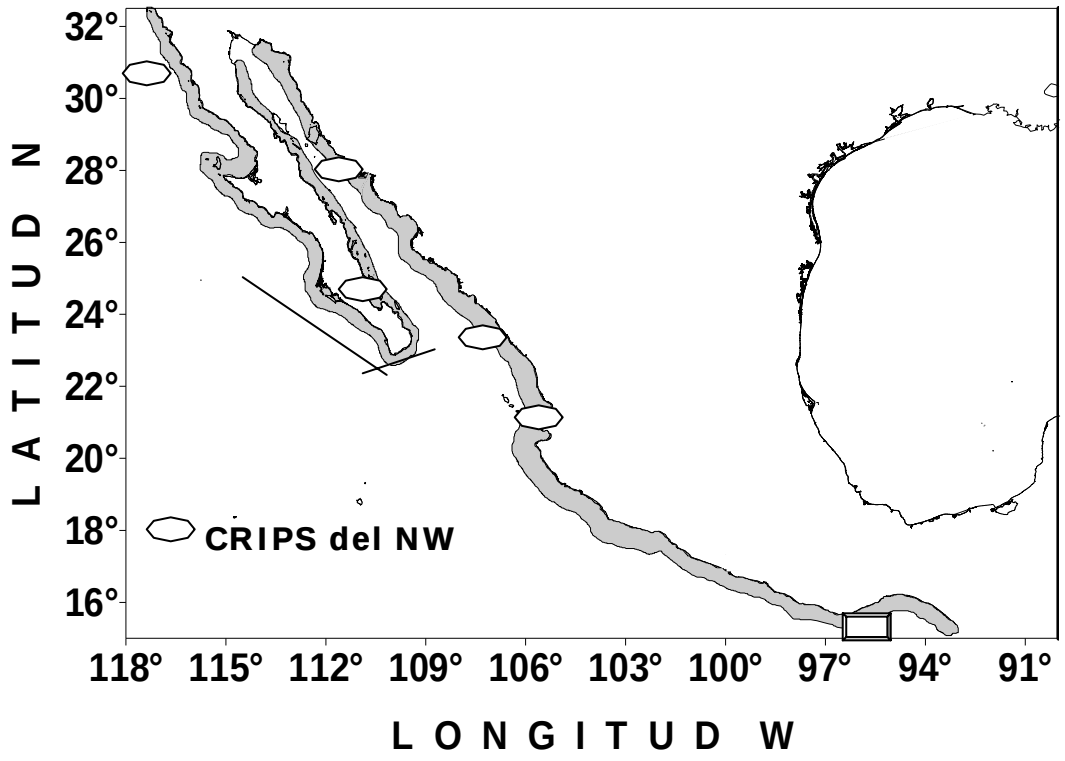

Fig. 1. Exclusive sport fishery zone of 50 nm miles from the coast, location of the two additional billfish protection zones in the Mexican Pacific and geographical position of the CRIPS-INAPESCA from the NW.

Marlins Total Catch and Catch and Effort (ISC-Categories I and II Data):

Reported catch are the basis for the analysis used in the INAPESCA-CRIPS for this fisheries. Catch is defined as the number of fish caught. This includes the fish which is hooked and released, as well as, the fish which dies and are retained. The rate of catch/release in the Mexican recreational fishing zones reported by the different fleets combined is high. In 2008 it was reported of 93.5% and for the same year, a value of 75% was monitored directly by the INAPESCA-CRIPS scientists on the different fishing sites routinely surveyed. However, no data is still available at the present on the survival rates of the fish released by the recreational fishery Mexican waters. Recently, Domeier, Dewar and Nasby-Lucas (2003) reported a mortality rate of 26.2 % for the striped

marlin caught with recreational fishing tackle used in Magdalena Bay in BCS, a locality which is not traditionally used for this activities. In this report we tabled for the first time, data on catch and release from the sport fishery encompassing the years 1998-2008.

The effort in turn is defined as the number of fishing trips. Therefore, CPUE is the number of fish reported caught per boat per day. The average catch rate here reported (monthly or annual) is the number of fish caught by the number of trips.

Table 1, taken from the CNP-INP, 2004, CNP-INP, 2006 and complemented by the new data from SPFM-CRIP-LA PAZ. It shows the total and average number of sport fishing trips recorded at the three main sport fishing locations in the Mexican Pacific coast from 1990 till 2008. However, the information for the year 2008 is still preliminary, since they are fleets which are still reporting to the SPFM-INAPESCA-CRIP-LA PAZ.

The number of sport fishing trips in the 19 years series presented in Table 1, yielded a total average of 39, 755. From those, 35, 721 or (89.85%) were based at the two Baja California Sur main fishing areas (Los Cabos and Buenavista) and the corresponding, 4, 032 (10. 144%) were in the mainland area, in Mazatlán. This confirms the importance for the sport fishing activities of the two main locations placed at the southern part of Baja California peninsula.

With this data a graph is produced showing a steady increase in the associated effort observed in Los Cabos area since 1995 to the present (Fig. 2). In comparison, Buenavista and Mazatlán had more stability in their historic number of trips. The total effort associated to this recreational fishery in the region of the mouth of the Gulf of California has increased since 1995 from 25, 307 trips per year to 56, 760 trips in 2005, (CNP-INP, 2004; CNP-INP, 2006 and recent data generated by the (CRIP-LA PAZ).

The data provided in Table 2, presents the corresponding information for all the marlin species caught at the combined three locations in Mexico. It is evident in terms of their relative numbers, the clear dominance of the striped marlin with of the total catches, among the marlin species in the entire area. It is followed by the sail fish, then the blue marlin. For, the black marlin, one of the less abundant billfishes in the Mexican Pacific waters, the average for the entire time series only represented 40 specimens and likewise, only and average of 36 sword fishes have

been reported caught in the recreational fisheries in the entire time series presented. This information is also graphed in Fig. 3.

Table1. Total and average number of sport fishing trips at the three main sport fisheries locations at the Mexican Pacific coast: Los Cabos, Buenavista, B.C.S. and Mazatlán, Sin. Mexico, from 1990-2008*. (Data taken from the CNP-INP, 2004, 2006 and SFMP-CRIP-LA PAZ, *data from 2008 still is preliminary).

YEAR	Los Cabos	Buenavista	Mazatlán	Areas Combined
1990	13589	9276	8649	31514
1991	19462	10157	5715	35334
1992	16576	9127	4320	30023
1993	15385	9313	4545	29243
1994	14845	9961	4421	29227
1995	13472	8619	3216	25307
1996	15315	9365	4368	29048
1997	20611	9694	2318	32623
1998	23501	8106	3321	34928
1999	25783	9948	4313	40044
2000	28211	9555	4074	41840
2001	24939	9300	3793	38032
2002	27618	12909	3828	44355
2003	34651	9361	3622	47634
2004	32780	12522	3554	48856
2005	37434	15288	4038	56760
2006	40888	11408	3679	55975
2007	40600	11619	3226	55445
2008*	37467	10073	1618	49158
AVERAGE	25,427	10,294	4,032	39,755

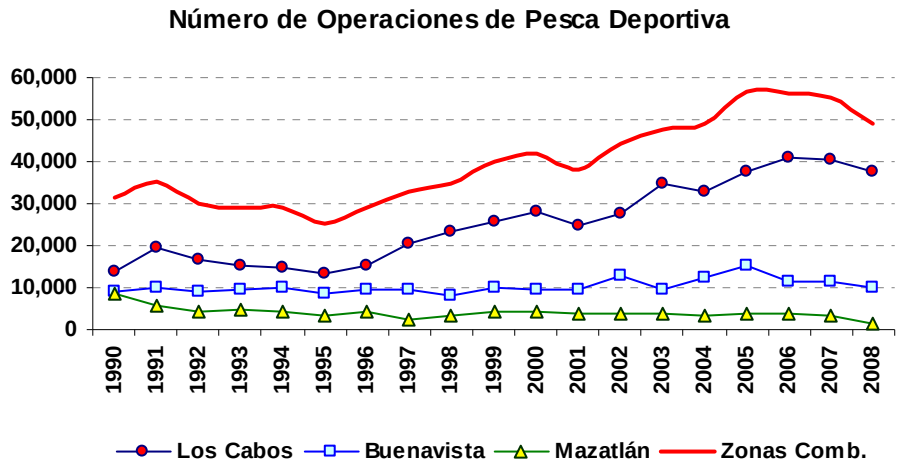

Fig. 2. Number of sport fishing trips at the three main locations at the Mexican Pacific coast: Los Cabos, Buenavista, B.C.S. and Mazatlán, Sin. Mexico, from 1990-2008*. (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ ,* data from 2008 still is preliminary).

