

Recreational Billfish Tournaments in the Virgin Islands, 1973 to 1990

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ABSTRACT

Recreational billfish tournaments have been monitored in the Virgin Islands since 1973. These tournaments offer an excellent opportunity to obtain accurate catch and effort data on blue marlin (*Makaira nigricans*) and other billfish species in the area.

Three tournaments are held annually in St. Thomas, U.S. Virgin Islands and one in Virgin Gorda, British Virgin Islands. Catch rates varied from 0.02 to 0.333 blue marlin per boat hour with as many as 141 fish being taken in one four day tournament. Despite increased recreational fishing effort, tournament fishing success has varied without trend over time. Minimum size limits were established in 1978 for the United States Virgin Island Open Atlantic Blue Marlin Tournament and in the late 1980s for the other events. This greatly reduced the number of boated fish and has been the impetus for the extensive tagging effort which occurs in the Virgin Islands. Tournament catch and hookup rates are significantly higher in the Virgin Islands compared to other areas presently being monitored in the U.S. and Caribbean.

KEYWORDS: blue marlin, billfish tournaments, Caribbean recreational fisheries.

INTRODUCTION

The expansion of billfish fishing in the southeast United States has spread to the Virgin Islands and throughout the Caribbean in recent years (McIntosh, 1983; Valdez-Pizzini, 1992). The U.S and British Virgin Islands are recognized as having some of the finest blue marlin (*Makaira nigricans*) fishing in the world, and much of the recreational fishing effort is directed towards this species (Friedlander, In press). Data has been collected on the recreational fisheries in the U.S. Virgin Islands since 1983 (Brandon, 1987). Despite this sampling strategy, catch and effort information are sometimes inaccurate and a complete survey of the fishing fleet is difficult to obtain using this method (Beardsley and Conser, 1981).

Tournaments offer an excellent opportunity to collect accurate catch and effort information on recreational fishing activities (Beardsley and Conser, 1981). Sampling coverage is usually 100% since all participating boats are at a single marina. In addition, time is strictly controlled with all vessels fishing for the same amount of time. The National Marine Fisheries Service (NMFS), Miami Laboratory, has been conducting surveys of recreational billfish tournaments since 1971 in the Gulf of Mexico and 1972 in the Atlantic and Caribbean (Lopez and Pristas, 1982). The number of these tournaments has increased greatly since 1980 (Witzell, 1987). Several Caribbean countries have initiated billfish tournaments as a means of stimulating local tourism (Walters, 1983; Harvey, 1989). This proliferation of events has provided an excellent opportunity to obtain information on recreational billfish fishing within the region. Blue marlin are the most sought after fish in the Virgin Islands, and tournaments which target this species have been monitored since 1973. Peak abundance for blue marlin in the Virgin Islands occurs between July and September (Olsen and Wood, 1983), and all marlin tournaments are held during this time of year.

Longline vessels targeting swordfish (*Xiphias gladius*) and tunas (*Thunnus* sp.) often capture blue marlin and other billfish species as bycatch (Beardsley, 1989; Tobias, In preparation). This information is usually poorly documented and often unreliable (Farman, 1989). The sale of blue marlin, white marlin (*Tetrapturus albidus*), Atlantic sailfish (*Istiophorus albicans*) and longbill spearfish (*Tetrapturus pfluegeri*) are presently prohibited within the U.S. Caribbean (Caribbean Fishery Management Council, 1989). As a result, billfish taken by U.S. longline vessels are either released or not reported on weighout sheets (Tobias, In press). For these reasons, accuracy of abundance estimates using catch and effort data from the longline fishery is questionable (Farman, 1989). Billfish tournaments may provide a better method of determining relative abundance for blue marlin from a directed fishery.

The purpose of this work was to examine catch and hookup rates between blue marlin tournaments within the Virgin Islands over time. These data also provide a comparison of fishing success in the Virgin Islands with other areas of the Caribbean and southeastern United States. Tournament catch and effort data are useful as a measure of relative abundance for a species where no directed commercial fisheries exist.

