



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
Southwest Fisheries Center  
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**TO ALL BILLFISHERS:**

And so passes another outstanding Hawaiian International Billfish Tournament (HIBT) into history. The National Marine Fisheries Service (NMFS) has sent observers to the latest 17 of the 20 tournaments to gather biological data on game fishes, billfishes in particular. After the fishing and associated activities are over, we of the Honolulu Laboratory analyze the data and issue a report on the biological and statistical aspects of the tournament.

Before proceeding with the report, I would like to acknowledge all of you billfishers for your cooperation and support. It was your permission to allow us to inspect your fish and your faithful reporting at the radio round-ups that made it possible for Bob Humphreys and ~~me~~ to get the job done. Our sincere thanks also go to the tournament officials and community volunteers who assisted us in the data collecting. Peter Fithian and James Sutherland did their usual excellent job in the planning stages so that we could get right to work without a lot of worrisome preliminaries. Beverly and Phil Parker and Carol Zuzak gave us invaluable assistance at the radio round-ups. Colleen Bryant went out of her way to provide us with the data from the catch reports. Our work at the pier was certainly made easier by Jack Fischer. He could always be counted on for anything we needed and for setting up the equipment. Above all, special thanks to Chris Mason who assisted us with handling the numerous day to day details.

**THE CATCH**

Befitting the milestone of the 20th year of HIBT, the catch of billfish reached record breaking levels. The official tournament catch was 105 blue marlin, 2 striped marlin, 9 shortbill spearfish, and 43 ahi (yellowfin tuna) (Table 1). New HIBT records established are the number of blue marlin, the number of shortbill spearfish, and the total number of billfish (116). The catch is even more outstanding when one considers that in 1975, the previous record breaking year, there were 79 teams compared to the 65 teams this year. In fact the teams this year not only caught more billfish but caught more fish per team than the teams of 1975. The teams of 1978 beat the teams of 1975 by the diameter of a gnat's antenna...2.446 to 2.443 fish per team.

The largest blue marlin weighed 665 lb. The smallest was almost a tenth of the largest at 65.5 lb. The average weight of the blue marlin was 206.3 lb. The weights of the ahi ranged from 103.5 to

to 234 lb and averaged 164.4 lb. The nine shortbill spearfish ranged from 27 to 43 lb and averaged 33.9 lb. The two striped marlin weighed 35 and 42 lb.

#### FISHING AREAS

Year after year most of the fishing effort is concentrated in the same nine areas. This year was no exception; 96% of the effort was concentrated in those areas. The nine areas listed in order of number of boat-hours expended in them are: Juliet (375 boat-hours), Kilo (354 boat-hours), Sierra (312 boat-hours), Tango (250 boat-hours), Uniform B (186 boat-hours), India (172 boat-hours), Uniform A (163 boat-hours), Lima (149 boat-hours), and Victor (119 boat-hours). Only those areas with over 100 h of effort are considered in the analysis.

The strike rate for all areas combined was 0.20 strike per boat-hour. Table 2 lists the areas and their strike rates. Area Victor had the best strike rate by far with 0.39 strike per boat-hour. Areas India and Uniform B followed with 0.24 and 0.23 strike per boat-hour, respectively. The best strike rate for an area in 1977 was 0.22. The strike rate this year for all of the heavily fished areas was considerably better than last year. Figure 1 shows the areas categorized according to strike rates.

Table 3 summarizes the catch by area, species, and date. The best areas for blue marlin were Sierra (23), Kilo (20), Juliet (15), and Uniform B (14). When the areas are ranked by number of blue marlin per boat-hour of fishing (Table 2) Uniform B was best. It was followed by Sierra, India, Kilo, and Victor. In a billfish tournament where the point system is based on the weight of the fish, perhaps a more interesting variable to look at is the number of pounds per boat-hour (Table 2). In this case Sierra edged out Uniform B as the top area but the other top seven areas remained in the same order. Of the 10 largest blue marlin caught, 3 were caught in Uniform B, 3 in Sierra, and 1 each in India, Juliet, Kilo, and Victor.

The best areas for ahi were Victor, Uniform B, Kilo, and Sierra.

Area Alpha deserves special mention. Slightly more than 5 boat-hours of effort were spent in it. In that time one blue marlin and two ahi were caught for 62.6 lb of blue marlin per boat-hour and 52.5 lb of ahi per boat-hour.