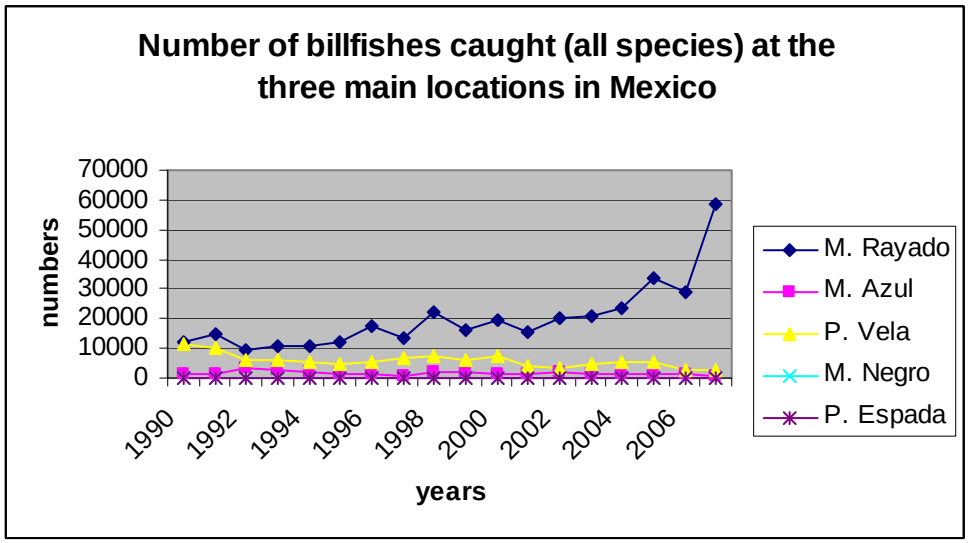

Fig. 3. Number of <u>all billfishes species caught</u> at the three main locations combined in the Mexican Pacific from 1990-2007. (Data taken from the CNP-INP, 2004, 2006 and SFMP-CRIP-LA PAZ,*data from 2008 still is preliminary).

Table 2. Number of billfish caught by species at the three main locations at the Mexican Pacific coast: Los Cabos, Buenavista, B.C.S. and Mazatlán, Sin. Mexico, from 1990-2008*. (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ ,*data from 2008 still is preliminary).

YEAR	MARLIN	BLUE MARLIN	SAIL FISH	BLACK MARLIN	SWORD FISH
1990	12375	1514	11345	27	98
1991	15120	1535	10079	31	37
1992	9463	3347	6117	46	1
1993	10950	2444	6031	78	5
1994	11083	1709	5101	52	36
1995	11974	1285	4592	34	21
1996	17354	1268	5389	25	18
1997	13302	752	6771	36	99
1998	22458	2083	7257	44	48
1999	16465	2351	6107	45	65
2000	19350	1630	7728	62	77
2001	15468	1561	3775	37	43
2002	19864	1754	3300	14	5
2003	20977	1156	4492	47	18
2004	23546	1214	5577	38	34
2005	33318	1544	5209	36	39
2006	29010	1294	2642	62	15
2007	58409	858	2403	26	16
2008*	59,213	507	3,515	10	18

Biological Data (Category III Data):

Pick concentrations for the striped marlin in the Mexican Pacific zones have been correlated with sea water temperatures. This normally occurs from December to June, when the temperature is 22^{o} C to 25^{o}C (Howard and Ueyanagi, 1965). Also, Ortega-García et al. (2003), reported more recent, a similar range of temperatures from 22^{0}C to 24^{0}C. Other works, like Squire (1974, 1985 and 1987), have discussed the catch distribution of the marlin and its relationship with surface isotherm temperatures.

At the present there is some evidence of reproduction of the marlin in the Baja California waters. González-Armas, Sosa-Nishizaki, Funes–Rodríguez and Levy-Pérez (1999) confirmed the presence of marlin larvae in the entrance of the Gulf of California, from June to November. This finding was associated with warmer temperatures ranging from 27-8^{0}C to 31.5^{0}C. The study suggested that females have to stay in warmer

waters because of its reproductive activity. Reproduction is also assumed to occur while migrating to the Pacific southern latitudes, during the months from July to October, (CNP-INP, 2004).

Ortega-García et al. (2003), reported the average lengths of marlin from Los Cabos area (B.C.S.). They sampled a data set with a total of 4,646 fishes caught from 1990-1999. From these, 2,524 (54.32%) were males and 2,122 (45.68%) females respectively. The average eye-fork length derived from this important regional study was 175 cm. The minimum size was recorded by them in 1996, with 167 cm and the maximum length reported in this study was 182 cm. significant length and weights differences were also found by these authors for males and females.

Similarly, the heaviest fish recorded on this data series (Loc. cit.) was reported in the spring. The Figure 9 (page 487) of their report, noted a lower number of fishes during the summer, but heavier females during this period were found. The sex ratio obtained in the cited study which encompasses ten years of data was 1: 1.19, with more males landed, but they again noted that females were more frequent during the summer months.

Complementary to the published information on size and weights of the marlins caught at Mexico, we present here new information collected by the CRIP La PAZ-INAPESCA. These are presented in detail by species and by sexes in the following series of 21 tables. Size here reported is from lower jaw to fork.

For the striped marlin Tables 3 to 8 summarizes the available length and weight information, as well as the same detailed information by sex. In turn, Tables 9 to 14 presents comparable information for the blue marlin. Tables 15 to 20 show the corresponding for the sword fish and tables 21 to 24 for the black marlin, although for this species no data of weights by sex is presented. With this information Fig. 4 are constructed for the lengths of principal marlin species caught in the Pacific waters of Mexico.

Table 3. Longitudes (Max and Min) of the striped marlins caught by the sport fisheries activities in Pacific Mexican waters form 1985-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ.*Data from 2008 still is preliminary).

Año	n	Tmin	Tmax	Media	s	Conf. Int.
85	277	134	243	199.944	13.335	1.570
86	181	161	246	203.411	14.967	2.180
87	786	160	239	204.023	13.393	0.936
88	545	165	246	203.618	13.332	1.119
89	552	167	256	207.172	12.452	1.039
90	714	163	257	208.514	11.547	0.847
91	665	154	246	207.558	12.584	0.956
92	466	166	244	210.974	12.974	1.178
93	352	156	256	206.49	11.975	1.251
94	400	152	244	204.858	14.685	1.439
95	513	136	247	200.682	17.652	1.528
96	648	157	243	199.164	13.869	1.068
97	392	142	241	203.069	13.081	1.295
98	373	163	238	202.729	14.204	1.441
99	235	171	244	204.574	12.057	1.542
00	236	163	240	203.852	14.852	1.895
01	205	160	234	202.156	13.173	1.803
02	230	156	239	201.513	13.509	1.746
03	279	153	245	200.151	13.343	1.566
04	241	161	245	194.743	15.917	2.010
05	342	148	261	193.228	17.054	1.807
06	317	151	237	193.035	14.309	1.575
07	292	141	238	194.592	15.913	1.825
08	282	160	239	197.227	13.528	1.579

Table 4. Median weights of the striped marlin caught by the sport fisheries activities in Pacific Mexican waters form 1985-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ.*Data from 2008 still is preliminary).

