

## CONTRAST BETWEEN THE TRENDS OF BILLFISH ABUNDANCE RECORDED FROM THE SPORT FISHING ACTIVITY OFF PLAYA GRANDE YACHTING CLUB AND FROM SPORT FISHING TOURNAMENTS IN THE CENTRAL VENEZUELAN COAST, DURING THE PERIOD 1984-1999

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### ABSTRACT

*The long historical data on sport fishing activities at Playa Grande Yachting Club (PGYC), located in the central Venezuelan coast near La Guaira, has served as an index to identify mayor trends in billfish abundance within the North Atlantic Ocean. In 1990, the Venezuelan Government issued a regulation restricting the landing and commercialization of billfish in a 50-mile zone around La Guaira, in an effort to protect billfish populations in this area where sport fishing is particularly intense. The regulation induced misreporting of billfish catches by the sport fishers in PGYC, which lowered the quality of information in the historical database after 1990. In this paper, a comparison is made between the trends in billfish abundance observed in PGYC and alternative information on billfish sport fishing tournaments performed in the same fishing ground (Placer de La Guaira), for the periods 1984-90 and 1991-99. Pearson correlation coefficients between the CPUE-PGYC and CPUE-tournament series were highly significant for blue marlin (*Makaira nigricans*) but only marginally significant for sailfish (*Istiophorus platypterus*) using the 1984-90 CPUE series; the correlation was non-significant for white marlin (*Tetrapturus albidus*). The correlations for the three species are non-significant when the 1984-99 CPUE series are used. It is concluded that CPUE data from sport fishing tournaments in the central Venezuelan coast during 1991-99 could be used to offset deficiencies in the historical data base of PGYC after 1990, allowing for the estimation of a corrected catch series from PGYC for blue marlin and sail fish.*

### RESUMEN

*La larga serie de datos históricos sobre la pesca deportiva en el Club de Yates de Playa Grande (PGYC), situado en la costa central de Venezuela, cerca de La Guaira, ha servido de índice para identificar las principales tendencias en la abundancia de marlines en el Atlántico Norte. En 1990, el Gobierno venezolano promulgó una regulación restringiendo el desembarque y comercialización de marlines en un área de 50 millas alrededor de La Guaira, en un esfuerzo para proteger las poblaciones de estas especies en una zona donde la pesca deportiva es particularmente intensa. La regulación indujo a una falsa información de la captura de marlines de la pesquería deportiva del PGYC, lo cual disminuyó la calidad de la información en la base de datos histórica a partir de 1990. En este documento se establece una comparación entre las tendencias en la abundancia de marlines observada en el PGYC y la información alternativa sobre los campeonatos deportivos de pesca de marlines que tuvieron lugar en la misma zona de pesca (Placer de La Guaira) en los periodos 1984-1990 y 1991-1999. Los coeficientes de correlación de Pearson entre la CPUE-PGYC y la serie de CPUE de los torneos resultaban muy significativos en el caso del pez vela (*Istiophorus platypterus*) y aguja azul (*Makaira nigricans*) usando la serie de CPUE de 1984-1990; esta correlación no era importante en el caso de la aguja blanca (*Tetrapturus albidus*). Las correlaciones para las tres especies no resultan significativas cuando se usa la serie de CPUE de 1984-99. Se llega a la conclusión que los datos de CPUE*

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*procedentes de los campeonatos de pesca deportiva en la costa central de Venezuela de 1991 a 1999 podrían aplicarse para compensar las deficiencias en la base de datos históricos del PGYC a partir de 1990, teniendo en cuenta la estimación de una serie de capturas corregida del PGYC para la aguja azul y el pez vela.*

## RÉSUMÉ

*Les longues données historiques sur la pêche sportive pratiquée à Playa Grande Yachting Club (PGYC), située sur la côte centrale du Venezuela près de La Guaira, ont servi d'indice pour identifier les principales tendances de l'abondance des istiophoridés dans l'océan Atlantique nord. En 1990, le Gouvernement vénézuélien a promulgué une loi en vertu de laquelle les débarquements et la commercialisation des istiophoridés ne seraient effectués que dans une zone de 50 milles autour de La Guaira, afin de protéger les populations d'istiophoridés dans cette zone où la pêche sportive est particulièrement intense. Cette réglementation a conduit les pêcheurs sportifs de la Playa Grande Yachting Club à faire de fausses déclarations sur leurs prises d'istiophoridés, ce qui a détérioré la qualité de l'information contenue dans la base de données historiques après 1990. Le présent document effectue une comparaison entre les tendances de l'abondance des istiophoridés observée à PGYC et une information alternative sur les championnats de pêche sportive d'istiophoridés tenus dans la même zone de pêche (Placer de La Guaira), pour les périodes 1984-90 et 1991-99. Des coefficients de corrélation Pearson entre les séries de CPUE-PGYC et CPUE-championnats ont été très significatifs pour le voilier (*Istiophorus platypterus*) et le makaire bleu (*Makaira nigricans*) en utilisant la série de CPUE de 1984-90; la corrélation a, par contre, été négligeable pour le makaire blanc (*Tetrapturus albidus*). Les corrélations pour les trois espèces sont négligeables lorsque les séries de CPUE 1984-99 sont employées. Il a été conclu que les données de CPUE obtenues des championnats de pêche sportive qui se sont déroulés sur la côte centrale du Venezuela entre 1991-99 pourraient être utilisées pour compenser les déficiences détectées dans la base de données historiques de la PGYC après 1990, ce qui permettrait d'estimer une série de capture corrigée provenant de la PGYC pour le makaire bleu et le voilier.*