#### SEX

Male blue marlin have outnumbered females at all HIBT tournaments except one since we started data collecting 16 years ago (Table 4). The males ran true to form this year. Of the 102 blue marlin examined 80 were males and 22 were females for a male:female ratio of 3.6:1.

As I mentioned in my report for HIBT 1977 catch rates of blue marlin were highly correlated with the number of males caught and independent of the number of females caught. The numerous males and high catch rate of this year strengthened that correlation.

#### TACKLE, TIME, AND TIDE

Fifty-three blue marlin were caught on 24-kg (50-lb) test line and 52 on 36-kg (80-lb) test line. The ahi catch was almost as closely divided: 40 on 24-kg test line and 43 on 36-kg test line. Blue marlin caught on 24-kg line averaged 193.5 lb compared to an average weight of 219.3 lb for those caught on 36-kg line. On the other hand, ahi caught on the lighter line outweighed their heavier line counterparts 164.8 lb to 156.3 lb per individual. The largest blue marlin was caught on 24-kg line and the smallest on 36-kg line.

For 3 consecutive years beginning in 1975 the 11 a.m. to noon hour was the best for blue marlin. This year the 9-10 a.m. hour was slightly better than other times (Figure 2a), especially in area Sierra where seven were caught during that period. More ahi were caught between 2 and 3 p.m. than any other hour (Figure 2b). Other ahi catches were fairly evenly distributed throughout the fishing day except for the first hour.

Strike rates (number of strikes per boat-hour) were highest during the rising tide on the first, second, and fifth days of fishing (Figure 3). On the third and fourth days strike rates were best during low tide and the strike rates during the rising tide were almost equal to that at low tide. Except for the second day the period of lowest strike rates was at high tide or just before it. Area Victor, on the contrary, exhibited the highest strike rates during high tide. The strike rates in Victor during this period were two to four times higher than the average strike rate. Because of its distance from the starting point area Victor did not have any fishing effort during low tide which occurred at the beginning of the fishing day.

#### MARLIN DIET

Like other years the principal items found in marlin stomachs this year were tunas, opelu, and squid. Opelu occurred in a much greater percentage of the stomachs (56%) than usual (18%-34%). The list of the different species of fish found in the stomachs (Table 5) was roughly 50% longer than usual. None of the species was unusual; that is, all of them have been found in marlin stomachs before, at one time or another, but not all together in the same tournament.

Ten of the 96 stomachs examined were empty, that is, completely devoid of food. An interesting fact about the empty stomachs is

that seven of them came from females. This means that 32% of the female blue marlin had empty stomachs compared to only 4% of the males. Does this mean that the large females are becoming weight conscious and fasting?

#### ABOUT OTHER SUBJECTS

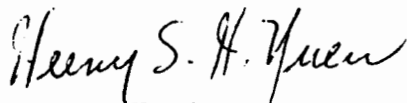
In March 1978 Walter Matsumoto of the Honolulu Laboratory anchored two floating platforms in Kona waters as part of a fish aggregating experiment. One was positioned on the border of Kilo and Juliet and the other in India. I suspect that the platform at Kilo and Juliet is the reason that these areas were the leading areas in fishing effort during the tournament. The platforms have been so effective in attracting fish that several fishermen from Kona had predicted that there would be traffic jams around the platforms during the tournament. I don't know if their prediction materialized but areas Kilo and Juliet did have the most fishing effort during the tournament.

Dorsal fin rays from 22 blue marlin over a range of sizes were collected during this HIBT. We will analyze these to see if they have any markings which can be used as age indicators. If so they will be used to verify present growth rate information which is an important statistic in determining conservation strategy. Also collected for growth rate studies were four small mahimahi found in blue marlin stomachs. These specimens, 15-25 cm (6-10 in.) in length, were a fortunate find because they nicely fill in an important size gap for our growth rate studies.

Among the fish that you caught were two abnormalities I had not seen before. An ahi had two anal fins. One was a normal fin and the other a vestigial one. The other abnormality was a fist-size tumor in the stomach of a blue marlin. Unlike other recent years we did not find any stomach ulcers in the blue marlin, so it looks like conditions in the marlin world must be improving.