Año	N	Media	s	Conf. Int.
85	3489	51.611	12.709	0.422
86	5741	52.837	11.501	0.298
87	788	52.871	11.863	0.828
88	600	52.84	11.64	0.931
89	550	59.993	13.444	1.124
90	692	56.625	9.844	0.733
91	567	56.921	10.079	0.830
92	433	53.164	10.397	0.979
93	319	49.89	9.796	1.075
94	363	48.804	11.94	1.228
95	485	52.134	14.939	1.330
96	616	52.218	10.714	0.846
97	380	52.047	9.911	0.996
98	360	47.731	10.646	1.100
99	235	49.953	9.474	1.211
00	236	49.695	12.2	1.557
01	195	48.903	10.29	1.444
02	227	49.89	11.513	1.498
03	278	47.14	10.279	1.208
04	238	43.466	11.994	2.208
05	340	41.05	13.038	1.386
06	309	41.434	10.782	1.202
07	277	41.181	11.401	1.343
08	282	43.27	10.731	1.252

Table 5. Longitudes of the male striped marlin caught by the sport fisheries activities in Pacific Mexican waters form 1987-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ.*Data from 2008 still is preliminary).

MALES	STRIPED	MARLIN	LENGTHS			
Año	n	Tmin	Tmax	Tmed	s	Conf. Int.
87	431	166	239	203.046	12.828	1.211
88	207	159	235	199.768	12.187	1.660
89	268	167	232	205.422	10.665	1.277
90	396	163	234	206.296	11.013	1.085
91	371	164	234	206.094	11.196	1.139
92	273	166	238	209.227	11.868	1.408
93	196	175	233	205.816	10.897	1.526
94	191	157	235	204.571	13.949	1.978
95	260	136	236	198.981	16.617	2.020
96	304	157	232	197.204	13.494	1.517
97	214	142	226	199.935	12.561	1.683
98	190	163	238	200.463	12.225	1.738
99	128	171	228	202.789	10.871	1.883
00	132	164	234	200.500	12.937	2.207
01	128	171	234	203.922	12.58	2.179
02	137	156	234	199.562	13.329	2.232
03	160	161	229	198.863	12.112	1.877
04	128	161	235	192.938	14.207	2.461
05	186	155	228	193.403	15.614	2.244
06	193	155	228	191.513	13.397	1.890
07	137	151	234	191.985	14.833	2.484
08	147	160	235	195.993	12.966	2.096

Table 6. Weights of the male striped marlin caught by the sport fisheries activities in Pacific Mexican waters form 1987-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ. *Data from 2008 still is preliminary).

MALE	STRIPED	MARLIN	WEIGHTS	
Año	n	Pmed	s	Conf. Int.
87	431	51.705	10.689	1.009
88	208	48.582	10.366	1.409
89	266	58.387	11.893	1.429
90	385	54.351	9.575	0.956
91	356	54.938	8.985	0.933
92	264	51.326	8.9	1.074
93	186	48.882	8.196	1.178
94	182	47.94	10.471	1.521
95	257	49.957	13.238	1.618
96	293	51.058	10.094	1.156
97	206	49.893	8.795	1.201
98	186	46.075	9.151	1.315
99	128	48.469	8.396	1.455
00	132	46.659	10.406	1.775
01	120	50.45	10.001	1.789
02	137	47.897	10.497	1.758
03	160	45.825	8.794	1.363
04	124	41.847	10.157	1.788
05	184	40.435	11.026	1.593
06	189	40.148	9.32	1.329
07	130	39.346	10.764	1.850
08	146	43.021	9.666	1.568

Table 7. Longitudes of the female striped marlin caught by the sport fisheries activities in Pacific Mexican waters form 1987-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ. *Data from 2008 still is preliminary).

FEMALES	STRIPEd	MARLIN	LENGHTS			
Año	n	Tmin	Tmax	Tmed	s	Conf. Int.
87	348	160	239	205.175	14.028	1.474
88	181	165	246	204.193	13.300	1.938
89	278	170	256	208.921	13.683	1.608
90	310	165	257	211.523	11.526	1.283
91	283	154	246	209.442	13.867	1.616
92	176	174	244	213.921	13.887	2.052
93	139	156	256	207.719	13.578	2.257
94	192	152	244	205.365	15.150	2.143
95	231	151	247	203.706	18.194	2.346
96	328	159	243	201.296	13.986	1.514
97	176	167	241	206.875	12.789	1.889
98	176	167	236	205.246	15.500	2.290
99	105	171	244	206.362	12.886	2.465
00	104	163	240	208.106	15.038	2.890
01	77	160	234	199.221	13.668	3.053
02	91	173	239	204.670	13.180	2.708
03	118	153	245	202.017	14.703	2.653
04	112	161	245	196.875	17.549	3.250
05	156	148	261	193.019	18.676	2.931
06	122	151	237	195.631	15.387	2.730
07	153	141	238	196.810	16.579	2.627
08	133	164	239	198.722	14.030	2.384

Table 8. Weights of the female striped marlin caught by the sport fisheries activities in Pacific Mexican aters form 1987-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ.*Data from 2008 still is preliminary).

FEMALE	STRIPED	MARLIN	WEIGHTS	
Año	n	Pmed	s	Conf. Int.
87	347	54.274	13.106	1.379
88	180	51.628	11.428	1.669
89	275	61.836	14.507	1.715
90	303	60	11.445	1.289
91	271	58.985	12.58	1.498
92	168	56.071	11.901	1.800
93	132	51.386	11.56	1.972
94	177	49.627	13.304	1.960
95	224	54.772	16.4	2.148
96	319	53.357	11.182	1.227
97	173	54.653	10.564	1.574
98	173	49.584	11.796	1.758
99	107	51.729	10.385	1.968
00	104	53.74	13.104	2.518
01	74	46.311	10.35	2.358
02	91	52.868	12.353	2.538
03	118	48.924	11.809	2.131
04	112	45.455	13.519	2.504
05	156	41.776	15.076	2.366
06	120	43.458	12.526	2.241
07	145	42.779	11.797	1.920
08	134	43.664	11.823	2.002

Table 9. Longitudes (Max and Min) of blue marlin caught by the sport fisheries activities in Pacific Mexican waters form 1985-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ.*Data from 2008 still is preliminary).

BLUE	MARLIN	LONGITUDES				
Año	n	Tmin	Tmax	Media	s	Conf. Int.
85	15	196	295	232.667	21.865	11.065
86	78	186	305	231.923	24.814	5.507
87	138	173	301	223.959	22.558	3.764
88	83	176	323	220.813	24.449	5.260
89	199	186	302	225.087	19.151	2.661
90	110	190	307	229.155	19.744	3.690
91	77	193	280	231.662	23.068	5.152
92	153	180	321	231.51	25.662	4.066
93	97	183	339	230.85	27.742	5.521
94	124	189	365	229.855	29.776	5.241
95	65	172	310	224.903	26.903	6.540
96	105	183	357	232.943	27.035	5.171
97	47	191	275	227.979	18.951	5.418
98	104	179	308	223.077	25.63	4.926
99	59	195	269	220.831	15.096	3.852
00	60	200	284	234.267	18.761	4.747
01	31	191	319	228.839	23.857	8.398
02	54	173	275	221.444	19.07	5.086
03	21	191	273	229.857	25.541	10.924
04	18	209	284	236.722	24.843	11.477
05	29	180	250	215.621	18.895	6.877
06	35	180	310	224.629	27.432	9.088
07	13	188	270	226.462	26.844	14.592
08	8	206	254	226.125	17.707	12.270

Table 10. Median weights of the blue marlin caught by the sport fisheries activities in Pacific Mexican waters form 1985-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ. *Data from 2008 still is preliminary).