## KEYWORDS

*Sport fishing, Catch/effort, Fish catch statistics, Fishery regulations*

## INTRODUCTION

Sport fishing was the first fishery oriented towards billfish in Venezuela (Machado & Jaén 1982). Most fishers performing this activity are associated to clubs and Marinas located in different areas along the coast, but the most intense sports activity takes place off Playa Grande Yachting Club, in the central coast of Venezuela (Gaertner et al. 1989, 1991; Gaertner & Alió 1994, 1998). This fishery targets species of the family Istiophoridae, mainly the sailfish, *Istiophorus platypterus*, blue marlin, *Makaira nigricans* and white marlin, *Tetrapturus albidus* (Cervigón 1994). Only occasionally the swordfish, *Xiphias gladius*, is targeted in sport fishing tournaments.

From the labor of the late J. Acosta, former harbormaster at Playa Grande Yachting Club, data on catch and sport fishing effort were gathered from 1961 until the late eighties on a daily basis. The gathering of information to update this database has been continued with the support of the Club authorities and of the ICCAT Enhanced Billfish Research Program, conforming one of the longest databases available on a billfish fishery in the Atlantic Ocean. This information has been used to detect mayor trends in billfish abundance within the North Atlantic Ocean (ICCAT 1994).

In an effort to protect billfish populations in the vicinity of Placer of La Guaira, an area of billfish concentration in the Southern Caribbean Sea where sport-fishing activities are particularly intense, in 1990 the Venezuelan Government issued regulations that restricted landings and commercialization of billfish in a 50 miles zone around La Guaira (MAC 1990). This regulation has been recently updated (MPC 2000), and includes restrictions to land undersized billfish in the entire country. Curiously, the

restrictions to land billfish also induced sport fishers to misreport billfish catches, thus lowering the quality of the database.

The purpose of this report is to evaluate alternative means to compensate for the deficiency in the information of the sport fishery database from Playa Grande Yachting Club after 1989, allowing the calculation of more reliable indices of billfish abundance.

## **MATERIALS AND METHODS**

Daily information on fishing effort and catch and releases of billfish by sport fishers off Playa Grande Yachting Club was gathered by the Harbormaster of club. Information pertaining to effort (number of participating vessels) and catch and releases of billfish species during sport fishing tournaments was gathered by the harbormaster and by personnel associated with the ICCAT Enhanced Billfish Research Program. Most fishing activity in the area takes place on or in the vicinity of Placer of La Guaira, thus the regular fishing activities off the Club and the tournaments would provide information on billfish abundance from the same general area. The reliability of the information provided by fishers is strongly enforced during sport fishing tournaments.

Pearson correlation coefficients (Sokal & Rohlf 1995) were calculated for the three species of billfish between CPUE values from the regular fishing activity off PGYC and from fishing tournaments in La Guaira region. The first series of calculations corresponds to 1984-89, a period when PGYC fishers were regularly reporting catches, and they could be verified through harbor landings. The second series of calculations correspond to 1990-99, when the PGYC fishers did not report catches and releases of billfish on a regular basis.

Using annual CPUE values from all tournaments in La Guaira region, estimated catches for the sport fishing activity off PGYC were extrapolated for the period 1991-99.

## **RESULTS AND DISCUSSION**

The database for the sport fishery off PGYC was updated to 1999 (Table 1). Reported catches for billfish have decreased to extreme low values since 1996, but this trend is not observed in the artisanal billfish fishery from the same general area (Marcano *et al.* 2000). Since misreports by sport fishers could originate the recorded low catch, an alternative to estimate the would be catches could be to assess annual CPUE by species from the group of tournaments organized in the general area of La Guaira.

From 1984 to 1999 there has been an average of three sport-fishing tournaments every year. Some, like the Blue Marlin Tournament, have been organized yearly since 1961 (Table 2). There are gaps in the tournaments database (for example, zero catch of white marlin in 1993 and 96), which could be related to the strong seasonal distribution of billfish resources in the Venezuelan coasts. White marlin shows greater abundance in the second semester of the year (Gaertner *et al.* 1989; Marcano *et al.* 2000), a period when a fewer number of sport fishing tournaments are organized around La Guaira.