Allow me to close on a personal note. In the 5 years I have worked at HIBT, many of you have become my friends. I wish to acknowledge that your friendship has enriched my life. I look forward to HIBT as that special time in the year when we get together again. Until August 1979,

Aloha,



Heeny S. H. Yuen  
Leader, Recreational Fisheries

Attachments

September 21, 1978

Table 1.--Numbers of qualifying game fish landed and teams fishing during  
Hawaiian International Billfish Tournaments, 1962-78.

Year	Blue marlin	Black marlin	Striped marlin	Shortbill spearfish	Sailfish	Yellowfin tuna >100 lb	Total qualifying fish	Number of teams	Number of boat-days fishing <sup>1</sup> per fish <sup>1</sup>
1962	30	1	--	--	1	19	51	68	6.7
1963	19	2	1	--	--	26	48	72	7.5
1964	31	--	1	--	--	2	34	69	10.1
1965	47	--	--	--	--	9	56	78	6.9
1966	26	3	2	--	--	7	38	72	9.5
1967	63	--	1	--	--	18	82	68	4.2
1968	36	2	4	--	--	4	46	85	9.2
1969	32	1	--	--	--	4	37	75	10.1
1970	91	--	2	--	2	14	109	73	3.3
1971	41	--	3	1	--	47	92	77	3.4
1972	77	--	--	--	--	11	88	59	3.4
1973	76	--	1	3	1	17	98	61	3.1
1974	66	2	1	6	--	37	110	64	2.9
1975	104	--	2	8	--	79	193	79	2.0
1976	47	1	3	5	--	32	88	74	4.2
1977	71	--	1	1	--	14	87	73	4.2
1978	105	--	2	9	--	43	159	65	2.0

<sup>1</sup>Nine-hour fishing days, 1962-73; 8-h days, 1974-78.

Table 2.--Strike and catch rates by area, Hawaiian  
International Billfish Tournament, 1978.

<u>Area</u>	<u>No. of strikes</u> <u>Boat-hour</u>	<u>No. of blue</u> <u>marlin</u> <u>Boat-hour</u>	<u>Pounds of</u> <u>blue marlin</u> <u>Boat-hour</u>	<u>No. of ahi</u> <u>Boat-hour</u>	<u>Pounds of ahi</u> <u>Boat-hour</u>
<u>India</u>	0.24	0.058	13.2	0.000	--
<u>Juliet</u>	0.19	0.040	7.9	0.019	2.7
<u>Kilo</u>	0.21	0.057	11.0	0.023	4.1
<u>Lima</u>	0.14	0.013	3.4	0.007	1.3
<u>Sierra</u>	0.20	0.074	16.8	0.019	4.1
<u>Tango</u>	0.19	0.036	6.1	0.016	2.2
<u>Uniform A</u>	0.18	0.018	2.9	0.018	2.6
<u>Uniform B</u>	0.23	0.075	16.1	0.027	4.1
<u>Victor</u>	0.39	0.051	9.9	0.051	7.9

Table 3.--Number of fish caught by species, area, and date, Hawaiian International Billfish Tournament, 1978.

Date 1978	Area											
	A	B	I	J	K	L	M	S	T	UA	UB	V
<u>Blue marlin</u>												
July 31	--	--	1	--	5	--	--	9	1	1	1	2
August 1	--	--	--	4	2	--	1	6	2	1	3	2
2	--	1	--	2	2	--	--	3	1	1	1	--
3	1	--	4	4	7	1	--	4	2	--	5	1
4	--	--	5	5	4	1	--	1	3	--	4	1
Sum	1	1	10	15	20	2	1	23	9	3	14	6
Average weight (lb)	335.0	122.0	226.8	198.1	194.5	257.3	127.0	228.2	169.7	159.7	214.5	196.3
<u>Ahi</u>												
July 31	--	--	--	4	3	1	--	4	1	1	2	2
August 1*	1	--	--	1	1	--	--	2	--	1	--	4
2	--	--	--	--	1	--	--	--	2	1	--	--
3	--	--	--	1	1	--	--	--	1	--	--	--
4	1	--	--	1	2	--	--	--	--	--	3	--
Sum	2	--	--	7	8	1	--	6	4	3	5	6
Average weight (lb)	140.5	--	--	146.7	179.9	188.0	--	212.3	136.0	142.7	153.9	156.1
<u>Shortbill spearfish</u>												
July 31	--	--	1	--	--	--	--	--	1	--	--	--
August 1*	--	--	--	--	--	--	--	--	--	1	--	--
2	--	--	--	--	2	--	--	--	--	--	--	1
3	--	--	1	--	--	1	--	--	--	--	--	--
Sum	--	--	2	--	2	1	--	--	1	1	--	1
Average weight (lb)	--	--	40.5	--	36.5	28.5	--	--	33.0	27.0	--	35.0
<u>Striped marlin</u>												
August 2	--	--	--	1	--	1	--	--	--	--	--	--
Weight (lb)	--	--	--	35	--	42	--	--	--	--	--	--

\*One fish caught in unspecified area.