BLUE	MARLIN	WEIGHTS		
Año	n	Media	s	Conf. Int.
85	16	121.875	39.953	19.577
86	80	110	39.937	8.751
87	138	93.295	35.461	5.916
88	83	77.541	38.43	8.268
89	206	101.782	28.691	3.918
90	113	110.035	35.416	6.530
91	75	119.76	40.142	9.085
92	146	110.232	47.253	7.665
93	86	107.91	46.883	9.909
94	109	106.89	52.841	9.920
95	42	100.937	41.007	12.402
96	101	117.279	42.167	8.224
97	47	109.489	26.955	7.706
98	104	98.529	40.398	7.764
99	59	97.203	21.339	5.445
00	59	110.932	31.276	7.981
01	31	107.677	47.444	16.701
02	54	93.778	23.532	6.276
03	21	109.238	41.89	17.916
04	18	117.222	32.394	14.965
05	29	80.759	22.784	8.292
06	35	94.657	48.432	16.045
07	13	93	30.537	16.600
08	8	92.75	27.912	19.342

Table 11. Available longitudes of the male blue marlin caught by the sport fisheries activities in Pacific Mexican waters form 1987-2006 (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ. Detailed data from some years is not available).

MALE	BLUE	MARLIN	LONGITUDES			
Año	n	Tmin	Tmax	Tmed	s	Conf. Int.
87	9	207	240	224.556	11.949	7.807
88	9	194	248	218.556	18.736	12.241
89	4	187	246	218.250	25.264	24.758
90	4	211	227	216.250	7.274	7.128
91	3	207	219	211.333	6.658	7.534
92	7	210	231	220.857	7.625	5.649
93	1	226	226	226.000	-	-
94	3	197	249	215.667	28.937	32.745
95	6	213	223	217.833	3.488	2.791
96	3	213	235	222.667	11.240	12.719
97	2	223	229	226.000	4.243	5.880
98						
99						
00	2	201	231	216.000	21.213	29.399
01						
02						
03						
04						
05						
06	2	197	243	220.000	32.527	45.079

Table 12. Available weights of the male blue marlin caught by the sport fisheries activities in Pacific Mexican waters form 1987-2006 (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ. Detailed data from some years is not available).

MALE	BLUE	MARLIN	WEIGHTS	
Año	n	Pmed	s	Conf. Int.
87	9	96.111	18.274	11.939
88	9	89.667	66.669	43.556
89	4	91.250	26.998	26.458
90	4	80.000	9.201	9.017
91	2	97.500	10.607	14.700
92	7	86.857	16.807	12.451
93	1	90.000		
94	3	90.667	42.736	48.359
95	6	90.833	13.258	10.608
96	3	93.667	16.042	18.153
97	2	106.500	16.263	22.539
98				
99				
00	2	87.500	17.678	24.500
01				
02				
03				
04				
05				
06	2	82.000	32.527	45.079

Table13. Available longitudes of the female blue marlin caught by the sport fisheries activities in Pacific Mexican Waters form 1987-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ. *Data from 2008 still is preliminary).

FEMALE	BLUE	MARLIN	LONGITUDES			
Año	n	Tmin	Tmax	Tmed	s	Conf. Int
87	116	173	301	223.397	22.491	4.093
88	75	176	321	221.520	24.928	5.642
89	193	186	302	225.249	18.580	2.621
90	104	190	307	228.817	19.179	3.686
91	73	193	280	232.110	23.073	5.293
92	141	180	321	232.255	26.471	4.369
93	85	183	339	230.800	28.864	6.136
94	113	189	365	228.726	28.703	5.292
95	151	172	310	225.801	27.971	4.461
96	102	183	357	233.245	27.329	5.304
97	44	191	275	228.023	19.583	5.786
98	104	179	308	223.077	25.630	4.926
99	59	195	269	220.831	15.096	3.852
00	56	200	284	235.178	18.827	4.931
01	31	191	319	228.839	23.857	8.398
02	54	173	275	221.444	19.07	5.086
03	21	191	273	229.857	25.541	10.924
04	18	209	284	236.722	24.843	11.477
05	29	180	250	215.621	18.895	6.877
06	33	180	310	224.909	27.66	9.437
07	13	188	270	226.462	26.844	14.592
08	8	206	254	226.125	17.707	12.270

Table14. Available weights of the female blue marlin caught by the sport fisheries activities in Pacific Mexican waters form 1987-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ.*Data from 2008 still is preliminary).

FEMALE	BLUE	MARLIN	WEIGHTS	
Año	n	Pmed	s	Conf Int..
87	117	91.87	33.554	6.080
88	74	91.23	36.856	8.397
89	196	101.74	28.409	3.977
90	104	108.808	33.46	6.431
91	72	118.472	37.376	8.633
92	136	112.618	48.212	8.103
93	84	108.464	47.295	10.114
94	105	106.143	51.971	9.941
95	135	101.037	41.734	7.040
96	124	125.387	44.731	7.873
97	44	110.25	27.432	8.105
98	104	98.529	40.398	7.764
99	59	97.203	21.339	5.445
00	57	110.614	32.994	8.565
01	31	107.677	47.444	16.701
02	54	93.778	23.532	6.276
03	21	109.238	41.89	17.916
04	18	117.222	32.394	14.965
05	29	80.759	22.784	8.292
06	33	95.424	49.484	16.883
07	13	93.000	30.537	16.600
08	8	92.75	27.912	19.342

Table 15. Longitudes (Max and Min) of sail fish caught by the sport fisheries activities in Pacific Mexican waters form 1985-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ.*Data from 2008 still is preliminary).

SAIL	FISH	LONGITUDES				
Año	n	Tmin	Tmax	Media	s	Conf. Int.
85	17	183	209	187.294	14.294	6.795
86	45	142	220	191	22.569	6.594
87	33	106	222	187.545	25.384	8.661
88	11	176	215	194.273	12.817	7.574
89	227	154	227	196.289	11.981	1.559
90	242	156	227	196.471	11.868	1.495
91	145	159	224	196.021	12.994	2.115
92	103	150	232	194.835	17.069	3.296
93	87	161	224	195.4	12.831	2.696
94	59	162	223	191.237	13.33	3.401
95	60	158	223	186.45	15.912	4.026
96	28	174	223	193.5	12.983	4.809
97	139	156	222	189.137	12.818	2.131
98	98	161	220	186.602	12.946	2.563
99	18	124	220	186.278	21.152	9.772
00	39	154	211	184.641	13.992	4.391
01	15	164	205	189.533	11.445	5.792
02	19	169	212	191.158	14.112	6.345
03	14	174	220	198.929	12.731	6.669
04	28	157	233	189.857	17.333	6.420
05	24	165	214	190.375	13.367	5.348
06	19	156	213	186.368	16.249	7.306
07	5	163	193	176.4	11.082	9.714
08	17	159	208	190.353	13.62	6.474

Table 16. Median weights (Max and Min) of sail fish caught by the sport fisheries activities in Pacific Mexican waters form 1985-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ.*Data from 2008 still is preliminary).

WEIGHTS	SAIL	FISH		
Año	n	Media	S	Int.Conf.
85	151	29.789	8.354	1.332
86	197	31.471	19.045	2.659
87	35	28.4	11.059	3.664
88	15	28.731	12.817	6.486
89	236	32.322	9.042	1.154
90	225	31.462	5.329	0.696
91	135	32.914	6.269	1.057
92	92	30.198	9.364	1.913
93	74	31.892	7.269	1.656
94	50	30.24	6.678	1.851
95	55	28.436	9.293	2.456
96	27	37.481	9.293	3.505
97	127	30.378	6.694	1.164
98	95	27.168	5.263	1.058
99	18	29.111	11.386	5.260
00	38	26.211	6.564	2.087
01	15	30.267	6.974	3.529
02	19	29.211	6.443	2.897
03	14	33.857	8.17	4.280
04	27	30.852	8.113	3.060
05	23	28.217	7.61	3.110
06	18	26.722	8.18	3.779
07	5	22.4	6.841	5.996
08	17	26.176	4.599	2.186

Table 17. Available lengths of the male sail fish caught by the sport fisheries activities in Pacific Mexican waters form 1987-2006* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ. *Data from 2008 still is preliminary).