METHODS

Fishing activities normally take place on the "North Drop", approximately 30 km north of St. Thomas (Figure 1). Billfish are also caught along the "South Drop", south of St. Thomas and Virgin Gorda. Information was provided to the National Marine Fisheries Service by program samplers, tournament committees, or by onboard observers who monitored participating boats by

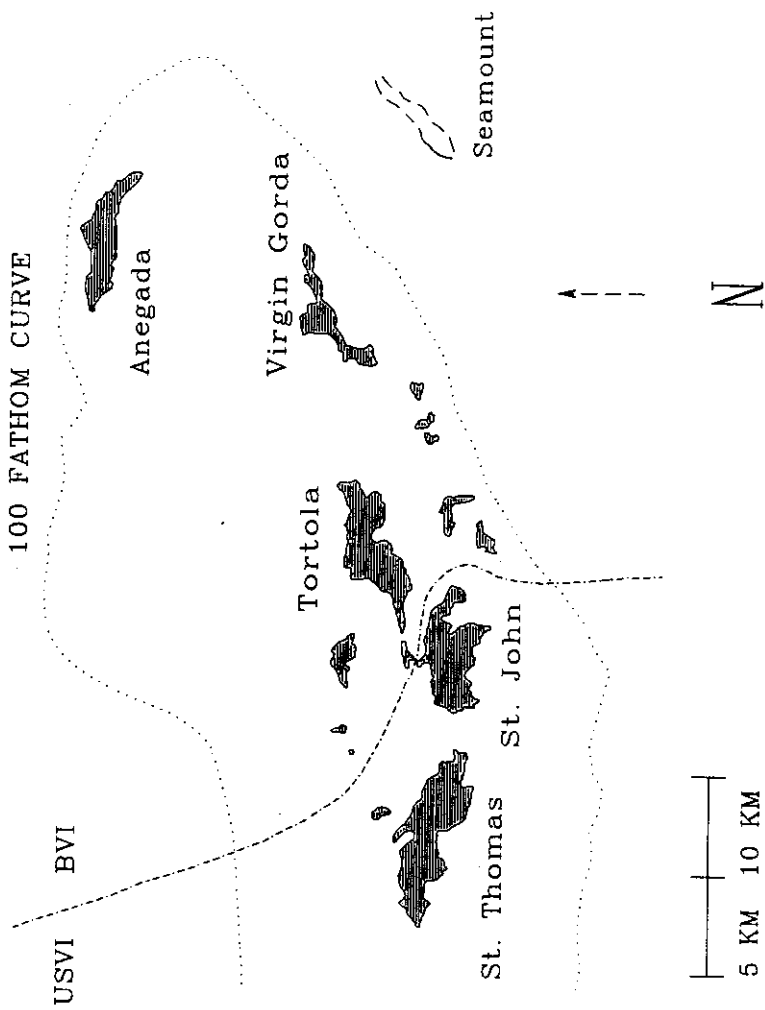


Figure 1. Chart showing U.S. Virgin Islands (USVI) and British Virgin Islands (BVI). International fisheries boundary separating the two countries runs

VHF radio. Data obtained included fishing time, number of vessels, wind direction and speed, wave height, and direction. In addition, information was collected on each hookup including time of hookup, species, outcome (tagged, released, boated, or lost), and fighting time.

Consecutive data exists on the United States Virgin Island Open Atlantic Blue Marlin Tournament from 1973 to 1990. This tournament occurs around the full moon in August during the peak of blue marlin abundance and is attended by boats from locations throughout the U.S. and Caribbean.

The July Open Tournament is sponsored by the Virgin Islands Game Fishing Club. Although this tournament has been conducted for 27 years, records exist only from 1983 to 1990. This event is held over the July 4th weekend at the beginning of marlin season and is mainly attended by boats from the Virgin Islands and Puerto Rico.

Due to the success of these events, the Biras Creek International Team Fishing Tournament (held in Virgin Gorda, British Virgin Islands) and the American Yacht Harbour - Allied Marine Tournament (AYH) were established in 1987 and 1988, respectively.

All information was downloaded from the NMFS Southeast Fisheries Center mainframe computer to a microcomputer for analysis. Catch per unit effort (CPUE) and hookup per unit effort (HPUE) were calculated by dividing the total number of blue marlin caught or hooked by the total fishing effort (number of boats multiplied by total fishing time) for each tournament. This nonstandardized calculation of CPUE and HPUE can be influenced by many factors including: changes in fishing methods, commercial fishing activity and changes in tournament rules (Prince *et al.*, 1990). Caught blue marlin were classified as those which were either boated, tagged, or released. The time frequency distribution was calculated by dividing the number of hookups in each time interval by the total fishing effort for that interval. This was necessary since fishing effort was not equally distributed among time intervals.