Table 4.--Sex ratios for blue marlin examined from  
Hawaiian International Billfish Tournaments, 1962-78.

Year	Number of males	Number of females	Ratio males to females
1962	16	7	2.3:1
1963	13	6	2.2:1
1964	14	12	1.2:1
1965	35	8	4.4:1
1966	16	8	2.0:1
1967	51	13	3.9:1
1968	24	10	2.4:1
1969	23	8	2.9:1
1970	63	14	4.5:1
1971	21	9	2.3:1
1972	64	8	8.0:1
1973	47	21	2.2:1
1974	46	14	3.3:1
1975	70	16	4.4:1
1976	7	37	0.2:1
1977	41	25	1.6:1
1978	80	22	3.6:1



Table 5.--Stomach contents of blue marlin, Hawaiian International Billfish Tournament, 1978.

Food items	Date and number of stomachs containing listed food items					Percent occurrence
	July 31	August 1 2 3 4				
<u>Fish</u>						
Tunas, Scombridae	8	8	5	14	12	49.0
Skipjack tuna	4	5	4	6	7	27.1
Other tunas	5	5	4	12	10	37.5
Jacks, Carangidae						
Opelu	4	10	4	21	15	56.3
Akule	--	--	--	1	--	1.0
Spiny puffer, Diodontidae	2	3	2	3	6	16.7
Mahimahi, Coryphaenidae	3	3	--	--	1	7.3
Snake mackerel, Gempylidae	1	--	--	4	1	6.3
Triggerfish, Balistidae	--	1	1	1	2	5.2
Aweoweo, Priacanthidae	--	--	1	--	3	4.2
Goatfish, Mullidae	--	--	--	1	3	4.2
Butterflyfish, Chaetodontidae	1	1	--	--	1	3.1
Squirrelfish, Holocentridae	--	1	1	1	--	3.1
Lancetfish, Alepisauridae	--	--	2	--	--	2.1
Sand lance, Ammodytidae	--	2	--	--	--	2.1
Flyingfish, Exocoetidae	1	--	--	--	--	1.0
Puffer, Tetraodontidae	1	--	--	--	--	1.0
Snipe eel, Nemichthyidae	1	--	--	--	--	1.0
Antigonia, Antigoniidae	--	1	--	--	--	1.0
Needlefish, Belonidae	--	--	1	--	--	1.0
Ocean sunfish, Molidae	--	--	1	--	--	1.0
Cowfish, Ostraciidae	--	--	1	--	--	1.0
Surgeonfish, Acanthuridae	--	--	--	--	1	1.0
Unidentified fish	3	5	2	10	9	30.2
<u>Invertebrates</u>						
Squid, Loliginidae	8	12	6	12	9	49.0
Octopus, Octopodidae	--	--	1	--	--	1.0
Empty or everted stomachs	4	5	3	3	2	17.7
Number of stomachs examined	17	21	10	26	22	
Total:	96					