MALES	SAIL	FISH	LENGTHS			
Año	n	Tmin	Tmax	Tmed	s	Int.Conf.
87	8	152	197	174.000	13.137	9.103
88	2	175	201	188.000	18.385	25.480
89	70	154	218	194.000	12.326	2.887
90	108	169	227	192.833	11.592	2.186
91	45	159	223	191.068	14.307	4.180
92	36	169	232	193.111	14.723	4.809
93	28	161	214	191.000	13.219	4.896
94	17	162	205	185.000	12.510	5.947
95	26	158	206	179.039	12.334	4.741
96	9	174	195	185.220	7.379	4.821
97	65	164	212	185.877	11.459	2.786
98	56	161	220	183.750	11.803	3.091
99	4	170	202	189.500	14.526	14.235
00	19	161	206	182.000	12.188	5.480
01	7	181	200	191.857	7.290	5.400
02	1	193	193	193.000		
03	6	174	193	187.500	6.892	5.515
04	9	157	206	188.000	16.651	10.878
05	8	170	214	188.375	14.030	9.722
06	6	172	208	189.167	13.630	10.906
07	1	173	173	173.000		
08	4	174	208	191.250	17.727	17.372

Table 18. Available weights of the male sail fish caught by the sport fisheries activities in Pacific Mexican Waters form 1987-2006 (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ.*Data from 2008 still is preliminary. Detailed data from some years is not available).

MALE	SAIL	FISH	WEIGHTS	
Año	n	Pmed	S	Int.Conf.
87	8	21.5	4.751	3.292
88	2	28	7.071	9.800
89	71	31.592	6.95	1.617
90	106	29.264	5.088	0.969
91	42	30.571	8.5	2.571
92	34	27.882	8.903	2.993
93	25	29.44	6.665	2.613
94	16	28.063	6.213	3.044
95	25	24.88	7.801	3.058
96	9	33.778	6.261	4.090
97	63	28.937	5.954	1.470
98	54	26.056	4.973	1.326
99	4	27.25	3.862	3.785
00	19	24.684	4.738	2.130
01	7	29	2.582	1.913
02	1	28	-	-
03	6	27.833	5.536	4.430
04	9	30.778	8.074	5.275
05	7	27.429	7.721	5.720
06	5	26.8	6.34	5.557
07	1	20	-	-
08	4	25.75	4.787	4.691

Table 19. Available lengths of the female sail fish caught by the sport fisheries activities in Pacific Mexican waters form 1987-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ.*Data from 2008 still is preliminary).

FEMALE	SAIL FISH	FISH	LENGHTS			
Año	n	Tmin	Tmax	Tmed	s	Int.Conf.
87	24	142	222	195.458	20.633	8.255
88	15	175	214	195.733	11.841	5.992
89	150	154	227	198.187	11.560	1.850
90	129	165	219	199.256	11.697	2.018
91	97	166	224	198.454	11.803	2.349
92	63	150	230	195.476	18.551	4.581
93	56	165	224	197.714	12.116	3.173
94	40	168	223	194.425	12.914	4.002
95	31	158	223	193.065	15.319	5.393
96	18	177	223	198.333	13.110	6.056
97	68	156	222	193.044	13.349	3.173
98	42	165	216	190.405	13.554	4.099
99	14	124	220	185.357	23.070	12.085
00	20	154	211	187.150	15.401	6.750
01	8	164	205	187.500	14.363	9.953
02	18	169	212	191.056	14.514	6.705
03	8	196	220	207.500	8.435	5.845
04	19	160	233	190.737	18.024	8.104
05	16	165	209	191.375	13.376	6.554
06	13	156	213	185.077	17.689	9.616
07	4	163	193	177.250	12.354	12.107
08	13	159	208	190.077	12.977	7.054

Table 20. Available weights of the female sail fish caught by the sport fisheries activities in Pacific Mexican waters form 1987-2008* (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ. *Data from 2008 still is preliminary).

FEMALE	SAIL	FISH	WEIGHTS	
Año	n	Pmed	s	Int.Conf.
87	24	32.083	10.782	4.314
88	15	30.6	5.552	2.810
89	152	33.684	6.512	1.035
90	126	32.071	5.396	0.942
91	95	32.084	5.414	1.089
92	60	31.65	9.589	2.426
93	49	33.143	7.309	2.046
94	34	31.265	6.73	2.262
95	29	31.931	9.215	3.354
96	18	39.333	10.238	4.730
97	64	31.797	7.114	1.743
98	41	28.634	5.333	1.632
99	14	29.643	12.834	6.723
00	19	27.737	7.823	3.518
01	8	31.375	9.41	6.521
02	18	29.278	6.623	3.060
03	8	38.375	6.844	4.743
04	18	30.889	8.366	3.865
05	16	28.563	7.789	3.817
06	13	26.692	9.022	4.904
07	4	23	7.746	7.591
08	13	26.308	4.733	2.573

Table 21. Longitudes (Max and Min) of black marlin caught by the sport fisheries activities in Pacific Mexican waters form 1987-2007 (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ. Detailed data from some years is not available.

BLACK	MARLIN	LONGITUDES				
Año	n	Tmin	Tmax	Media	s	Int.Conf.
87	1	208	208	208		
88	5	210	261	231.6	25.56	22.404
89	4	204	260	235.25	23.258	22.792
90	3	246	272	259.333	13.013	14.725
91	1	270	270	270		
92	2	194	198	196	2.828	3.919
93	7	183	272	214	27.923	20.685
94	3	219	295	257.667	38.018	43.021
95	4	206	279	235.25	31.127	30.504
96	8	216	321	281.5	32.807	22.734
97	1	220	220	220		
98	1	214	214	214		
99	4	202	283	253.5	35.949	35.229
00	1	192	192	192		
01	1	288	288	288		
02						
03						
04	1	226	226	226		
05						
06	1	196	196	196		
07						

Table 22. Weights (Max and Min) of black marlin caught by the sport fisheries activities in Pacific Mexican waters form 1987-2006 (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ). Detailed data from some years is not available.

BLACK	MARLIN	WEIGHTS		
Año	n	Media	s	Int.Conf.
87	1	98		
88	5	108.8	33.395	29.271
89	4	122	25.528	25.017
90	4	180.5	24.31	23.823
91	1	184		
92	2	60	0	
93	7	84.857	33.652	24.929
94	3	198.333	140.301	158.763
95	4	134	70.347	68.939
96	8	193.5	45.925	31.824
97	1	105		
98	1	127		
99	4	170	66.833	65.495
00	1	65		
01	1	272		
02				
03				
04	1	118		
05				
06	1	72		

Table 23. Available lengths of the male black marlin_caught by the sport fisheries activities in Pacific Mexican waters form 1992-1993 and1995 (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ). Detailed data from some years is not available.

MALES	BLACK	MARLIN	LENGTHS			
Año	n	Tmin	Tmax	Tmed	s	Conf. Int.
87						
88						
89						
90						
91						
92	1	198	198	198.000		
93	4	183	212	201.250	13.251	12.986
94						
95	2	206	232	219.000	18.385	25.480
96						
97						
98						
99						
00						
01						
02						
03						
04						
05						
06						

Table 24. Available lengths of the female black marlin caught by the sport fisheries activities in Pacific Mexican waters form 1988-2006 (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ). Detailed data from some years is not available.