CPUE and HPUE data among tournaments and locations were not found to meet the assumptions of parametric statistics (e.g. normal distribution and homogeneity of variance); therefore, a Kruskal-Wallis test was used to analyze fishing success for these parameters. A non-parametric Tukey-type multiple comparison test was used to compare mean CPUE and HPUE values if significant differences were found using the Kruskal-Wallis tests. Linear regression was used to examine the relationship between CPUE and HPUE.

Data were entered and manipulated using Lotus 1-2-3, graphic output was performed on Harvard Graphics, and Systat and Statgraphics were used for statistical analysis.

RESULTS

Catch and effort information for all tournaments are presented in Table 1. The Biras Creek event had the highest CPUE (mean = 0.171 blue marlin/boat

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Table 1. Catch and effort data for major blue marlin tournaments in the Virgin Islands. Effort* = total boat hours; Tagged # = tagged and released; \pm S.E. = standard error for CPUE (blue marlin caught per boat hour) and HPUE (blue marlin hookups per boat hour).

Tournament	Biras Creek	USVI Open	AYH	July Open
Years	1987-90	1973-90	1988-90	1983-90
Effort*	955.35	7114.28	789.5	5255.09
Hookups	235	1330	109	335
Boated	11	79	3	81
Released	65	201	9	5
Tagged #	91	468	59	93
Total	167	767	71	179
Mean CPUE	0.171	0.100	0.091	0.033
\pm S.E. CPUE	0.062	0.007	0.004	0.004
Mean HPUE	0.245	0.203	0.136	0.064
\pm S.E. HPUE	0.073	0.017	0.011	0.009

hour) and HPUE (mean = 0.245 blue marlin/boat hour) among tournaments when all years for each tournament were pooled. The July Open Tournament had the lowest mean CPUE and HPUE among events (0.033 and 0.063, respectively). Data from 1987 to 1990 showed a significant difference among tournament CPUE values (Kruskal-Wallis statistic = 8.617, $P < 0.05$) and HPUE values (K-W statistic = 8.879, $P < 0.05$) (Table 2) with the July Open having the lowest values.

Blue marlin catch per boat hour has varied without trend for the two tournaments with long time series data bases (USVI Open and July Open) (Figure 2). The Biras Creek Tournament showed a high CPUE in 1988 with data

Table 2. Comparison of Virgin Islands blue marlin tournaments by CPUE and HPUE for tournament years 1987-90. Results of Kruskal-Wallis (K-W) test. * = significant difference ($P < 0.05$). Non-parametric Tukey-type multiple comparisons: underlined means are not significantly different. AYH# = 1988-90 only.

	Biras Creek	USVI Open	AYH#	July Open	K-W Test	P
Mean CPUE	<u>0.175</u>	0.110	<u>0.090</u>	0.044	8.617	0.035*
Mean HPUE	<u>0.246</u>	0.175	<u>0.138</u>	0.079	8.879	0.031*

from the remaining years within the range of the other tournaments. The AYH tournament has shown fairly consistent catch rates for its three years of existence.

Effort has risen steadily since tournaments were first monitored in 1973 (Figure 3). In addition to an increase in the number of events held each year, there has also been an increase in the number of days per tournament, total number of fishing hours for each tournament day, and total number of participating boats.

Information obtained from various locations along the east coast of the U.S., Gulf of Mexico, Bahamas, and Caribbean showed a highly significant difference in CPUE (K-W statistic = 88.831, $P < 0.001$) and HPUE (K-W statistic = 85.633, $P < 0.001$) between locations with the Virgin Islands having the highest values for these parameters (Table 3).

A linear regression was performed to determine the relationship between CPUE and HPUE. This analysis yielded an r^2 value of 0.733 (Figure 4). The line equation for this regression was $HPUE = 0.044 + 1.352 CPUE$.