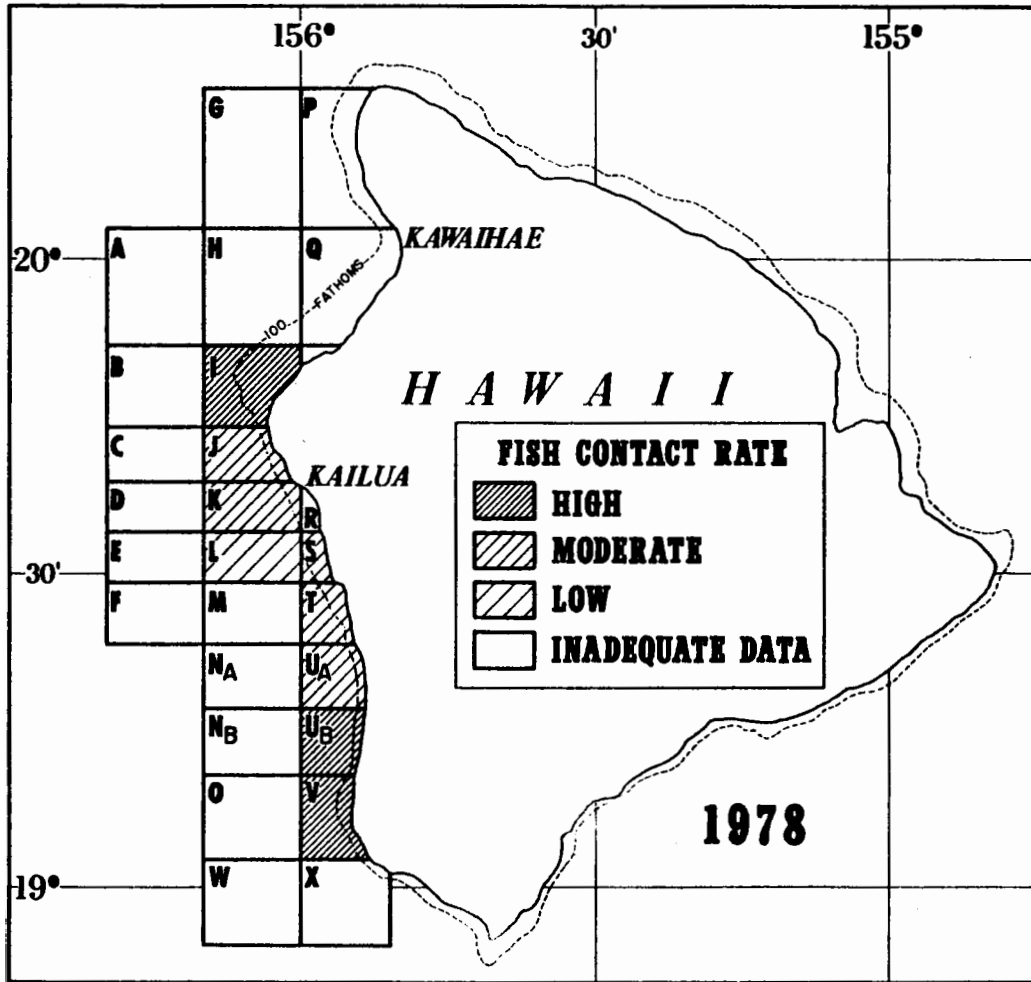


Figure 1.--Strike rate in various fishing areas.