FEMALES	BLACK	MARLIN	LENGTHS			
Año	n	Tmin	Tmax	Tmed	s	Int.Conf.
88	1	215	215	215.000		
89	4	204	260	235.250	23.258	22.792
90	3	246	272	259.333	13.013	14.725
91	1	270	270	270.000		
92	1	194	194	194.000		
93	3	203	272	231.000	36.290	41.065
94	3	219	295	257.667	38.018	43.021
95	2	224	279	251.500	38.891	53.899
96	8	216	321	281.500	32.807	22.734
97	1	220	220	220.000		
98	1	214	214	214.000		
99	4	202	283	253.500	35.949	35.229
00	1	192	192	192.000		
01	1	288	288	288.000		
02						
03						
04	1	226	226	226.000		
05						
06	1	196	196	196.000		

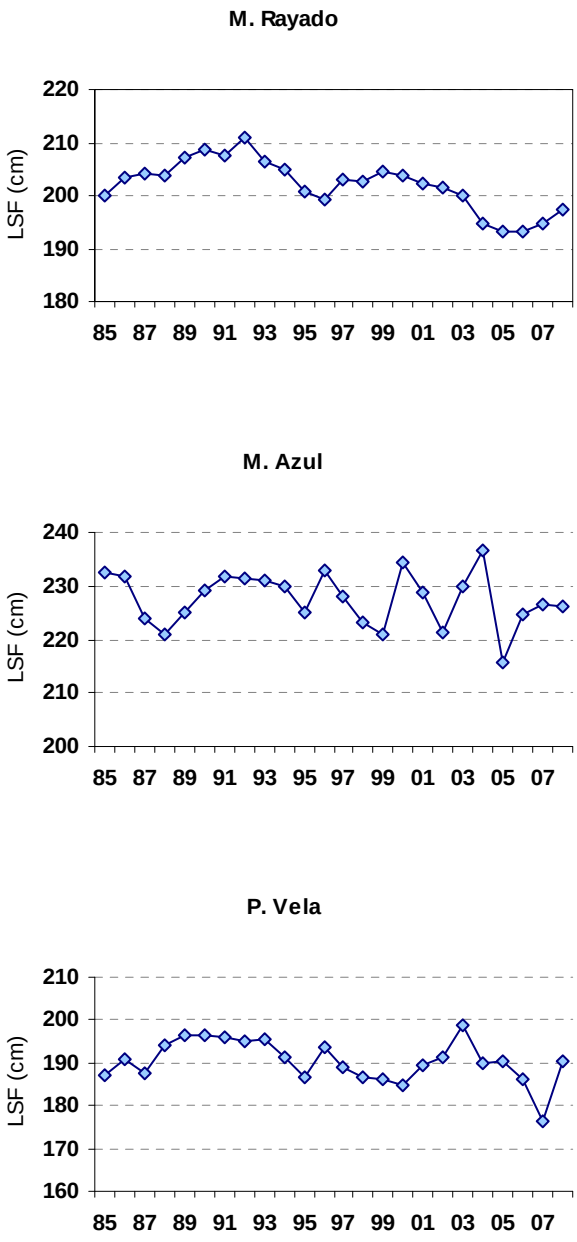

Fig. 4. Longitudes from lower jaw to fork of the different species of billfishes caught in the sport fisheries operations from 1985-2007. (Data from the CNP-INP, 2004, 2006 and SFMP-CRIP LA PAZ).

Tables 25 and 26 shows for the first time, data on catch and release data derived from the sport fishery at the two main fishing areas of Mexico. This data encompass 10 years from 1998-2008 of comparative analysis between the catch and release rates reported by the fleets and the data collected directly by the SFMP-INAPESCA-CRIP-LA PAZ. The overall average from both sources combined is of 78.25%. However, the fleets reported separately and average of 80.19% and respectively, the monitored data 75.62% for los Cabos area. For los Barriles the reported rate by the fleets was 81.42%. A it was said, at the present there is nort information on the survival rate of the fish released. With this information Figure 5 is constructed and it shows, the tendency of the fleets data to report a little higher than the sampling data collected directly during the monitoring operations.

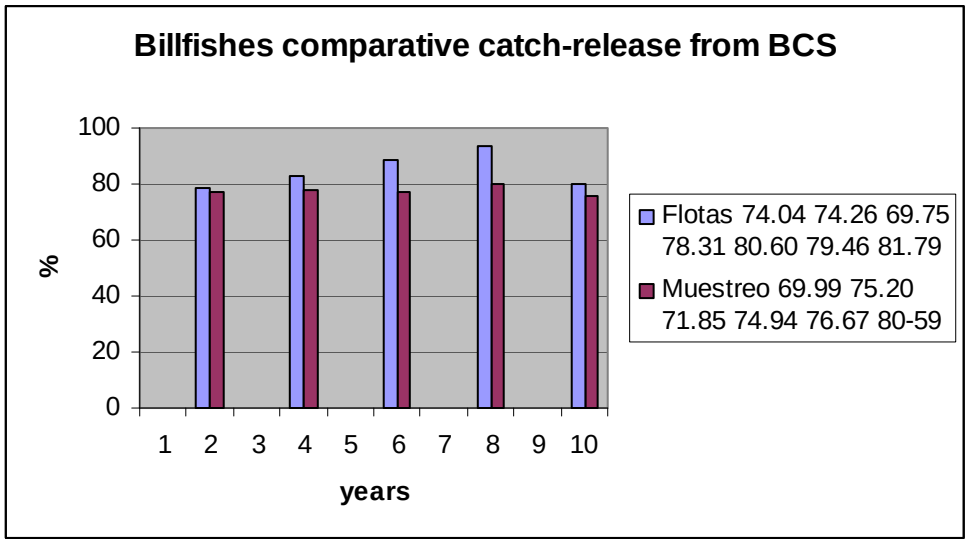

Fig. 5 Comparative catch and release rates for the different billfishes caught in the Los Cabos, BCS, Mexico from 1998-2008. (fleet data compared with monitored data)

Table 25. Comparative catch and release rates for the different billfishes caught in Los Cabos, BCS, Mexico from 1998-2008.

	Cabo San Lucas						
Año	Fuente	*M. Rayado*	*M. Azul*	*P. Vela*	*M. Negro*	*P.Espada*	Total
1998	Rep Flotas	76.10	39.87	74.97	12.50	28.57	74.04
1999	Rep Flotas	76.49	59.90	74.17	31.25	23.53	74.26
	Muestreo	72.42	51.97	70.83	33.33	33.33	69.99
2000	Rep Flotas	72.59	35.66	72.44	32.26	25.00	69.75
	Muestreo	77.26	29.07	83.51	0.00	0.00	75.20
2001	Rep Flotas	80.32	59.12	74.58	80.00	0.00	78.31
	Muestreo	72.98	43.86	78.08	50.00	0.00	71.85
2002	Rep Flotas	82.22	63.91	75.13	50.00	0.00	80.60
	Muestreo	78.01	33.71	61.54	0.00	0.00	74.94
2003	Rep Flotas	80.91	56.84	72.69	22.22	60.00	79.46
	Muestreo	77.98	8.33	53.13	0.00	100.00	76.67
2004	Rep Flotas	82.54	60.45	84.29	41.67	14.29	81.79
	Muestreo	82.47	28.00	54.84	0.00	0.00	80.59
2005	Rep Flotas	79.01	65.63	80.14	62.50	27.27	78.59
	Muestreo	79.42	27.66	51.43	0.00	0.00	77.47
2006	Rep Flotas	84.87	48.20	77.54	41.18	0.00	83.08
	Muestreo	79.01	51.39	65.67	0.00	0.00	77.90
2007	Rep Flotas	88.82	63.49	91.40	66.67	50.00	88.63
	Muestreo	76.92	54.17	78.26	0.00	0.00	76.80
2008	Rep Flotas	93.98	64.44	86.90	0.00	40.00	93.59
	Muestreo	79.74	74.07	82.61	0.00	0.00	79.74
Total Average							78.25

Table 26. Comparative catch and release rates for the different billfishes caught in Los Barriles, BCS, Mexico, from 1998-2008.