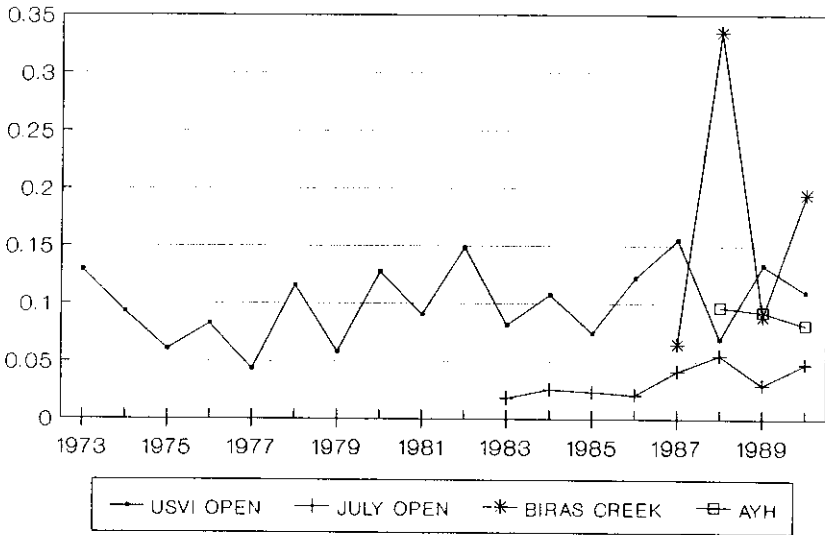


Figure 2. Blue marlin catch per boat hour by year for major billfish tournaments held in the Virgin Islands, 1973-90.

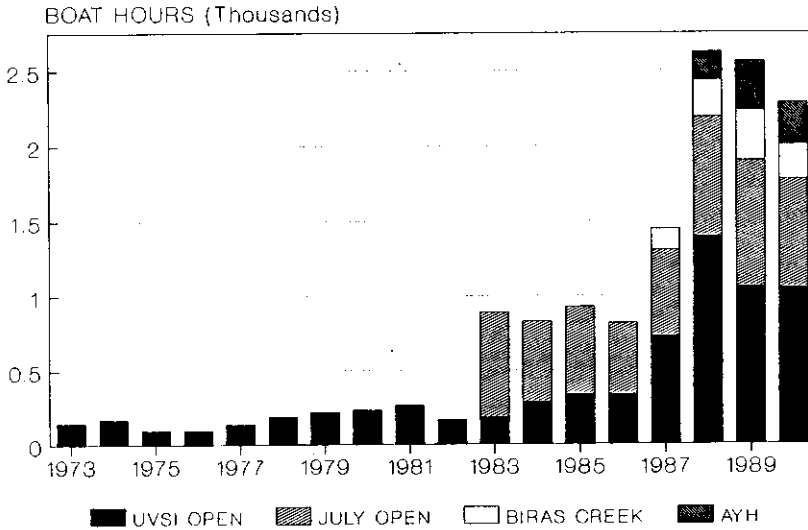


Figure 3. Total billfish tournament fishing effort in the Virgin Islands, 1973 to 1990.

Table 3. Comparison of blue marlin tournaments by CPUE and HPUE from locations around the Caribbean and U.S., 1972-90. Results of Kruskal-Wallis (K-W) test. * = significant difference ($P < 0.001$). Non-parametric Tukey-type multiple comparisons: underlined means are not significantly different.

	Virgin Islands	Puerto Rico	Bahamas	U.S. Gulf	East Coast U.S.	Florida	K-W Test	P
Mean CPUE	<u>0.096</u>	<u>0.03</u>	0.013	0.012	0.009	0.001	88.83	0.000*
Mean HPUE	<u>0.184</u>	<u>0.053</u>	0.027	0.026	0.023	0.003	85.63	0.000*

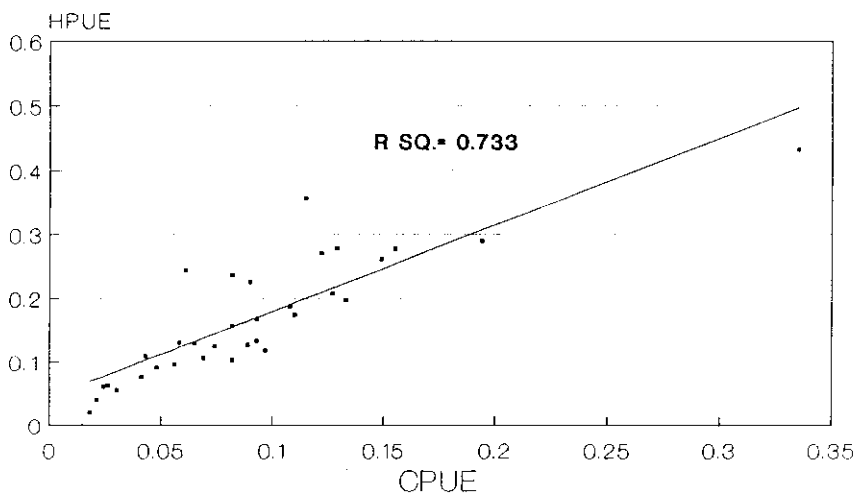


Figure 4. Catch per boat hour (CPUE) and hookup per boat hour (HPUE)