The catch per unit of effort from the fishing activity off PGYC and the sport-fishing tournaments for the period 1984-99 were calculated (Table 3). Correlation coefficients between these two CPUE series for 1984-89 were significant for blue marlin. For sailfish the correlation was marginally significant, and non significant for white marlin (Table 4). The correlations for the extended period 1984-99 are non significant for all three species of billfish (Table 4 and Figure 1).

The results of the correlation analysis allow the estimation of the catch series that would have occurred for blue marlin and sailfish off PGYC for 1990-99, using tournament CPUE values (Table 5). Table 5 also shows catch values for the reference period 1984-89 for comparative purposes. Differences between observed and estimated catches for the reference period are significant (Chi Square test,  $P < 0,001$ ),

associated to scaling differences between the Club and tournament data series. Thus, the new estimated catches of blue marlin and sailfish are improved but still ruff estimates of the actual catch of the sport fisheries in La Guaira area for the period 1990-99.

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**Table 1.** Effort and catch of billfish in the sport fishery off Playa Grande Yachting Club in the central Venezuelan coast from 1961 - 99.

Year	Trips	WHM	BUM	SAI
61	661	721	102	287
62	440	336	103	188
63	460	268	49	71
64	537	627	43	182
65	516	564	31	124
66	637	540	109	469
67	791	832	93	423
68	845	514	95	446
69	822	229	105	916
70	868	408	101	501
71	1059	2231	60	475
72	1117	842	34	412
73	778	1000	17	203
74	729	251	33	295
75	739	915	11	166
76	735	594	8	188
77	784	271	16	99
78	987	170	19	80
79	662	243	30	82
80	945	1016	38	130
81	959	634	62	88
82	955	679	28	50
83	1250	770	86	181
84	1222	517	164	303
85	1347	579	79	278
86	1208	246	64	150
87	1311	294	82	264
88	1278	308	48	127
89	1159	179	75	219
90	934	47	16	26
91	1118	62	44	44
92	1170	494	68	91
93	1038	15	40	
94	754	94	80	29
95	561	60	52	6
96	1329	1	35	9
97	1403	23	42	8
98	1157	4	14	2
99	950	3	6	4

**Table 2.** Effort and catch (No. fish) in sport fishing tournaments off La Guaira, central coast of Venezuelan. Period 1984-99.

Year	N° Tournaments	Effort (trips)	WHM	BUM	SAI
84	3	55	9	30	16
85	5	138	82	16	28
86	4	194	32	12	27
87	5	188	60	20	66
88	6	87	31	7	12
89	4	190	72	1	30
90	4	102	27	5	18
91	3	24	4	6	6
92	1	78	14	21	3
93	1	105		46	1
94	3	92	41	41	22
95	3	229	675	54	39
96	3	72		34	16
97	2	81	13	18	7
98	1	48	3	22	4
99	4	61	7	62	1

**Table 3.** Catch per unit of effort (No. fish/trip) for the sport fishery off Playa Grande Yachting Club (PGYC) and from sport fishing tournaments in the central Venezuelan coast. Period 1984-99.

Year	WHM		BUM		SAI	
	Tournaments	PGYC	Tournaments	PGYC	Tournaments	PGYC
84	0.164	0.423	0.545	0.134	0.291	0.248
85	0.594	0.430	0.116	0.059	0.203	0.206
86	0.165	0.204	0.062	0.053	0.139	0.124
87	0.319	0.224	0.106	0.063	0.351	0.201
88	0.356	0.241	0.080	0.038	0.138	0.099
89	0.379	0.154	0.005	0.065	0.158	0.189
90	0.265	0.050	0.049	0.017	0.176	0.028
91	0.167	0.055	0.250	0.039	0.250	0.039
92	0.179	1.313	0.269	0.325	0.038	0.296
93		0.385	0.438	0.057	0.010	0.165
94	0.446	0.125	0.446	0.106	0.239	0.038
95	2.948	0.346	0.236	0.275	0.170	0.162
96		0.001	0.472	0.026	0.222	0.007
97	0.160	0.016	0.222	0.030	0.086	0.006
98	0.063	0.003	0.458	0.012	0.083	0.002
99	0.115	0.003	1.016	0.006	0.016	0.004

**Table 4.** Pearson correlation coefficients between cpue values of the billfish sport fishery off Playa Grande Yachting Club and from sport fishing tournaments in the central Venezuelan coast.