	Buena Vista						
Año	Fuente	*M. Rayado*	*M. Azul*	*P. Vela*	*M. Negro*	*P.Espada*	Total
1998	Rep Flotas	78.18	63.54	89.02	10.00	0.00	79.46
1999	Rep Flotas	76.17	66.67	87.60	20.00	11.11	78.02
2000	Rep Flotas	80.28	67.15	93.19	66.67	0.00	84.78
2001	Rep Flotas	77.19	65.28	89.70	14.29	0.00	80.02
2002	Rep Flotas	82.01	59.54	76.95	100.00	0.00	79.27
2003	Rep Flotas	79.27	65.69	89.31	54.55	0.00	81.78
2004	Rep Flotas	81.62	66.21	91.40	50.00	100.00	83.59
2005	Rep Flotas	85.95	66.33	86.67	66.67	0.00	85.36
2006	Rep Flotas	80.95	71.15	89.15	85.71	0.00	81.99
2007	Rep Flotas	84.02	63.37	95.00	50.00	0.00	84.14
2008	Rep Flotas	76.12	45.65	85.26	100.00	0.00	77.25
Total Average							81.42

Swordfish
Data Sources:

The development of the swordfish fishery in Mexico has two different historical periods. One started in 1964 using long liners, the second began in 1986, with gillnets. The main ports used by this fishery are: Ensenada, San Carlos, and some times, La Paz, in the Baja California peninsula and also in Mazatlán, across the Gulf of California..

The commercial swordfish fishery is regulated by a special Mexican administrative regulation (NOM-017-PESC-1994) which mandates that logbooks should be submitted by the fleet to the fishery agency in Mexico, (CONAPESCA). Besides this, the swordfish fishery was closely monitored from 1998 till 2000 by special trained observers of the

Programa Nacional de Aprovechamiento del Atún y Protección a los Delfines, (Mexican Tuna-Dolphin Program-PNAAPD). They worked for those years aboard the long liners and the gillnet ships, which operated outside the 50 miles protected zone set for the sport fisheries operations.

In 1992 the swordfish the nominal fleet was integrated by a total of 27 boats. From those, only 24 were active fishing boats in that year. In 1995, the fleet was reduced to 22 fishing ships, number which did not change for many years. More recently, in 2006, the number reported was 29 boats. The growth in numbers of the ships is explained because some of them have permits for different species, (multiple fisheries), pending on the availability of the species by season and the presence or not of some species during the year mainly sharks. In 2007 and 2008, only 24 boats fished. From those, 20 used long lines and the other four gillnets. Table 27, shows the sizes of the 17 boats which operates from Ensenda, B.C. Their sizes range from 15.9 to 24 m.

The sword fish fleet operates in Mexican waters mainly from September-October to February or the autumn and winter seasons. The swordfish catches decline after that period and is very scarce in the summer months of July and August. The greater fishing effort is concentrated in two areas in the western coast of the Baja California peninsula, between the latitudes 21^{o} 30'N and 32^{o} 20'N. One is south of Punta Eugenia to the 23^{o}N and the other fishing zone, from the 30^{o} parallel, to the northern limit of the Mexican ZEE (Sosa et. al. 1992; Castro, et. al. 1995), Figure 6. Also, as it was mentioned before, although in very low numbers, the swordfish is some times caught in the recreational fisheries. Its average number in the entire time series available for 19 years was 36 fish/year.

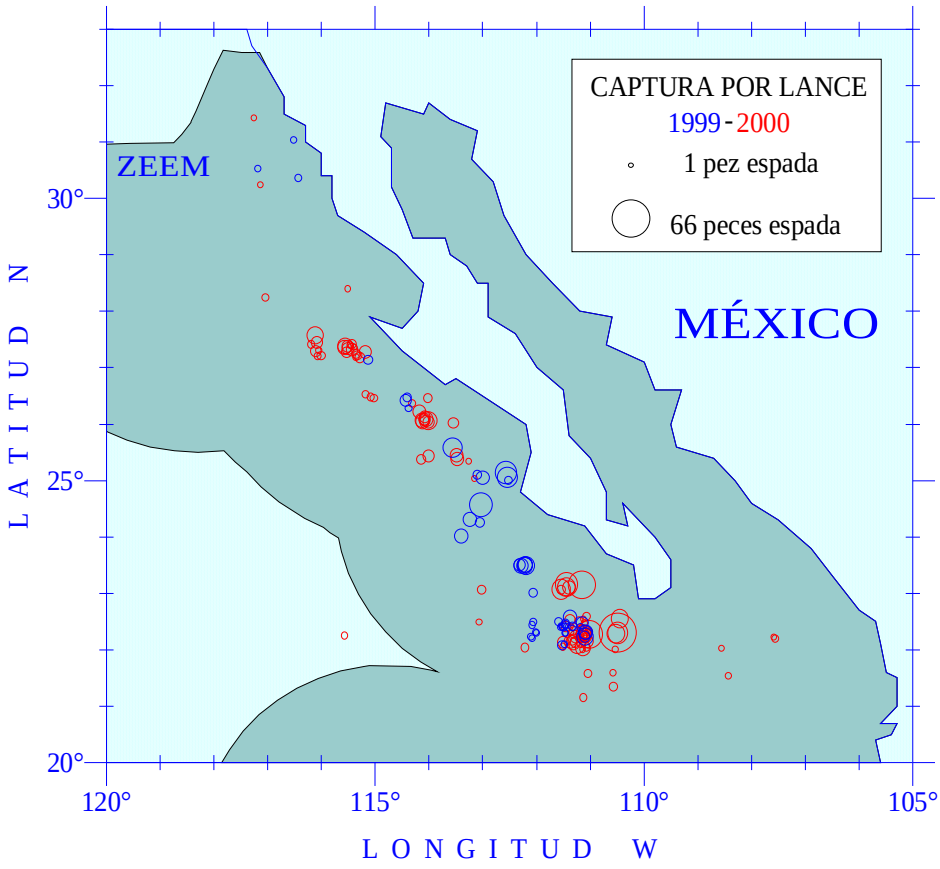

Fig. 6. Swordfish main fishing grounds in northwest Mexico and examples of catches by set.