The average number of boated blue marlin per year per tournament varied from 1.00 for the AYH Tournament to 11.40 for the July Open (Table 4). The largest fish caught for all tournaments was 315.9 kg while the smallest was 41.4 kg. Of the 138 fish which were landed and sexed, 80.6% (112) were females. The number of boated fish per year has decreased from 100% in 1973 to less than 5% in 1990 (Figure 5). The drop in boated fish in 1978 was most likely the result of the minimum size limit imposed by the USVI Open. The rise in 1983 was due to the inclusion of the July Open Tournament in data analysis. While 85% of the marlin were boated during the July Open in 1983, zero were boated in the USVI Open.

A time frequency distribution was derived by pooling data from all tournaments from all years. This distribution showed a highly significant difference among time intervals ($\chi^2 = 43.493$, $P = 0.000$) with the late afternoon period having the highest number of hookups per fishing hour (Figure 6).

Table 4. Weight, length, and sex data for boated blue marlin from Virgin Island tournaments. S.E. = standard error of the mean.

Tournament	Sex	Number boated	Average Length(cm)	S.E. Length	Average Weight (kg)	S.E. Weight	Largest (kg)	Smallest (kg)
USVI Open	Total	98	248.22	3.24	138.98	5.20	295.40	41.40
	Male	18	207.04	4.24	69.64	3.27	103.40	47.17
July Open	Female	73	258.73	2.78	154.02	4.92	295.40	41.40
	Total	81	248.48	4.25	137.71	5.62	315.90	36.70
	Male	7	226.90	9.93	87.05	11.13	116.30	47.40
	Female	28	256.44	6.30	146.70	10.55	315.90	36.70
Biras Creek	Total	11	231.10	11.10	124.69	14.07	201.30	51.80
	Male	2	200.90	22.37	74.40	12.84	96.20	51.80
	Female	8	246.17	10.43	143.56	13.61	201.30	75.30
	Total	3	n/a	n/a	124.60	13.41	151.30	109.10
AYH	Male	0	-	-	-	-	-	-
	Female	3	n/a	n/a	124.60	13.41	151.30	109.10

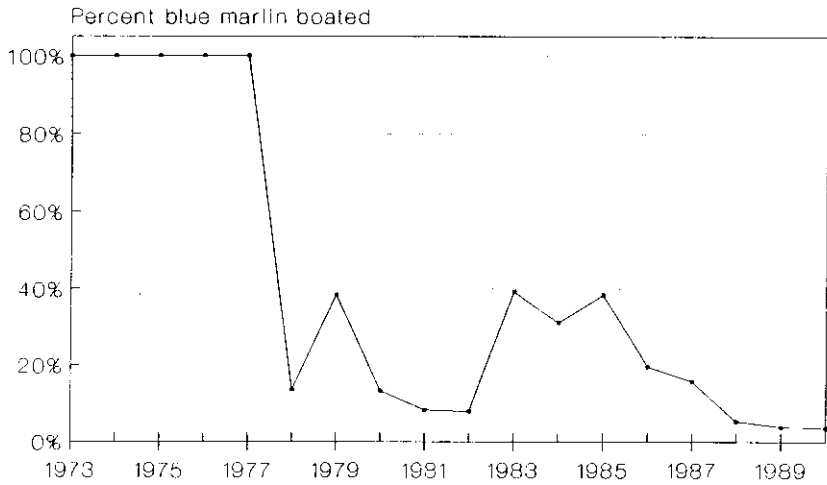


Figure 5. Percentage of boated blue marlin caught during tournaments in the Virgin Islands, 1973 to 1990.