Period analyzed	WHM	BUM	SAI
84-89	0.28 Ns	0.93 **	0.72 #
84-99	0.07 Ns	-0.08 ns	0.14 ns

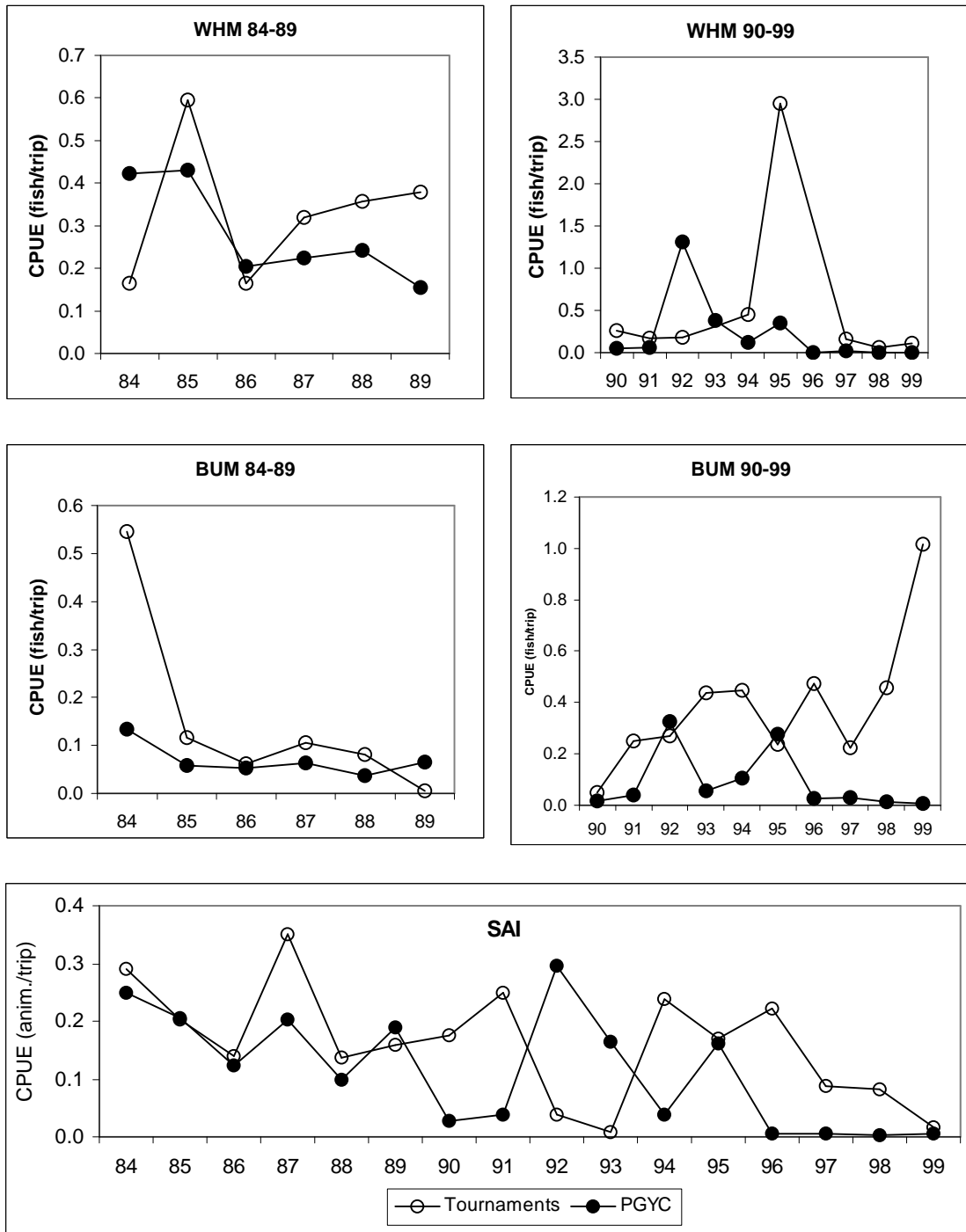
\*\* P<0.001

# P<0.109

ns, non significant

**Table 5.** Observed and estimated catches of blue marlin and sail fish in the sport fishery off Playa Grande Yachting Club, central Venezuelan coast, for 1984-99. Estimates were extrapolated using cpue values from tournaments in La Guaira region during the same year.

Año	BUM observed	BUM estimated	SAI observed	SAI estimated
84	164	667	303	355
85	79	156	278	273
86	64	75	150	168
87	82	139	264	460
88	48	103	127	176
89	75	6	219	183
90	16	46	26	165
91	44	280	44	280
92	68	315	91	45
93	40	455		10
94	80	336	29	180
95	52	132	6	96
96	35	628	9	295
97	42	312	8	121
98	14	530	2	96
99	6	966	4	16



**Figure 1.** Comparison of CPUE trends in the billfish sport fishery off Playa Grande Yachting Club (PGYC) and from sport fishing tournaments in the central Venezuelan coast. Period 1984 - 99