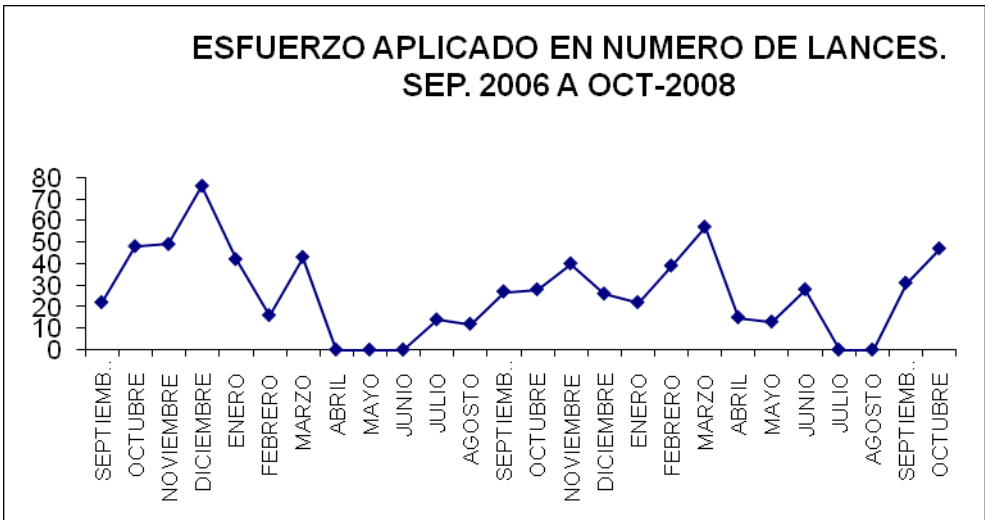

Fig. 7 Effort applied (number of sets) from 2006 till October 2008

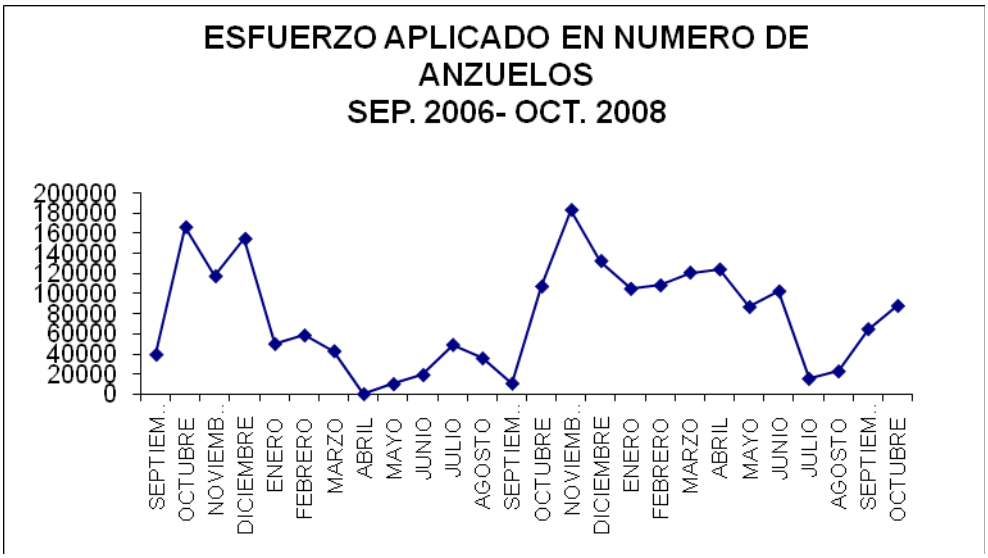

Fig 8. Effort applied (No. of hooks) from 2006-Oct. 2007

Table 27. Relationship of the 17 fishing boats operating from Ensenda, B.C.

BOAT	SIZE (METROS)	FISHING GEAR USED
1	17.9	LONG LINER
2	24	LONG LINER
3	24	LONG LINER
4	20	LONG LINER
5	22	LONG LINER
6	20	LONG LINER
7	17.8	LONG LINER
8	22	LONG LINER
9	22.6	LONG LINER
10	22.9	LONG LINER
11	17.9	LONG LINER
12	18.2	LONG LINER
13	21.9	LONG LINER
14	15.9	GILLNET
15	15.9	GILLNET
16	20.5	GILLNET
17	17.8	GILLNET

CPUE (Long liners fishery)

In accordance with (FAO, 2000) the total world captures of swordfish are about 90,000 mt. each year. From those, 25,000 t. are taken from the Pacific Ocean and the Mexican fleet since year 2000 contributes to those captures with an average of 711 t per season. This represents only (2.8%) of the total Pacific Ocean captures.

In the Eastern Tropical Pacific (ETP), the swordfish shows since 1965 a stable CPUE and it is estimated that it can sustain an annual yield of 2,800 t (Bartoo and Coan, 1989; Joseph, 1981). Still there is no model which reflects the condition of the swordfish stock in the entire Pacific Ocean. The Japanese data from the long liners indicates that the stock it is subjected to a low catch rate and that there are still possibilities of increasing its harvest. Therefore, the data collection process for this exercise is a mandatory as identified by the SWOWG of ISC and México is contributing for this with the available information.

During the period 1998-2000, time in which the PNAAPD observers program operated aboard the long liner fleet, it was found that the biggest average rate of captures was obtained using 700 hooks by long liner. This number of hooks yielded 24 fishes/1000 hooks. Comparatively, the use of 800-900 hooks yielded 17 or 12 fish/1,000

hooks. In 2006, they were 544 sets. The capture of sword fish reported for that year was of 347 t with CPUE of 727 kg/1000 hooks and an associated effort of 477, 000 hooks. In 2007, the captures were very similar with 383 t and a CPUE of 549kg/1000 hooks. The effort that year was calculated higher with 697,700 hooks. For 2008, we have available data only till the month of October and the complementary data from the best months of the fishery (November-December) still is arriving. The captures till October are much lower than the previous two years, with only 84 t and CPUE of 100 kg/1000 hooks. The associated effort was comparatively higher than previous years with 837, 280 hooks.

The INAPESCA reviewed the long line fishery data from the observers from the PNAAD and found that among the captures in this fishery, the sharks and from them, the blue shark was the most important with (61%) of the reported captures. The swordfish represented only (19%) and the complementary (20%) was formed by other 10 other fish species, encompassing: dorado, yellow fin tuna and other sharks species. In other studies, Sosa et al., 1992, the sharks were the dominant species caught, followed by the swordfish which has a comparative greater percentage in the long line fishery.

CPUE (Gillnet fishery)

Sosa et al., loc.cit., reports also preliminary information of the composition in the sword fish gillnet fishery from México. They mentioned that the catches were composed by 88% of sharks species, several other commercial species, like the sun fish and tunas and the swordfish was only the 12 % of the total. As reported before, only four boats are operating with gillnets in the Mexican sword fishery. They nets range from 1500/2000 m in length.

In 2006, they were 195 fishing sets which captured 65 t. In 2007, 248 sets were reported with identical yield of 65 t. In 2008 (till October), 252 sets were performed with a capture of 23 t, much lower than in previous years. The total captures reported in the table 28 encompass both the gill net and the long liners. The historic record of the sword fish fishery of the Mexican fleet is presented in the Table. 28 and Figure 9.

These data indicates three different pick periods. The first in 1981 yielded 1,575t. This catches later declined till 1985. Later an increment was observed reaching 2,650t in 1990. After that another decline was observed again obtaining 428t. The next pick was in 1998 with 3,603t, which is the historic highest record for the entire series. The variation observed between the periods is attributed to the changes in the two

fishery methods described above. For 2003 a little increment was obtained again with 671t. During 2004, 2005 and 2006 the captures have been around 300t for the Ensenada fleet. A similar value of 383 in 2007 was obtained and a very low in 2008 of only 84 till October of that year.

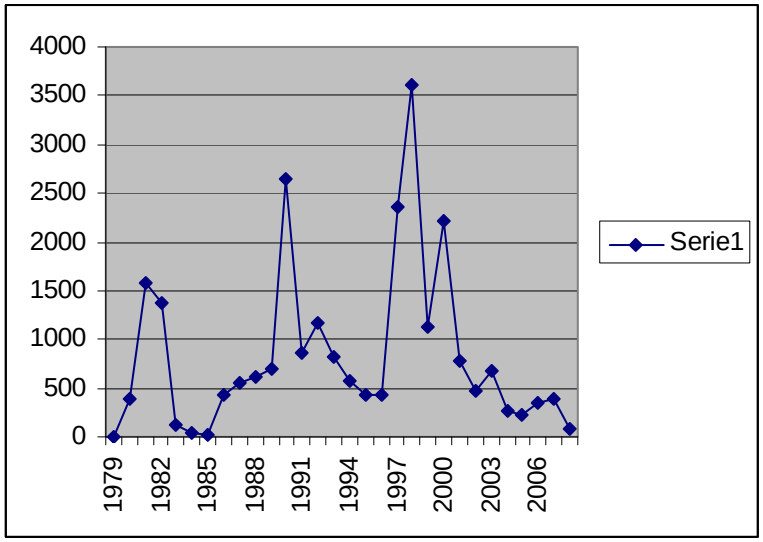

FIG. 9 Sword fish historic catches in Mexican waters from 1979-2008.
(Data FAO, CONAPESCA-Subdelegación de Pesca en Ensenada BC).

Table 28 Historic records of the Mexican swordfish fishery from 1979-2008. (Data sources from INAPESCA-CONAPESCA-México).

YEARS	Metric Tones
1979	7
1980	380
1981*	1575
1982	1365
1983	120
1984	47
1985	18
1986	422
1987	550
1988	613
1989	690
1990*	2650
1991	861
1992	1160
1993	812
1994	581
1995	437
1996	439
1997	2365
1998**	3603
1999	1136
2000	2216
2001	780
2002	465
2003	671
2004	270.1
2005	234.5
2006	347.2
2007	383
2008^	84

Notes: ^Data from 2008 still is preliminary
*High picks
**Highest Historic record

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