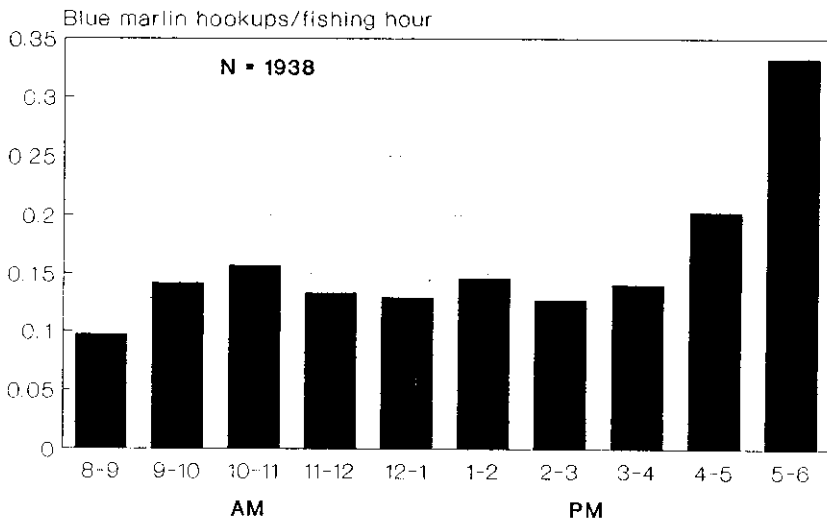


Figure 6. Time frequency distribution of blue marlin hookups per fishing hour during Virgin Island tournaments, 1973 to 1990.

DISCUSSION

HPUE and CPUE varied widely among events within the Virgin Islands depending on time of year and tournament rules. The July Open, held during the early portion of marlin season, had the lowest fishing success among tournaments, whereas the USVI Open and the Biras Creek events held during the peak of marlin abundance, had the highest CPUE and HPUE values.

A unit of recreational fishing effort (catch per boat hour) has changed over time due to advances in boat design, gear technology, and improved electronics. Increases in annual fishing effort were a result of better organization on the part of the tournament committees as well as outstanding fishing success which has resulted in greater interest by individuals wishing to participate. The slight decline in fishing effort in 1990 was a result of an overall decline in visiting boats following Hurricane Hugo in September 1989 (Friedlander, In preparation). Despite the increase in fishing effort and changes in fishing power over time, CPUE has varied without trend over this period.

When compared with other areas, the Virgin Islands showed higher fishing success rates for blue marlin tournaments based on CPUE and HPUE data. The Virgin Islands lie within the center of the distribution of blue marlin for the northwestern Atlantic (Beardsley, 1989). The other survey locations excluding Puerto Rico are at the extremes of the range for this species. It is unknown why fishing success is higher in the Virgin Islands than Puerto Rico. The fishery in the Virgin Islands takes place in a very concentrated area along the 100 fathom curve, and this may be the site of some type of aggregation.

In recent years many tournaments have begun advocating minimum size limits and tag and release format (Witzell, 1987). In 1978, the U.S. Virgin Islands Open was one of the first tournaments to establish a minimum size limit (91 kg) (Jim Loveland, pers. comm.). Most tournaments encourage tagging and provide additional points or awards for tagged fish. Rules for the July Open Tournament disallow released fish which are not tagged.

The regression of CPUE and HPUE was calculated to determine the level of relationship between these two parameters. HPUE data is not always available, and CPUE values may be used to calculate HPUE in these cases (Prince *et al.*, 1990). This will help to preserve the integrity of the present HPUE data base for future analysis.

The July Open Tournament is judged on the largest fish boated. Consequently, a larger number of fish are boated in this tournament compared to others within the Virgin Islands. Recent rule changes in this and other events have established or increased minimum size limits in order to reduce the number of boated fish.

Maximum HPUE values were recorded in the late afternoon fishing hours. Pristas (1978) stated that strikes (hookups) were the best indicator of feeding activities for billfish. He noted three active feeding periods in the northern Gulf

of Mexico based on strikes: early morning, late morning, and early evening. These late morning and early evening peaks align closely with those observed during Virgin Island tournaments. Early morning peaks may be missed since most tournaments do not begin until 8:30 am.

CONCLUSIONS

The large fishing effort and high blue marlin catch occurring during tournaments in the Virgin Islands makes them valuable as accurate estimators of relative species abundance within the area. Data from within the Caribbean may be better indicators of billfish abundance than those recorded at the extremes of the range. The recreational fishery should be near the center of species distribution in order for catch rates to be used as a valid measure of monitoring stocks (Squire, 1987).

It should be kept in mind that billfish tournaments and recreational billfish fishing in general may not be accurate methods of monitoring stock abundance since they are mostly released; they never fish far from shore, and thus, they do not sample throughout the stock (Prince *et al.*, 1990). Catch and hookup rates may, however, reflect a change in apparent relative abundance from year to year (Lopez and Pristas, 1982). Lacking a commercial fishery directed towards blue marlin, CPUE data from tournaments can serve as a valuable method for monitoring changes in abundance.

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