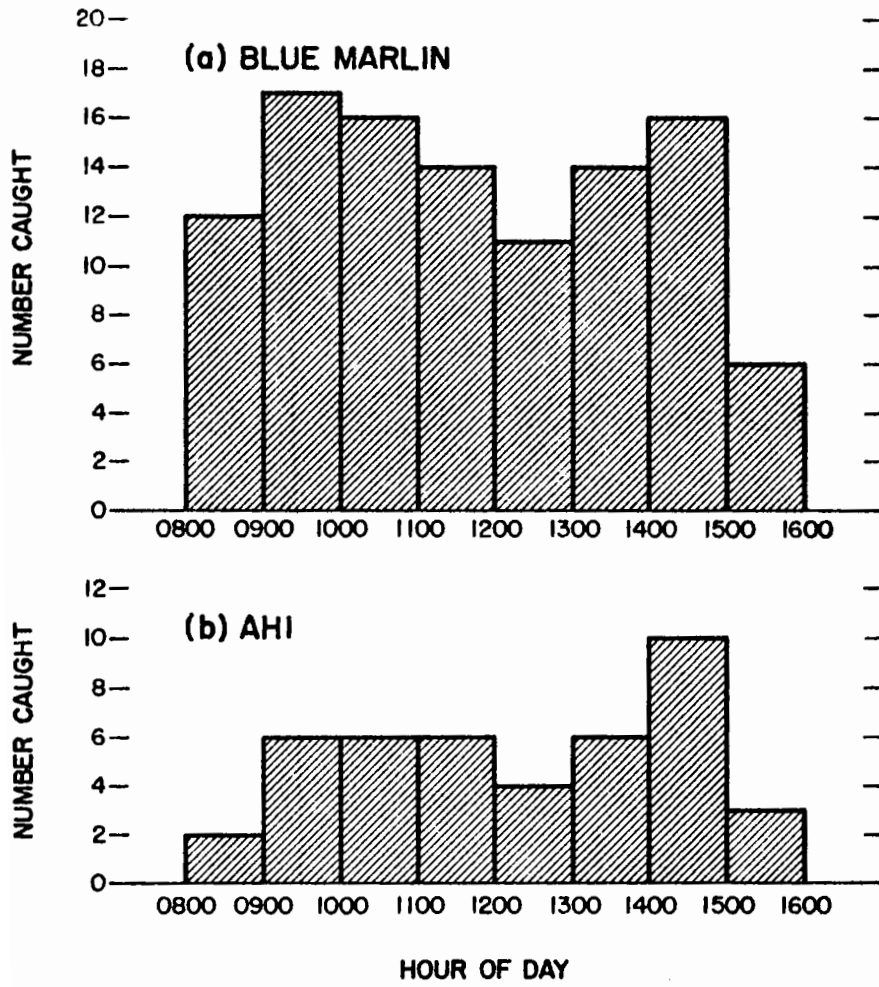


Figure 2.--Fish catch throughout the day by hours.

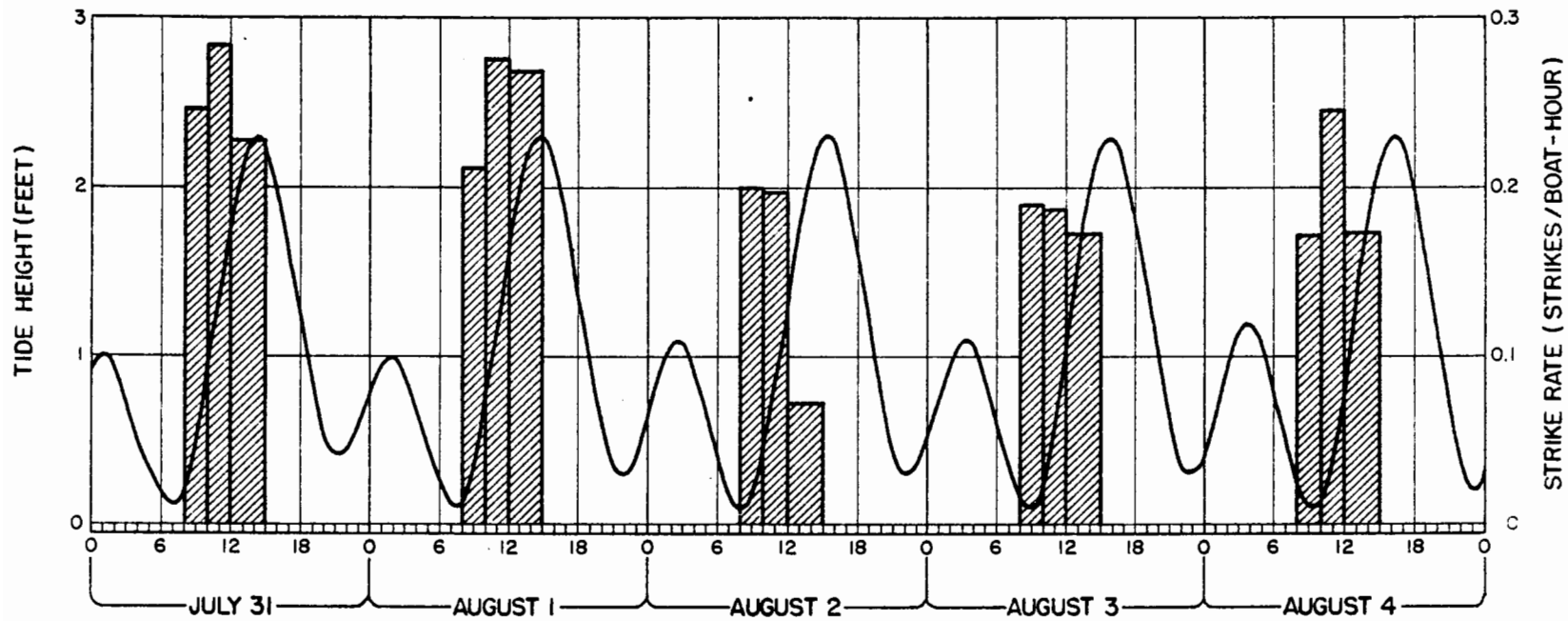


Figure 3.--Strike rates and tide cycle, Hawaiian International Billfish Tournament, 1978.